Linguistics Meets
Philosophy

Edited by Daniel Altshuler

Linguistics Meets Philosophy

Linguistics and philosophy, while being two closely related fields, are often approached with very different methodologies and frameworks. Bringing together a team of interdisciplinary scholars, this pioneering book provides examples of how conversations between the two disciplines can lead to exciting developments in both fields, from both a historical and a current perspective. It identifies a number of key phenomena at the cutting edge of research within both fields, such as reporting and ascribing, describing and referring, narrating and structuring, locating in time and space, typologizing and ontologizing, determining and questioning, arguing and rejecting, and implying and (pre-)supposing. Each chapter takes on a phenomenon and explores it through a set of questions which are posed and answered at the outset of each chapter. An accessible and engaging resource, it is essential reading for researchers and students in both disciplines, and will empower exciting and illuminating conversations for years to come.

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University of Oxford

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Linguistics Meets Philosophy:
A Historical Preface

Barbara H. Partee

Before 1965, the level of mutual awareness and interest between linguists and philosophers was relatively low, and interactions were largely by chance.* A decade later,[1] the picture was very different, and foundations for much of the subsequent history had been laid. From the mid-1970s onward, various paths converge, intertwine, and diverge, as linguistic semantics matures and new directions develop in linguistics and in philosophy, with links between the two fields ebbing and flowing. This brief preface offers some historical context for this volume, describing interactions and influences between linguists and philosophers in the development of formal semantics. I focus on the decade of explosion, roughly 1965–74, with some earlier background and brief notes on developments after that period, including some major topics that didn't emerge until later, sometimes involving questions that opened up only as progress was made. This is not a short history of formal semantics, but an offering, based partly on personal reminiscences, of sketches of people, events, and topics of discussion and debate that may give a picture, necessarily very incomplete, of some of the mutual influences and cross-fertilization that marked the emergence of our field.

Before 1965

There was a great deal of relevant work in logic and philosophy of language before 1965. Philosophers and logicians had been discussing aspects of natural language and studying formal properties of logical languages for decades

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before any substantial interaction with linguists began. We could easily go back at least to Aristotle and mention Buridan, Leibniz, de Morgan, Boole, and Peirce, and say a great deal about the foundational giant Frege, but here I focus on strands of influence and interaction in the twentieth century.[2] I note only that Frege made explicit that his interest in formalizing a good logical language that avoided some of the shortcomings (from a logical point of view) of natural language did not mean that he did not value natural language: he wrote that he did not see himself as offering an analysis of natural language, but a tool to augment it, as the microscope augments the eye, acknowledging that natural language, like the eye, is an excellent instrument for human purposes (Frege 1972: 105). And even Bertrand Russell, who famously criticized natural language syntax as illogically putting *every man* and *Smith* into the same syntactic category, wrote in 1903: "The study of grammar, in my opinion, is capable of throwing far more light on philosophical questions than is commonly supposed by philosophers" (Russell 1903: 42).

Many other philosophers and logicians were important to the development of semantics as a part of logic and philosophy of language in the first half of the twentieth century, sometimes for their work, sometimes for their influence on their students, sometimes for their active encouragement of interactions. I mention a few examples.

Hans Reichenbach (1891–1953) was one of the few logicians who looked closely at constructions in natural language, including modifiers and tense and aspect, both discussed in his logic book (Reichenbach 1947) and followed up later by formal semanticists. He taught at UCLA from 1938 until his death in 1953, and helped establish UCLA as a leading philosophy department in the United States in the postwar period, introducing a strong curricular tradition rooted in studies in logic and the philosophy of science. His PhDs included Hilary Putnam (1926–2016, PhD 1951).

Putnam is an important part of the story both before and after 1965. He went to high school with Chomsky in Philadelphia in the early 1940s, and they became friends as undergraduates in Zellig Harris's class at UPenn. He taught at Princeton 1953–61, MIT 1961–65, and then Harvard 1965–2000. His Princeton PhDs included Jerry Fodor (1960), his MIT PhD was George Boolos (1966), and his Harvard PhDs included Ned Block, Hartry Field, Georges Rey, and Norbert Hornstein. He and Kripke were crucial parts of the 'direct reference' revolution; he famously argued that "Meanings ain't in the head" (Kripke 1972; Putnam 1975).

Alfred Tarski (1901–83) didn't interact with linguists as far as I know, but had great influence through his writings and his students and grandstudents –

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[2] Cocchiarella (1997) is a good source for the contributions of Descartes, Leibniz, Boole, Frege, and early twentieth-century philosophers to the development of 'formal philosophy of language'.

he was instrumental in adding semantics to logic, influencing Carnap while still in Europe and many others once at Berkeley. He is best known among semanticists for his seminal contributions to model theory and the semantic conception of truth (Tarski 1944). He taught at UC Berkeley from 1942 until his death in 1983, and founded his influential interdepartmental program in Logic and the Methodology of Science there in 1957; his students included Richard Montague (PhD 1957), and Dana Scott as an undergraduate. Scott left Berkeley and got his PhD from Princeton under Church in 1958.

The logician and philosopher Alonzo Church (1903–95) is a major figure in many ways, including for the invention of the lambda calculus, his detailed construction of the Fregean and Russellian intensional logics, and his stellar list of PhD students (including Scott, Turing, Henkin, Rosser, Kleene, Kemeny, and Smullyan). And as Angelika Kratzer (2022) observes,

> By the time Church wrote "The Need for Abstract Entities in Semantic Analysis," he had designed formal languages that were similar enough to natural languages for him to conclude that "although all the foregoing account has been concerned with the case of a formalized language, I would go on to say that in my opinion there is no difference in principle between this case and that of one of the natural languages." (Church 1951: 106)

He joined the UCLA Philosophy Department in 1967 after retiring from Princeton, and taught there until 1990, though he didn't interact directly with the linguists there.

Rudolf Carnap (1891–1970) played a major role in the developments that led to formal semantics, including with his work in (Carnap 1947) on the extension/intension distinction with possible worlds as state-descriptions, the notion of intensional isomorphism, and the introduction of meaning postulates, among much else. He had a major influence on Yehoshua Bar-Hillel, David Kaplan, and others. Like Church, he spent the last part of his career at UCLA, arriving in 1954, the year after Reichenbach died.

Others who richly deserve their own descriptions include W. V. O. Quine, for his many contributions to set theory and logic, his views, influential on the East Coast, that only first-order predicate logic is real logic, and that intensions are "creatures of darkness," and his keen insights and classic puzzles about the semantics of natural language (Quine 1960); Haskell Curry for his work on combinatory logic; Julius Moravcsik for his tireless efforts to get philosophers, logicians, and psychologists acquainted with one another's work; Evert Beth in the Netherlands for his contributions to logic and to supporting interdisciplinary collaboration; Jaakko Hintikka for his linguistically sensitive work on varieties of modality and epistemic logic in the analysis of knowledge and belief. And many more.

One last mention: the name of Yehoshua Bar-Hillel comes up frequently in the history of linguistics–philosophy interactions, partly from his own foundational work on topics from categorial grammar to indexicality, but also from

his influence on others and his efforts at building bridges. He was born in Vienna in 1915, emigrated to Palestine in 1933, and got his PhD in Philosophy from Hebrew University. Bar-Hillel was influenced by the works of Reichenbach and Ajdukiewicz and later did foundational work on categorial grammar. He met Zellig Harris in Palestine in 1947 and was convinced by Harris that natural languages could be described by context-free grammars that could be arrived at by "discovery procedures." He also became convinced that philosophers and logicians could not ignore linguistics. He was a major disciple of Rudolf Carnap, deeply influenced by his pre-semantic *Logische Syntax der Sprache* (Carnap 1937); he held a postdoctoral position with Carnap at Chicago in 1950 and collaborated on a volume with Carnap (Carnap & Bar-Hillel 1952). But he strongly disagreed with Carnap's stated belief that the tools being applied so successfully to the study of language in general could not be applied to natural language. According to Carnap,

In consequence of the unsystematic and logically imperfect structure of the natural word-languages (such as German or Latin), the statement of their formal rules of formation and transformation would be so complicated that it would hardly be feasible in practice. (Carnap 1937: 2)

Bar-Hillel got a position at MIT 1951–53, where he was the first academic to work full-time in the field of machine translation in 1952. Later, influenced by Chomsky, he famously expressed doubts about its feasibility. In 1953, he moved to the Philosophy Department of Hebrew University, where he taught until his death in 1975. He was a good friend of Chomsky, and of Montague, and tried repeatedly to get each to pay attention to the other's work (see, for instance, Bar-Hillel 1954b).

Chomsky had studied philosophy and mathematics as well as linguistics at Penn, and was influenced by Nelson Goodman there; then, as a Junior Fellow at Harvard, he got to know other philosophers, especially Quine. The three philosophers cited in *Syntactic Structures* (Chomsky 1957) are Bar-Hillel, Goodman, and Quine. And when Chomsky and Halle started the PhD program at MIT in 1961, with the first three cohorts including James McCawley, Barbara Hall (Partee) (both PhD 1965), and Haj Ross (third cohort, PhD 1967), the philosophers Jerry Fodor and Jerrold Katz were junior faculty members in the Humanities and part of Chomsky's circle, and Putnam had just joined the MIT faculty. I was able to take a course from Putnam in my first year, and later a course at Harvard from Quine. David Lewis, who was then studying with Quine at Harvard, sometimes came to Chomsky's lectures at MIT, and he and I and Gil Harman would sometimes puzzle over the differences between Chomsky's and Harris's transformational grammar. Other philosophers were sometimes there as well. John Searle spent a semester at MIT in the early 1960s, where he and Chomsky clearly enjoyed arguing vigorously.

Chomsky was ambivalent about semantics (Partee 2018), but Katz and Fodor, and then Katz and Paul Postal (a philosopher–linguist pair), worked on adding semantics to generative grammar (Katz & Fodor 1963; Katz & Postal 1964), and linguistics students at MIT in the 1960s sometimes shared with each other their "discoveries" of interesting work by philosophers. I recall us passing around a copy of *Reference and Generality* (Geach 1962), with its novel anaphora puzzles – donkey sentences, Hob-Nob sentences – around the same time (and with the same excitement) that we were passing around a copy of *Catch-22* (Heller 1961).

But I don't remember anything resembling conferences or workshops that brought linguists and philosophers together, although one important event for me was an interesting summer 1960 course at Penn, taught by Henry Hiż, on Structural (Zellig Harris-style) Linguistics, with some sort of external funding, designed for undergraduate students with backgrounds in mathematics, philosophy, or psychology; it was the first introduction to linguistics for three of us from Swarthmore – David Lewis, Gil Harman, and me. Katz and Fodor, who had just completed their PhDs in Philosophy at Princeton, sat in the back of the room and kibitzed. (Harris was one linguist who believed that linguists and philosophers should be interacting more; like Bar-Hillel, he deplored the attitude expressed by Carnap, Russell, and others that natural languages were too unsystematic to study formally.)

Perhaps linguistics–philosophy interactions might have begun earlier if not for Chomsky's negative reply to Bar-Hillel's invitation in *Language* for closer cooperation between linguists and logicians (Bar-Hillel 1954b; Chomsky 1955; see Partee 2011). But I think it's more likely that interactions increased after more linguists started working on semantics, which is closer to more issues in logic and philosophy than syntax or phonology are. And I should add that Chomsky's influence on the convergence of linguistics and philosophy of language was overall a great positive, as emphasized by both Stanley (2008) and Kratzer (2022). Stanley writes:

Chomsky's work made the project of transferring the tools of the logician to the analysis of meaning considerably more tractable. If natural languages have a systematic syntax, then there is no obstacle to mimicking the formal semantic project directly for natural languages. (Stanley 2008: 424)

By 1965, philosophers had thought a great deal about reference, quantification, and indexicality, logical structure, intensionality, tense, aspect, and modality, the logic of modifiers, the semantics of interrogatives, and many other semantic issues which were very new to linguists in the 1960s and early 1970s. Linguists, on the other hand, had generally thought more about syntactic structure and syntactic constraints on possible interpretations, and when they began to interact with philosophers, they were very good at generating examples that could challenge any suggested generalization.

1965–1974: The Blossoming of Linguistics–Philosophy Interaction

Interaction between linguists and philosophers in the second half of the 1960s and through the 1970s played a major role in the development of semantics. The earliest conferences that included both linguists and philosophers were organized by philosophers; later ones were increasingly organized by linguists.

By 1965, people who in 1955 had still been in high school (Terry Parsons, David Lewis, Max Cresswell, Gil Harman, Ed Keenan, Rich Thomason, Hans Kamp, George Lakoff, Barbara Partee, Arnim von Stechow, Lauri Karttunen, etc.) or were undergraduates (David Kaplan, Ed Keenan, James McCawley, etc.) were emerging onto the scene with interests in or heading towards semantics and philosophy of language. And the first work in generative semantics was beginning.

In the mid to late 1960s, there were a number of developments that soon led to an acceleration of linguistics–philosophy interactions.

1965–1967

Two early milestones were international, with the main impetus coming from philosophers who had an interest in and appreciation of recent work in linguistics.

In 1965, Frits Staal, a philosopher, linguist, and Vedic scholar in Amsterdam (and a friend of both Chomsky and Montague) and an international group of colleagues, including linguists Morris Halle and Peter Hartmann and philosopher Benson Mates, founded the journal *Foundations of Language* with a call for interdisciplinary cooperation. That journal became an important venue for papers in linguistics and philosophy and lasted until 1976, when it was succeeded by *Linguistics and Philosophy*, which began in 1977 and still continues.

In the summer of 1967, Staal, Bar-Hillel, and Curry organized a symposium during the 3rd International Congress for Logic, Methodology, and Philosophy of Science, on "The Role of Formal Logic in the Evaluation of Argumentation in Ordinary Language." Bar-Hillel prepared an opening position paper, and participants included Montague, Jerrold Katz, Dummett, Geach, Hintikka, and others – almost all philosophers. Edited proceedings were published in *Foundations of Language* as (Staal 1969).[3] From Staal's editorial introduction:

The discussion, moreover, contains brief expositions and applications of two important recent trends in the analysis of natural language, i.e., transformational generative

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[3] Audio recordings of that meeting are now available. Montague's part can be found on a site established in 2021 by Ivano Caponigro: www.richardmontague.com/home.

grammar as represented by Jerrold J. Katz and model theory as represented by Richard Montague. Many may be familiar with either of these trends, but few appear to be conversant with both. In addition, many comments made by other participants throw light on basic issues, such as the observations made by John Lyons on the nature of sentencehood and the type/token distinction, those of Max Black on the possibility of a theory about context, and those of several participants on indexical expressions, sentences, statements, and propositions. (Staal 1969: 256)

Linguists were also becoming increasingly interested in semantics. In 1967, a three-day conference that involved only linguists marked perhaps the earliest intensive discussion of the relation between syntax and semantics, including early statements of, or contributing to, the generative semantics program. The conference was organized by Emmon Bach and Robert Harms at the University of Texas, Austin, on the topic of universals in linguistic theory. The four presented papers were Fillmore, "The case for case"; Bach, "Nouns and Noun Phrases"; McCawley "The role of semantics in a grammar"; and Kiparsky, "Linguistic universals and linguistic change," published in (Bach & Harms 1968). Discussants at the conference included George Lakoff and Haj Ross, Ed Klima, Terry Langendoen, Paul Schachter, and György Szepe. The lively discussion led to revisions in the papers, including the addition of a postscript in McCawley's paper stating that deep structures can be taken to be identical with semantic representations.

Another landmark event, which did not reach the attention of linguists until a little later, was Paul Grice's delivery of the 1967 William James Lectures at Harvard. The history of the publication of various lectures in that series is complex (Horn 2020). The most influential second lecture, in which Grice defines and exemplifies the notions of conversational and conventional implicature, was published as (Grice 1975); the sixth lecture, which also discusses those notions, appeared earlier in the journal *Foundations of Language* (Grice 1968). I heard Grice lecture in 1971 at the Irvine Institute (see below), and had heard about his work before that, possibly from Larry Horn, who had a teaching job at Berkeley in 1970–71, where Grice was from 1967 until his death in 1988. Horn, who made a great deal of use of Grice in his dissertation work on scalar implicatures (Horn 1972) and in subsequent papers beginning with (Horn 1973), was one of the first linguists to appreciate the impact that Grice's ideas could have on explanation in linguistics, helping to distinguish entailment from implicature and various kinds of implicatures from one another.[4] By the mid-1970s, partly as a result of

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[4] Linguists and philosophers both found Grice's work important, but for different reasons. Philosophers focused on Grice's goal of showing that logical and natural languages were not as different as the Ordinary Language philosophers claimed, once we can understand and factor out the pragmatic effects of implicatures. Linguists found the classification and behavior of implicatures a major step towards making pragmatics a field of study rather than a "wastebasket."

Horn's fruitful applications of Grice's ideas, many people working on semantics appreciated the value of Grice's work in helping to define what kinds of data a semantic theory should or should not be responsible for. First the generative semanticists, and later formal semanticists and others, began developing those ideas as part of a serious field of pragmatics. As Horn notes in his 2020 lecture, Chomsky paid early attention to Grice in a paper first distributed in 1970, discussing how presuppositions seem to come in different varieties, and suggesting that Grice's ideas be developed and sharpened to sort out which kinds should be accounted for in grammar and which should better be left to something like "conversational implicature" (Chomsky 1971b).

1967–1968

From 1967 to 1969, the philosophers Donald Davidson and Gilbert Harman were both at Princeton, intensely interacting, optimistic about potential fruitfulness of linguistics–philosophy interactions. Harman had done his PhD at Harvard with Quine and Roderick Firth, while spending a great deal of time at MIT learning from Chomsky, having discussions with him, and interacting with the linguists; he was at Princeton from 1963. Davidson appreciated the potential value of Chomsky's syntactic work for progress in semantics: "Recent work by Chomsky and others is doing much to bring the complexities of natural languages within the scope of serious semantic theory" (Davidson 1967b: 315).

Davidson was very interested in logical form, and Harman convinced him to look at what the generative semanticists were doing to develop a notion of logical form with both linguistic and logical grounding. They influenced each other's work, and together they produced some exciting conferences and influential edited collections bringing philosophers and linguists together, to be described below.

David Lewis stayed at UCLA for a relatively short time, 1966–70, but his UCLA period was an important one for the field of semantics, not least because of Lewis (1968, 1969, 1970). His colleagues during those years included Richard Montague, David Kaplan, Keith Donnellan, Rudolf Carnap, and Alonzo Church. Hans Kamp was at UCLA at the beginning of that period, finishing his PhD under Montague. And the famous UCLA "logic year" was in 1967–68, David's second year there, with visitors including Wilfrid Hodges, Jon Barwise, and Jerome Keisler. David Lewis introduced me to Montague and I first sat in on a seminar of Montague's at UCLA (with David Lewis and Frank Heny) in 1968.

The year 1968 was also when the young philosopher Terry Parsons circulated the first version of his manuscript, "A Semantics for English" – a project

similar to Montague's, but using combinatory operators rather than variables and lambda abstraction. He visited UCLA around then, mainly to meet with Montague, and Frank Heny, David Lewis, and I got acquainted with him and his work then. The later version (Parsons 1972) was circulated in 1972. After moving to UMass Amherst in 1972, Parsons and Partee joined forces on further research extending "Montague grammar," and Parsons never published a final version of his manuscript.

1969

Two early notable conferences on semantic topics happened in the Midwest in 1969, both organized by linguists and attended mainly by linguists. In April 1969 Charles Fillmore organized the "1969 Spring Semantics Festival" at The Ohio State University, leading to the volume (Fillmore & Langendoen 1971). From the preface:

The theme of the conference was chosen to reflect the current concerns of generative grammarians to develop an adequate linguistic account of semantics. It should be noted straight off that not all current issues in semantics nor all current theoretical positions are represented in this collection. The major issues that are discussed are the separability of syntax from semantics and the nature of presuppositions; the major position that is represented is that of generative semantics (see particularly the paper by Postal).[5] Only the paper by Langendoen and Savin attempts to develop the deep interpretive semantics position currently held by Jerrold Katz, while surface interpretive semantics as recently expounded by Noam Chomsky, Ray Jackendoff, and others is not represented at all. Three papers (Partee, Garner, Fillmore) relate current linguistic concerns with semantics to past linguistic concerns or to philosophical concerns, either past or present. (Fillmore & Langendoen 1971: vi)[6]

The other 1969 conference on the relation between syntax and semantics was CLS 5,[7] the 5th Annual Meeting of the Chicago Linguistic Society, April 18–19, just after the Ohio State conference, so that many linguists were able to attend both. That year the main session of CLS was on Syntax and Semantics. Presenters included Davison, Emonds, Fraser, Green, Heringer, Horn,

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[5] Other papers with a generative semantics approach were by George Lakoff, Robin Lakoff, James McCawley, and Sandra Thompson.
[6] See also a retrospective review eight years later (Williams 1979).
[7] CLS 4, 5, 6, and 7 (1968, 1969, 1970, and 1971) were all on the shortlist heading the bibliography of work on semantics and syntax by linguists that I prepared for philosophers during the 1971 "summer school" described below. McCawley's students were among the active organizers of the CLS conferences, which were centers for reporting work in semantics, especially generative semantics, in those years.

Karttunen, G. Lakoff, R. Lakoff, Morgan, Newmeyer, Postal, Ross, Stanley, and Zwicky, all linguists. Newmeyer (1980: 152) lists five of the papers from that conference as papers that "were to define a research strategy for the majority of the theoretical linguists in America": (Horn 1969; Lakoff 1969; Morgan 1969; Postal 1969; Ross 1969).[8] Larry Horn was my PhD student at UCLA (PhD 1972), but he spent the year 1969–70 at Michigan by invitation of George and Robin Lakoff and McCawley, all visiting there that year, and later wrote his beautiful generative semantics dissertation on negation and quantifiers.[9]

The First Real Linguistics and Philosophy Conference

The first real linguistics and philosophy conference was in August 1969, organized by Davidson and Harman; it took place at the Center for Advanced Study in the Behavioral Sciences, in Stanford. Generative semantics was well represented. Geach presented "A Programme for Linguistics," countered by McCawley's "A Programme for Logic." Harman recalls that at the conference the philosophers included Quine, Geach, and David Kaplan; the linguists included Bach, Lakoff, McCawley, and Partee. They published a set of papers in a pair of double issues of *Synthese* in 1970, with neither all nor only authors who were at the conference (e.g. that's where Lewis 1970 and Montague 1970 were first published), then expanded it into an edited volume that became a classic reference, adding Kripke 1972 and papers by McCawley, Ross, Ziff, and Strawson. That volume gives a good picture of the state of linguistics–philosophy interaction just before Montague began to have a big influence.[10] I believe that the conference and the two publications had a large and beneficial impact.

The topics in the big volume included several that were addressed by both linguists and philosophers, especially the biggest "joint" topic of that era, semantic theory and its relation to grammar, which was addressed in the papers by the philosophers Harman, Lewis, Quine, Strawson, and Geach and the linguists Lakoff, McCawley, and Fillmore. The family of issues of reference,

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[8] He also lists a seminal paper by James McCawley from the previous year's CLS meeting (McCawley 1968a).

[9] Larry Horn recalls (interview with the author, January 2014) that those were very exciting times for a graduate student just getting interested in semantics and pragmatics, with those two conferences, the La Jolla syntax conferences of the winters of 1969 and 1970, and the conference in the church basement at UCLA in 1970, to be described below. And indeed he was present at several of the very first conferences on such topics.

[10] See also Gil Harman's reflections on his interactions with Davidson and their jointly organized conferences and co-edited books all in the interest of linguistics–philosophy connections (Harman 2013).

coreference, and anaphora were addressed by Kripke, Donnellan, and Partee, and the semantics of action sentences was addressed by (Jerry) Fodor and Ross. Topics addressed only by philosophers were modifiers (Parsons), philosophy and grammar (Strawson, Linsky, Wallace), semantics and logic (Scott), pragmatics (Stalnaker, Montague), modality (Hintikka, Castañeda), propositional attitudes (Ziff), metaphor (Cohen and Margalit), and probabilistic grammars (Suppes).

1970

Richard Montague died in March 1971; it is remarkable in hindsight to see how few conferences he attended that included any linguists. There were two in 1970, the "church basement conference" at UCLA and the conference at Stanford that included Montague's last paper. But before describing them, let me describe a seminar I taught at UCLA in spring 1970, after which I expanded and circulated a bibliography on "Logic and Language" that I had put together for that course (Partee, Sabsay, & Soper 1971). The list of topics on the syllabus is a good representation of what I and a number of others were thinking about then (worrying about opacity and indefinites and anaphora, but not yet in a position to appreciate the special problems of donkey sentences; worrying about nondeclaratives, but ineffectively – it was seven years before Karttunen's landmark paper on questions [Karttunen 1977], etc.). It is an interesting inflection point, just before Montague's influence began to be widely felt; it shows how primed linguists and philosophers were to appreciate the tools and ideas he, David Lewis, Terry Parsons, and others offered, and how indeed his work was not happening in a vacuum.

From the initial syllabus:

Topic Areas
  I. The relation of syntax and semantics in formal systems
     Tarski; Carnap; examples with logic and other formal systems
 II. Formal languages vs. natural languages
     Reasons for constructing formal languages; their expressive power, their limitations; vagueness and ambiguity; syntax of formal languages
III. The nature of semantics for natural languages
     Katz et al.: interpretive feature-theory semantics
     Lakoff et al.: generative logico-feature theory syntax/semantics
     Jackendoff et al.: surface interpretive logico-feature theory semantics
     Tarski, Montague et al.: truth-conditional semantics on nonnatural syntax
     Davidson, Parsons, Heny: truth-conditional semantics on natural syntax
     The question of speaker–hearer asymmetry

IV. Problems in syntax/semantics

Quantifiers; negation; pronominalization[11] and deletion, including conjunction reduction, relativization, Equi-NP deletion; "sentence radicals" vs. declaratives, interrogatives, imperatives, etc.; performatives; pragmatic rules; presuppositions; reference.

The Church Basement Conference

On May 6 and 7 of that spring quarter, 1970, there was a small Symposium on Linguistics and Philosophy jointly organized by the Linguistics and the Philosophy Departments of UCLA, memorable in part because it was moved to the basement of a church after Reagan closed the University of California in the wake of protests over the bombing of Cambodia. Besides the speakers listed below, those attending included Lauri Karttunen and students Michael Bennett (philosophy) and Larry Horn (linguistics). That was the time when I intervened in an argument between Lakoff and Montague about whether it was crazy not to derive pre-nominal adjectives from relative clauses or whether it was crazy to do so,[12] outlining briefly to each of them where the other's position was coming from, and during the coffee break got a memorable "compliment" from Montague – "Barbara, I think that you are the only linguist who it is not the case that I can't talk to."[13]

The talks in that conference were:[14]

Julius Moravcsik (φ), "Semantics and Syntax in Philosophy and Linguistics"
George Bedell (λ), "Abstractness in Syntax"
George Lakoff (λ), "Linguistics and Natural Logic"
Montague (φ), "Universal Grammar"
Robin Lakoff (λ), "Modal Illogic"
John Vickers (φ), "Referential Transparencies"
Partee (λ), "Does de Morgan's Law Operate in English?"
Martin Tweedale (φ), "Grammar and Innate Knowledge"
Plus a Graduate Linguistics Club Lecture by George Lakoff: "Generative Semantics."

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[11] Note the term "pronominalization" rather than "anaphora," reflecting the syntactic treatment of the topic in transformational grammar, starting from Lees and Klima's seminal paper (Lees & Klima 1963) "Rules for English pronominalization."

[12] Lauri Karttunen wrote in a letter to Robert Wall that he kindly shared with me: "I recall hearing Montague present what must have been an early version of PTQ [actually UG]. George Lakoff gave a talk about Natural Logic. The mutual incomprehension was total."

[13] My memory of the wording was confirmed by Larry Horn (p.c.), who recorded the utterance as part of his research on negation at the time.

[14] I annotate λ for linguists and φ for philosophers.

The 1970 Stanford Conference

Then in the fall of 1970 came the conference "Approaches to Natural Language" at Stanford, organized by the philosophers Moravcsik and Hintikka and the polymath Patrick Suppes, at which Montague presented PTQ (Montague 1973). There was a "part two" of the conference, in December, where the invited participants gave formal comments on each other's papers.[15] The topics at that conference were quite wide-ranging, including syntax, semantics, phonology, computational syntax, language acquisition, mathematical linguistics, and philosophy of language. Participants included philosophers Hintikka, Montague, Kaplan, Gabbay, Moravcsik and linguists Bresnan, Peters, Partee, Wexler; and others.

The year 1970 also saw the publication of David Lewis's classic paper "General Semantics" (Lewis 1970) in *Synthese* as one of the papers added to those of the participants of the Davidson–Harman 1969 workshop. It was reprinted in the expanded volume Davidson & Harman 1972, also as the first paper in Partee 1976.[16] David Lewis's papers were more accessible, in both senses, to linguists than Montague's papers were, partly because he knew and appreciated the work of Chomsky and other linguists. Many of Lewis's papers have remained highly influential. See Partee 2015 and Kratzer 2022 for contemporary appreciations of his importance to the field of formal semantics.

1971

In 1971 there were a number of relevant events that contributed to the rise of interactions between linguists and philosophers.

In summer 1971, the final first edition of the language and logic bibliography (Partee, Sabsay, & Soper 1971) was "published" by the Indiana University Linguistics Club, a widely used venue for distributing unpublished manuscripts. I had sent out the 1970 version to colleagues for feedback, and had encouraging and helpful replies from Dana Scott, Montague, Jerry and Janet Fodor, Harman, Moravcsik, Kaplan, Parsons, Ross, Karttunen, and Lewis. It was clear from the correspondence and the many requests for the

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[15] There I ventured my first comments on Montague's syntax, comparing and contrasting it with transformational grammar (Partee 1973).

[16] "I invited David to contribute an original article to the volume, but he declined, saying that philosophy of language was only one of his interests and he was just then more focused on working on some problems in metaphysics. But he kindly gave me permission to reprint his 'General semantics,' which appeared as the first paper in the volume and served as an ideal introduction to the aims and methods of formal semantics" (Partee 2015: 341). Lewis had first presented that paper in March of 1969 at one of La Jolla syntax conferences, otherwise legendary for early debates and clashes about generative vs. interpretive semantics, where he was the only philosopher.

bibliography that there was high demand for such an interdisciplinary bibliography in the 1970s. The second edition (Partee et al. 1979) increased in size from 60 to 91 pages.

The 1971 Institute in Philosophy of Language and Linguistics

A memorable event in the summer of 1971 was the six-week Summer Institute in Philosophy of Language and Linguistics at UC Irvine, organized by Donald Davidson and Gil Harman, and sponsored by the Council for Philosophical Studies.

The Institute had two 3-week sessions, each session with three philosophers and one linguist as lecturers. Each lecturer gave two lectures a week, an hour-and-a-half lecture followed by an hour and a half of discussion – a schedule unfamiliar to linguists, with time for real thought and intense discussion. Lecturers in the first session were Grice, Davidson, and Harman, and Partee as the linguist; the second session had Strawson, Quine, Kaplan, and Haj Ross as the linguist, plus a special evening lecture series by Kripke on his just-completed *Naming and Necessity*. The "students" were themselves young philosophy professors, including Rich Thomason, Bob Stalnaker, Gareth Evans, Dick Grandy, Peter Unger, Steven Stich, Bill Lycan, Bob Martin, Oswaldo Chateaubriand, James McGilvray, Carl Ginet, and (linguist) Sally McConnell-Ginet, plus many others; and many of them gave evening lectures.[17] With most of the group living together in UC Irvine dormitories that summer and eating lunch in the big cafeteria we had to ourselves, and with everyone attending those intense seminars together four days a week focused on language and linguistics, that institute was a milestone in "philosophy meeting linguistics."

In the fall quarter of 1971, David Kaplan and I each taught an invited seminar at Stanford, back-to-back on Thursday afternoons – David from 12 to 2 on Demonstratives, then my first course on Montague Grammar (still struggling with Montague's intensional logic). I learned a great deal from both seminars, from Kaplan and from Hintikka and Moravcsik, who both attended both seminars.

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[17] Gil Harman reports, "After intense discussions, we would spend time in Laguna Beach, where Davidson was teaching Quine to surf" (Harman 2004). I learned a great deal from the lectures of the philosophers and got great help from the philosophy "students" in deciphering how to use Montague's meaning postulates in derivations. As I was publicly beginning to try to put Montague Grammar together with transformational grammar (my first serious attempts were that summer), I can remember David Kaplan and especially Rich Thomason saying "Use lambdas!" and me replying "Not in the syntax!" and finally figuring out what I called the "derived VP rule" to interpret syntactic deletion of a subject variable as semantic lambda-abstraction in order to have a compositionally appropriate replacement for "Equi-NP deletion" (Partee 1972).

Also in 1971, an important milestone was the appearance of Ed Keenan on the scene, via the publication of two striking papers (Keenan 1971a, 1971b), one on presupposition, and both on problems connected with quantification and variable binding, including the first demonstration that what Ross had called "sloppy identity" (Ross 1967) actually involves semantically strict identity of bound variables. I hadn't yet met Keenan in person, although we had been corresponding since 1969, and he had sent me an early draft of his thesis (Keenan 1969), done at Penn under Zellig Harris. Keenan was doing formal semantics, independent of Montague and of everyone else I've mentioned so far. His approach was quite different. He shared many of the goals of generative semantics, including positing deep structures that could serve as logical forms, but with much more logical and semantic sophistication with respect to types, quantifiers, variable binding, anaphora puzzles, intensional contexts. He cared very much about getting the semantic types right, and considered it a step backwards that the generative semanticists sometimes treated quantifiers as if they were predicates (p.c. 1970).

I am omitting a great deal that happened outside the US, but let me mention one important international encounter in 1971: Bar-Hillel spent the year at the University of Konstanz, where he met Arnim von Stechow, read the Brockhaus and von Stechow papers (Brockhaus & von Stechow 1971a, 1971b),[18] and as Arnim recalls, Bar-Hillel said that their work was ingenious and had gone almost so far as Montague, which he said Arnim should read. Von Stechow went on to become one of the pioneers in formal semantics and was an important influence on colleagues and students in Germany, Norway, and elsewhere.

1972

Jackendoff's seminal book on semantics (Jackendoff 1972), full of valuable insights that transcend the linguistic wars,[19] was published in 1972. It made lasting contributions to topics as diverse as topic-focus structure and the correlation between the positions of adverbs and their possible interpretations.

In the winter and spring quarters of 1972, I taught my first Montague Grammar seminars at UCLA. That was one more case of "linguistics meets philosophy." Montague had died, suddenly and shockingly, in March 1971, just as I was planning to try to talk with him about how he might handle certain constructions like passive, expletive *there*, and object-raising, which combine

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[18] Their 1971 paper "Formale Semantik" may be the first use of the term "formal semantics" by linguists.

[19] See Harris 1993 for a description of the "wars" between the generative semanticists and the interpretive semanticists, in which Jackendoff was a major player on the interpretivist side.

in sentences like *There was believed to be a unicorn in the forest*. I advertised the 1972 seminar to both philosophy and linguistics graduate students, and had some of each, including philosophy students Michael Bennett and Enrique Delacruz, who had been Montague's dissertation students, and were now advised jointly by David Kaplan and me, and Donald Victery. The linguistics students included Steven Cushing, Kathy Dahlgren, Robert Rodman, and a few others. Auditors included philosopher Renate Bartsch and linguists Jacquelyn Schachter and Eva-Maria Wotschke. The linguistics students and I got a lot of valuable assistance from the philosophy students with Montague's formidable logic, and the linguistics students helped the philosophy students learn and appreciate some essential syntax. It seemed clear to me that it would take cooperation between the two fields to realize the potential of Montague's approach to the semantics of natural language in a way that would satisfy the concerns and the standards of both fields.

The lecture notes for the winter seminar were circulated as "Montague Grammar and Transformational Grammar (1972)."[20] In the spring, the students and I worked together on extending Montague's PTQ fragment; it was Bob Rodman who proposed publishing our term papers (including mine) in a Working Papers volume (Rodman 1972a), which contains papers by five linguists (Dahlgren 1972; Partee 1972; Rodman 1972b; Schachter 1972; Wotschke 1972) and three philosophers (Bartsch 1972; Bennett 1972; Delacruz 1972). My article gave a brief introduction to Montague Grammar, argued that transformations could be consistently added if they had a uniform semantic effect, and illustrated with several transformations modified to meet that requirement, plus the new "Derived VP Rule," which had been born the summer before at the 1971 Irvine Institute. The other articles presented additions to Montague's fragments – sometimes with revisions – to treat plurals, restrictive and nonrestrictive relative clauses introduced by *who* and *which*, ditransitive verbs, conditionals, complementation, and factives and proposition-level constructions.

In April 1972 three philosopher-logicians at the University of Western Ontario organized a Linguistics and Semantics Workshop. They described the workshop in the preface to a 1975 volume containing most of the papers from the workshop (plus a few others) as being "on topics of common interest to philosophers and linguists" (Hockney, Harper, & Freed 1975: vii). The invited linguists included Fillmore, Lakoff, McCawley, Partee, and Ross; philosophers included Davidson, Donnellan, van Fraassen, Herzberger, Kaplan, Lewis, Ruth Barcan Marcus, Scott, Stalnaker, Thomason, and Vendler. Topics addressed by

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[20] That manuscript was revised continually and used as course material three times and then published as Partee 1975, and for a short time served as a substitute for a textbook, until the publication of Dowty 1978 and then Dowty, Wall, & Peters 1981.

the linguists included indexicals; vagueness; "verbs of bitching"; Montague grammar and transformational grammar; and sloppy identity. The philosophers' topics included logics; presuppositions; counterfactuals; truth; reference and nonexistence; and ontology without reference.

In Fall 1972, Terry Parsons and I moved to UMass Amherst at the same time, influencing each other to do so and applying for a joint NSF grant even before we arrived. We didn't succeed on our first try, but did get one from 1973 to 1975 ("Formal Syntax and Semantics for Natural Languages"), and together with Emmon Bach, who moved to UMass in 1973, we taught joint seminars on a range of topics in semantics and philosophy of language, cross-listed between our departments and attended by both linguistics and philosophy students. The three of us also served together on several of the first UMass semantics dissertations, in both departments. While Terry was here, 1972–78, we had a wonderful environment for linguistics–philosophy interaction. I learned after he left how hard it is to attract philosophy students to linguistics seminars without a philosophy faculty member to provide the other anchor for the "bridge."

Interlude: International Developments

Before we get to 1973 and the first international conference on formal semantics, organized by Ed Keenan while he was at Cambridge, I want to fill in some more background on people and groups and happenings outside of North America.

The context in which formal semantics emerged was different on the two sides of the ocean. In talks and papers on the history of formal semantics (including this one so far), I've emphasized the scene in the US. But parts of that context were quite US-specific.

Semantics in early European linguistics was mainly lexical; lexical semantics and principles of semantic change and semantic drift were important for historical and comparative linguistics. Structuralism arose first in Europe, and Saussure was influential for structuralism, for putting synchronic grammar into the foreground, and for conceiving of grammar as connecting form and meaning. Bühler's *Sprachtheorie* (Bühler 1934) included an early treatment of indexicality and perspective-shift.

Otto Jespersen made lasting contributions to semantics as well as syntax (Jespersen 1924), while in the Netherlands, Evert Beth was laying foundations (Beth 1947, 1963) for the cooperation among logicians and linguists that made the Netherlands one of the major contributors to the development of formal semantics from the start – more on that below.

The situation in philosophy and logic was complex, with different traditions cross-cutting regional boundaries. The Frege–Russell–Carnap–Tarski

developments, and Polish logic (Łukasiewicz, Ajdukiewicz), were spread across continents, given that Carnap and Tarski both emigrated to the US. The Ordinary Language vs. Formal Language wars in philosophy of language were largely fought within Anglo-American philosophy, and the major ordinary language philosophers were in England. While the most direct ancestry of formal semantics traces back to the formal language side – Frege, Russell, Tarski, Carnap – the ordinary language philosophers also influenced many linguists, especially the generative semanticists, with their attention to features of natural language that were abstracted away from in logical languages, such things as nondeclarative sentences, speech acts (Austin), presuppositions, and context-dependence. Austin's influence is felt in speech act theory and in situation semantics, where the term "Austinian situations" reflects the idea (Austin 1950) that sentences are true in situations, with the whole world a limiting case. Strawson was a pioneer in the study of presuppositions and context-dependence. Early Wittgenstein followed Russell and articulated the idea that the core of the meaning of a sentence is its truth conditions, but the later Wittgenstein advocated a theory of meaning as closely tied to use. Those ideas are part of the background of formal pragmatics.

Philosophy in Germany, as Arnim von Stechow mentioned in discussing his own education,[21] was largely dominated by continental philosophy. So whereas philosophers were among the leaders in developing the earliest formal semantics in the US, the Netherlands, New Zealand, and Scandinavia, that was not the case in Germany, where linguists, starting with and then mentored by von Stechow, had to teach themselves the necessary formal and logical tools and develop formal semantics themselves.

The Netherlands

Evert Beth (1908–64), held the chair of Logic and Philosophy of Science at the University of Amsterdam from 1947 until his death in 1964. Beth resisted psychologism in logic, became interested in the relation between formalized and natural languages, defended Tarski's semantics against Oxford philosophers, and took an interest in formal approaches to linguistics by Harris, Hjelmslev, and Chomsky. He created the Institute for Logic and Philosophy of the Exact Sciences at UvA, a place that promoted interdisciplinary research.

Dick de Jongh and Hans Kamp came to Amsterdam to do their MAs with Beth (both from physics) in the early 1960s. Chomsky's work was then becoming famous, but was vehemently resisted by the influential Anton Reichling. Some linguists who were sympathetic to Chomsky's work, including Peter Seuren, came to Beth for support; that was an early sign of the interconnections between logicians and linguists in Amsterdam.

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[21] Interview with the author, March 14, 2011.

Montague first came to Amsterdam in Fall 1962 while Beth was there. Hans Kamp first got to know him there, and then went to UCLA and did his PhD with Montague.

After Beth's death in 1964, there was a gap of seven years before a permanent successor, Martin Löb, was found. Frits Staal, who was Professor of General and Comparative Philosophy in Amsterdam 1962–67 before moving to Berkeley, helped keep things going with a series of temporary fillers for that position – including Montague (spring 1966), Dana Scott, and Haskell Curry. Martin Löb, Johan van Benthem's PhD advisor, filled the chair from 1971 to 1985 and helped to create an interdisciplinary group between philosophy and mathematics as a successor to Beth's Institute and predecessor of today's ILLC. (The founding and explosive growth of ILLC occurred after Johan van Benthem came to occupy that chair in 1986.)

While Montague was at UvA in spring 1966 as a temporary Beth replacement, he and Staal co-taught a new seminar on philosophy of language centered on Quine (1960) and Chomsky (1965). At a joint meeting, Staal and Montague compared Chomsky's (1965) way and Montague's way of dealing with certain sentences. According to Ivano Caponigro's research,[22] it was Montague's experience in that seminar in Amsterdam that led to the decision he announced in the unpublished preamble to an early talk version of "English as a Formal Language," July 31, 1968, at BC, Vancouver: "I therefore sat down one day and proceeded to do something that I previously regarded, and continue to regard, as both rather easy and not very important – that is, to analyze ordinary language."[23]

Jeroen Groenendijk and Martin Stokhof, friends since high school, arrived at UvA to study philosophy in about 1969. There was no philosopher of language then, but they found their way into philosophy of language starting from logic, and some sympathetic faculty members helped them devise courses for themselves. For their MA work, Simon Dik, then a young professor of General Linguistics, supervised their philosophy of language. In the General Linguistics Department they had a reading group where they studied Cresswell's *Logics and Languages* (Cresswell 1973).

Johan van Benthem arrived as an assistant professor in 1972, and Martin and Jeroen took a modal logic course with him right away. They were simultaneously pursuing graduate work in philosophy and in linguistics, although they never completed a PhD in linguistics (having realized to their happy surprise that they could make a living doing philosophy). With their strong interests in

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[22] See the Montague website he has created, www.richardmontague.com/home. His book in progress is (Caponigro in preparation).
[23] From the Montague archives at UCLA, as reported in (Partee 2013b: 434–435).

both fields, they frequently persuaded faculty members to organize courses or reading groups on topics in logic and language.[24]

When there was finally victory in the battle to get a new philosopher of language, something that had been promised when Staal left, a hiring committee was formed, including Dik, and including Martin and Jeroen as student members. They all went to Ed Keenan's conference in Cambridge in April 1973 (described below), along with additional students, in part so the committee could interview Renate Bartsch, who had applied for that position, and in part because Dik was a good mentor who wanted his students to know about all sorts of interesting work. Once Bartsch occupied the chair in philosophy of language in the Centrale Interfaculteit, Amsterdam quickly became a center of interdisciplinary work, and starting in 1980 also of international conferences, in the young field of formal semantics.

New Zealand

New Zealander Max Cresswell got his PhD at the Victoria University of Manchester in England under (New Zealander) Arthur Prior in 1964. He taught at the Victoria University of Wellington from 1963 until his retirement in 2001, with many visiting professorships abroad before and after his retirement. The textbook (Hughes & Cresswell 1968) was the first modern textbook on modal logic and introduced generations of students to Kripke semantics; it made a big impact on Arnim von Stechow in Germany when he first discovered it.

Cresswell visited UCLA in the winter quarter of 1970, hosted by David and Steffi Lewis (both of whom he was meeting in person for the first time; they became close friends and colleagues) until he found a place to live. David urged Max to sit in on Montague's winter quarter 1970 course on "English as a Formal Language" – Max says he didn't even know what that meant, but was quite blown away by what he encountered there.[25] From then on he published many important works in formal semantics, starting with Cresswell 1973. In his many visits to universities in Europe and the US, with his deep interest in natural language and linguistics and his great skills as a lecturer, he was an important contributor to linguistics–philosophy cooperation. Angelika Kratzer spent a year in Wellington studying modal logic with Cresswell as part of her graduate education.

Germany

I mentioned Arnim von Stechow in connection with Bar-Hillel's visit to Konstanz in 1971, and in noting that in Germany, where continental

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[24] For more details on developments in the Netherlands in which Groenendijk, Stokhof, and Veltman were involved, see Partee 2013a.

[25] Interview with the author, October 10, 2013.

philosophy was dominant, it was linguists, self-taught in logic, who took the lead in developing formal semantics. Arnim recalls,[26] "Someone recommended to me for my [1964] voyage to the Philippines a textbook on logic by ... Irving Copi, and my feeling was that this was the first subject I understood." He read the whole book and did all the exercises and thought, "I have to do that."

Having studied logic and also linguistics, he was very interested in semantics, but not satisfied with Lyons 1968, because it had a lot of semantics but no entailment – just notions like synonymy, hyponymy, hyperonymy, ambiguity, etc. (as with the work of Katz, Fodor, and Postal in the 1960s at MIT.) So Arnim was very ready to appreciate Cresswell 1973, which reached Konstanz before publication; Cresswell and Bar-Hillel both influenced von Stechow, who in turn influenced a number of linguists in Scandinavia and elsewhere.

Scandinavia
Jaakko Hintikka was an important figure in logic, philosophy of language, and semantics. His 1962 book on the modal analysis of knowledge and belief (Hintikka 1962) was an influential classic; but in the early period I have been concentrating on, few linguists had tried to engage with the problems of propositional attitudes, perhaps because the syntax of sentences about attitudes seemed simple, and the focus of linguists' attention was more often on problems where the mapping between syntax and semantics posed evident puzzles. Hintikka was also a pioneer in the development of game-theoretic semantics. From 1964 to 1978 he was at Stanford, dividing his time between Stanford and Helsinki. He was often a part of conferences that included both linguists and philosophers, and a number of his students continued his interdisciplinary engagement.

In the early 1970s, when it was still possible to know everyone interested in Montague Grammar, I corresponded with two who were Norwegians, the logician Jens-Erik Fenstad in Oslo and the linguist Lars Hellan in Trondheim, neither knowing of the other's interest, and had the pleasure of introducing them to each other. Lars Hellan twice spent a year at UMass Amherst, while working on a magnum opus of a dissertation (Hellan 1980).

Östen Dahl in Sweden would not call himself a formal semanticist, but his work has often addressed relevant semantic puzzles, and two of his students, Jens Allwood and Lars-Gunnar Andersson, spent time at UMass Amherst in the early 1970s. The three of them wrote a textbook on logic in linguistics, first in Swedish in 1971, and then in English (Allwood, Andersson, & Dahl 1977). Dahl attended the 1974 Linguistic Institute at UMass Amherst and was an active participant in linguistics–philosophy discussions. Dahl has made

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[26] This and all quotations in this paragraph are from an interview with the author, March 14, 2011.

significant contributions in semantic typology, including on topic-comment structure, on sentence negation, and on tense and aspect.

1973

That brief introduction to a few of the international linguists and philosophers involved in the development of formal semantics brings us to the first international conference on formal semantics, organized by Ed Keenan at Cambridge University in the spring of 1973, while he was a fellow at the King's College Research Centre. He invited a broad range of people, and many participants and attendees met one another for the first time there.

Keenan's preface to the ensuing volume describes the conference:

The purpose of that colloquium was twofold: to stimulate work in natural language semantics and to bring together linguists, philosophers, and logicians working in different countries and, often, from different points of view. Both purposes were, it seems to us, achieved, though of course it was not feasible to represent all countries and all points of view at a single conference.

The questions treated in the colloquium papers represent the following current areas of interest: problems of quantification and reference in natural language, the application of formal logic to natural language semantics, the formal semantics of non-declarative sentences, the relation between natural language semantics and that of programming languages, formal pragmatics and the relation between sentences and their contexts of use, discourse meaning, and the relation between surface syntax and logical meaning. The papers have been loosely grouped under the six rubrics given in the table of contents. (Keenan 1975: xiii)

Below are the six rubrics, with the authors identified (sometimes questionably) as linguists (λ) or philosophers (φ) (counting logicians as philosophers):

1. Quantification in natural language – λ: Partee, Hull; φ: Lewis, Altham and Tennant
2. Reference and cross-reference – λ: Lyons, Seuren, Dahl, Biggs
3. Intensional logic and syntactic theory – λ: von Stechow; φ: Kamp, von Kutschera, Bartsch, Heidrich
4. Questioning model-theoretic semantics – φ: Jardine, Potts.
5. Pragmatics and sentences in context – λ: Lakoff, Isard, Sgall, Vennemann, Wilks
6. Semantics and surface syntax – λ: Emonds, Fuchs & Roualt, Gross, Keenan, Ross

Also in 1973, I was invited to give a paper at the Eastern Division meeting of the APA in December. The paper was on tenses as pronouns (Partee 1973b), with Stalnaker and Parsons as commentators. (Through the 1970s, I alternated attending LSA and APA, but later rarely attended APA.)

1974

The year 1974 marked the publication of Montague's *Formal Philosophy* (Montague 1974), edited and with extended introduction by Rich Thomason. That introduction was one of the earliest pedagogical pieces that helped people understand Montague's work.

In the summer of 1974, the LSA's then-annual 8-week Linguistic Institute was put on by UMass Amherst, with a large group of faculty, students, and visitors from all over the world. There was a rich array of courses on semantics and philosophy of language – I was in charge of organizing that part of the Institute. Almost all the faculty in those areas also participated in a seminar on Non-Extensional Contexts funded by MSSB that I organized, which included linguists Bach, Dowty, Jackendoff, Janet Fodor, Keenan, and Karttunen, philosophers Thomason, Stalnaker, Lewis, Parsons, Kamp, Michael Bennett, and Enrique Delacruz, and graduate students Anil Gupta (Thomason's student) and Robin Cooper (mine). The workshop had subgroups working on Montague Grammar, propositional attitudes, nondeclaratives, and "entia non grata" (fictional entities, intentional identity, intensional transitive verbs), and more.

David Kaplan was invited to give one of the Institute Lectures; in the course of his lecture to a large crowd, he memorably climbed up on a chair to impersonate an intension, picking out extensions in different possible worlds with enthusiastic godlike gestures. Other people at the institute as faculty or for longer or shorter times included philosophers Jerry Fodor, Cresswell, and Searle, and linguists Perlmutter and Postal (whose popular course unveiled Relational Grammar), Halle, McCawley, Ross, James Thorne, Horn, Polly Jacobson, Barbara Abbott, Dahl, and Zwicky. Ivan Sag, still a graduate student at MIT, organized UMass fraternity houses into co-ops, hosting weekly Institute parties. It was intense! The Institute newsletter, put out by a group of students, had a different title each week – The Morning Star, The Evening Star, Venus, Hesperus, Phosphorus, and a few formulas of intensional logic.

That Institute also helped to put UMass Amherst linguistics "on the map" (the department was only 3 years old), to introduce Montague Grammar to an international audience, and to get more linguists and philosophers acquainted and engaged with each other.

Summary of Major Topics in the Decade 1965–1974

This section has focused on a selection of the people and events that made the late sixties and early seventies an "explosive decade" of linguists and philosophers interacting and influencing one another in the early development of formal semantics. Here I give a summary – very incomplete, like all of this

essay – of topics that figured in the work of those years, many of which have been mentioned along the way.

Not surprisingly, topics characterizable as "logic and language" were prominent from the start – topics like quantifiers and quantifier scope had already been under intense investigation by linguistic semanticists of all sorts, and generalized quantifiers, introduced to linguists by Montague and Lewis, provided the crucial innovation of a semantic type that could uniformly interpret the natural language syntactic category of "NP" (later "DP").[27] Old puzzles of "pronominalization" also took on new forms with more attention to the difference between coreference and binding, something studied both in syntax by Chomsky and his students and in semantics, with a variety of proposals for how to implement variable binding in syntax and semantics. Variables and lambda abstraction also showed up in successful proposals for many sorts of constructions previously treated (problematically) via deletion under some sort of identity – "Equi-NP deletion," "conjunction reduction," relative clauses, and control structures. Reference and referential opacity were topics of great interest to both philosophers and linguists. While propositional attitudes and modality were mainly the province of philosophers, intensionality in modifier constructions and with verbs such as *seek* were topics on which linguists were happy to learn new tricks from philosophers like Parsons, Montague, and Kamp, and to provide philosophers with a barrage of new examples, puzzles, and linguistic generalizations.

Modifiers rarely held center stage, but there was very interesting work from early on by both linguists and philosophers. Around the same time that Jackendoff (1972) offered an account of the different meanings adverbial modifiers take on in different syntactic positions, Thomason and Stalnaker (1973) were giving formal analyses of sentence adverbs vs. VP-adverbs, while Parsons (1970) was exploring intensional vs. extensional modifier constructions (as were Montague and Romane Clark).

Plurality as a semantic topic was mainly the work of philosophers in the early period, as were *if-then* constructions and demonstratives. Tense and aspect were of interest to both, but the real explosion of work in that area came later.

Presuppositions attracted considerable attention among both philosophers and linguists in this period and provided fertile ground for interaction both across the fields and across theoretical frameworks. Presuppositions had been

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[27] Because of this shared interest in quantification, it is not surprising that there have been works on quantification co-authored by a linguist and a philosopher or logician from the 1970s up to the present, including Cooper & Parsons 1976; Barwise & Cooper 1981; Keenan & Moss 1985; Keenan & Stavi 1986; Kadmon & Landman 1993; Keenan & Westerståhl 1997; Peters & Westerståhl 2006. There will be a chapter on the "starring role" of quantifiers in the history of formal semantics in Partee in preparation, based on Partee 2013c.

an issue in the formal language – ordinary language wars, particularly in Strawson's (1950) arguments against Russell's theory of definite descriptions (Russell 1905). Early work by Stalnaker (Stalnaker 1970, 1973, 1974) offered a formal account of pragmatic presupposition and helped to lay the groundwork for the later "dynamic turn" in the 1980s, and for incorporating presuppositions into function-argument application, as constraints on the domains of functions. Karttunen's early work (Karttunen 1971b, 1971a, 1973, 1974), as well as works by Kiparsky and Kiparsky, Horn, Keenan, and Fillmore, broadened the range of "presupposition triggers" to a wide range of constructions, and made the issue of presupposition projection from embedded contexts a central theoretical issue. Presuppositions also figured in McCawley's arguments (McCawley 1968b) against the syntactic treatment of "selection restrictions" in Chomsky's *Aspects* theory. The centrality of functional application in semantic composition allowed many lexical presuppositions to be cast as constraints on the domains of functions. And attention to Grice's work added more dimensions to those investigations, leading to a major area of research on the distinctions among kinds of "not-at-issue" content.[28]

And from the beginning, and continuing, there was great interest in questions of the architecture of grammar – the nature of syntax, the nature of semantics, and of pragmatics, and the nature of and constraints on the relations among them. The linguistic wars had introduced competing visions of the basic structure of grammar; for me, unhappy with both sides in those wars, Montague grammar suggested the possibility of an architecture which could, with some work, be made compatible with Chomskyan syntax, while being even more serious about semantics than the generative semanticists. Later decades introduced additional possibilities into the debates.

Of course there were many more topics of research in this period than I could mention.

After 1974: Further Developments

In this final section, I begin with some overview observations about developments in the period of the late 1970s and the 1980s affecting linguistics–philosophy interactions, including the rise of interdisciplinary activity in cognitive science and the development of formal semantics as a branch of linguistics. I then mention a few of the important topics that were new or newly prominent, including old topics that underwent major rethinking and topics that saw shifts from philosophy-centered to linguistics-centered research. This section is by necessity brief, and doesn't aim to get much beyond the 1980s.

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[28] The article (Beaver, Geurts, & Denlinger 2021) includes a good overview of the history of work on presuppositions.

And of course many people and works that surely deserve discussion are unfortunately not mentioned,[29] but fortunately, their work lives on and speaks for itself.[30]

Some Overview Notes about the Late 1970s and the 1980s

The period of the late 1970s and the 1980s differed from the decade of explosion in noticeable ways. In the 1970s, formal semantics was just beginning, centers of research activity were just springing up, conferences that brought linguists and philosophers together were ad hoc events at which many participants met each other for the first time. Everything felt new, and research topics were easy to find. By the 1980s, formal semantics was becoming an established field within linguistics, and while linguistics–philosophy interactions continued, they became less intense after the 1970s, for a number of reasons. One benign reason was that communication between the fields was already established and did not require as much direct interaction. There were accessible publications that were read by linguists and philosophers: the journal *Linguistics and Philosophy* had been founded in 1977 and was thriving, the Amsterdam Colloquium with its biennial meetings was international from 1980, and there was no felt need for a bibliography in logic and language after 1979.

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[29] One topic I wish I could discuss, but won't, is the very big topic of lexical semantics, which has been studied in many ways, by both linguists and philosophers, but has never had a standard kind of "home" in formal semantics. The concerns of lexical semantics involve issues of the "basic meanings" of content words, and issues of the relations of lexical semantics to compositional semantics, including questions about lexical decomposition, meaning postulates, extraction of functional heads, "building meanings," approaches to vector semantics and its integration with formal semantics, and more. For some diverse views, see Barker 2003; Levin & Rappaport Hovav 2005; Asher, Van de Cruys, & Abrusán 2015; Kornai & Kracht 2015; Pustejovsky 2016.

Another topic that has barely been mentioned in passing is types, type-shifting, and type-driven composition; for overviews, see Winter 2007; Charlow 2020; Hendriks 2021; and section 3 of (Champollion 2016).

As for the huge (among linguists) ongoing topic of the syntax–semantics interface with various kinds of syntax, see works on semantics in GPSG, HPSG (Koenig & Richter 2021), Extended Categorial Grammar, Lexical-Functional Grammar (Dalrymple, Lowe, & Mycock 2019), Chomskyan theories of syntax with a level of LF (von Stechow 2012); interfacing with various kinds of semantics, including (descendants of) Montague semantics, Glue Semantics (Asudeh & Crouch 2002), continuation semantics, variable-free combinatorial semantics, and more. For the issue of direct compositionality, see Barker & Jacobson 2007; Jacobson 2012, and for some comparative overviews, see Jacobson 2014; Sailer 2016.

[30] A personal footnote: the problem of omissions weighs on me heavily. There is no good solution; making this preface even longer so as to include more would make remaining omissions all the more glaring. All I can do is apologize to those not mentioned and plead that it's an unsolvable problem.

A change on the philosophy side that weakened the intensity of linguistics–philosophy interaction after the 1970s was the increasing interest in philosophy of mind in the 1980s, with a somewhat decreasing interest in philosophy of language.[31]

And a factor on the linguistic side was the impact of the program of Sloan grants in Cognitive Science from 1978 to 1987, which were the impetus for many interdisciplinary conferences and the build-up of programs in cognitive science. Philosophy was included but to a lesser degree; there was much more action in psycholinguistics, computational linguistics, and linguistically informed AI. During the 1980s I sometimes felt torn, as though the stimulating Sloan-funded cognitive science activities were coming at the cost of close connections with philosophy. I was glad that at least some philosophers were involved in the cognitive science collaborations.[32] And System Development Foundation gave a major infusion of money for interdisciplinary collaborations that did include philosophy, starting with a very large grant in 1982 that created the interdisciplinary Center for the Study of Language and Information (CSLI) at Stanford in collaboration with SRI and Xerox PARC;[33] the first directors were the logician Jon Barwise and the philosopher John Perry, and the initial focus was on their kind of situation semantics. CSLI soon became a locus for interdisciplinary research, conferences, and publications, with a steady flow of visiting faculty and postdoctoral researchers.

Another important development was the increasing acceptance and specialization of formal semantics within linguistics, and a much greater focus on the syntax–semantics interface, starting perhaps with Heim's dissertation, and accelerating with the hiring of formal semanticists at MIT, first Richard Larson, and then in 1989, Irene Heim. By the middle of the 1980s the increasing recognition of formal semantics as part of the core curriculum in linguistics was seen in the publication of textbooks (Dowty 1978; Dowty, Wall, & Peters 1981; Chierchia & McConnell-Ginet 1999) and the growing number of departments with more than one semanticist.

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[31] When I later turned my interest back to the foundational problems of the "psychological reality" of model-theoretic semantics raised in Partee 1979, I came to appreciate that work on the philosophy of mind, especially Burge 2010, had yielded potential solutions to those problems; see Partee 2018.

[32] It was at an interdisciplinary Sloan-funded conference that I organized in 1978 around the problem of "indefinite reference," including philosophers, that Irene Heim found her dissertation topic.

[33] An important figure I haven't mentioned is Stanley Peters. He has published relatively few solo works, but a number of impactful joint works, such as Peters & Ritchie 1973; Karttunen & Peters 1977; Peters & Westerståhl 2006. He has had an oversized impact on the field through his ability to bring together and organize excellent groups of logicians, philosophers, and linguists and to make good things happen. He was one of the effective forces behind the large grant from SDF that founded CSLI, and it was also reportedly his initiative to found the journal *Linguistics and Philosophy*.

The growth of work on the syntax–semantics interface, recognized in the founding of the journal *Natural Language Semantics* in 1992 with Angelika Kratzer and Irene Heim as its co-editors and of the international annual conference Semantics and Linguistic Theory (SALT) in 1991, made it difficult to engage in some kinds of topics without a strong background in syntax, hence sometimes less accessible to philosophers.

As a further linguistics-internal development, linguists began doing the kind of "subdisciplinary" work in semantics that was common in phonology, morphology, and syntax: studying language acquisition, psycholinguistic processing, carrying out fieldwork, and investigating typology. Those additional dimensions helped formal semantics become a more mature field within linguistics, and crosslinguistic semantics has been especially important for moving the field away from its initial English-centric bias; see the early works (Srivastav 1991; Bittner 1994; Bach, Jelinek, Kratzer, & Partee 1995; Dayal 1995), which led to increasing amounts of formal semantic fieldwork in the late 1990s and beyond. But those newer subfields were of less direct interest to most philosophers than the earlier foundational semantic investigations. The net result was a decreased intensity in linguistics–philosophy interaction in the 1980s, although probably no overall decrease in quantity or quality, since the field was growing.

The picture just painted is centered in the US. In The Netherlands, for instance, the picture was quite different. A much more logic-oriented textbook (Gamut 1982) was written by an interdisciplinary team of logicians, philosophers, and a linguist, and eventually published in English (Gamut 1991). The Amsterdam Colloquium has always had a blend of work in logic, linguistics, and computation. Philosophy is not separately mentioned, in part because the "Centrale Interfaculteit," effectively the Philosophy Department, was itself interdisciplinary and with close ties to mathematics and computer science. The Institute for Logic, Language, and Computation (ILLC) was founded in Amsterdam in 1991 (with historic roots in Beth's Institute), as was the Association for Logic, Language, and Computation (FoLLI), which publishes the related journal *JOLLI* and organizes the ESSLLI summer schools, all marked by equal weight on language, logic, and computation.

The Netherlands may be unique with its logic-centered tradition going back to Beth. In Germany, despite the legacy of Leibniz and Frege, the development of formal semantics was, as earlier noted, mostly in the hands of linguists, and the picture resembles that in the US. In part in response to the success of SALT, the annual semantics conference *Sinn und Bedeutung* was initiated by the Gesellschaft für Semantik, founded in 1994 by Sebastian Löbner, Arnim von Stechow, and Thomas Ede Zimmermann (a scholar whose influence goes far beyond his published works), to create a venue more accessible to German students and young scholars.

With that background, we turn to some of the major topics of the period.

The Puzzle of Indefinite Reference and the "Dynamic Turn"

A pair of remarkably similar but totally independent works were published at about the same time, one by a philosopher and one by a linguist: Hans Kamp's Amsterdam-conference paper (Kamp 1981) and Irene Heim's UMass dissertation (Heim 1982). Both were concerned with a family of puzzles surrounding indefinite NPs and anaphora, including the puzzle of donkey sentences, made famous among linguists by Geach (1962).

Their work and its timing can be taken as evidence of both the maturity of the field Heim referred to as "logical semantics" (Heim 1982: 9), and of the degree to which ideas from linguistics and philosophy had by then become interwoven within the field. Despite widespread awareness of the donkey-sentence puzzle starting in the 1960s, treatments of quantification and anaphora were not formally explicit enough before the late 1970s or so for the difficulty of those problems to be evident.

There was a whole family of novel features in Kamp's and Heim's work – both treated indefinites in a sense as e-type variables, with no quantificational force of their own, introduced unselective binding, and treated *if*-clauses as domain restrictors. There were antecedents to their work in Lewis's paper on adverbs of quantification from the Keenan conference (Lewis 1975), and in Lauri Karttunen's "discourse referents" (Karttunen 1968, 1976). And the "dynamic turn," in which both replaced truth conditions as basic semantic values of sentences by what Heim called "file-change potential," took inspiration from Stalnaker's view of how an assertion affects the common ground shared by speaker and hearer (Stalnaker 1978). Heim also included a treatment of definite NPs, arguing for a "familiarity" theory of definiteness over the Russellian "uniqueness" theory. On her theory (oversimplifying), the difference between indefinites and definites is that an indefinite introduces a new discourse referent and its descriptive content is semantic content, while a definite is associated with an old discourse referent, and its descriptive content is presupposed.

By the late 1980s, with the work of Heim, Kamp, and Groenendijk and Stokhof in Amsterdam (Groenendijk & Stokhof 1984, 1988), we had context-change potential, dynamics, and a fading of the line between formal semantics and (the context-dependence part of) formal pragmatics. The work of Craige Roberts (1990) on "modal subordination" (her term) can be seen as a bridge between work on donkey anaphora and more general work on the dynamics of context-dependence.

Heim, after applying her File Change Semantics to issues in presupposition and accommodation (Heim 1983), argued later in favor of "E-type pronouns" for the treatment of donkey anaphora (Heim 1990), and then turned to other topics of research. Kamp, on the other hand, went on to elaborate his Discourse

Representation Theory in his subsequent work, and others joined in and elaborated it, especially Nicholas Asher and Alex Lascarides, with their Segmented Discourse Representation Theory (SDRT) (Asher 1993; Lascarides & Asher 1993). The "dynamic turn" was highly influential, and both Heim's dissertation and Kamp's paper remain landmarks in the field.

"Subatomic Semantics," Mereology, and Plurals

Another major innovation from the early 1980s, first argued for in Sharvy 1980, reached linguists primarily through the better-known and more extensive work of Godehard Link (Link 1983). Philosophers had long puzzled over how to analyze mass nouns; they were hindered, one can say in hindsight, by the fact that both set theory and logic were built up taking entities as basic and interpreting predicates as denoting sets of entities. So most treatments of mass nouns resorted to positing such things as "quantities of matter," with the count noun *quantity*. All such treatments made mass nouns more semantically complex than count nouns. The linguist Mark Stein argued in his dissertation on quantification in Thai (Stein 1981) that in Thai (and many other languages) mass nouns are basic, and devices such as classifiers are needed for "counting." So linguists were very receptive to Link's formalization of the denotations of mass nouns and of singular and plural count nouns in terms of lattice structures, with the count nouns restricted to atomic lattices, hence less "basic," more "marked," than the unrestricted (not-necessarily-atomic) mass noun lattices.

Link also included "plural individuals" in his ontology, with the help of which he elucidated the similarities and differences between mass nouns and plurals. His work helped trigger a resurgence of interest in the analysis of plurals, including influential work on groups vs. sets in the analysis of plurals, the relation between mass and plural, and later to typological work on those issues and more. For a recent overview, see Nouwen 2016.

Bach (1986) and Link (1987) proposed extensions of the mereological approach to issues in event structure, drawing a parallel between the count–mass distinction and the event–process distinction. Once the door was opened to exploiting structure within the denotata of the basic types, much more work of that sort was done, especially in investigations of the fine structure of events. Parsons developed interesting ideas about the event argument, treating aspectual phenomena in part by having two different primitive relations between events and times, *culminate* and *hold* (Parsons 1990). He also described his approach as "subatomic semantics," recalling Link's work on mass and count expressions.

Interesting connections turned out to be analyzable in mereological terms between verb semantics and NP or DP semantics, via the thematic role of

"incremental theme" with verbs such as *eat* (Krifka 1987). (Krifka, with his prolific work and his leadership of ZAS, the Center for General Linguistics at Humboldt University, has played a major leadership role in the development of semantics and semanticists in Germany for many decades.) For more on work on mereology, and its impact, see Champollion & Krifka 2016.

Negative Polarity Items

The history of formal semantics research on negative polarity items such as *any* and *ever*, a problem familiar to syntacticians since Klima 1964, has a remarkable beginning in the 1970s. Bill Ladusaw was searching for a dissertation topic that would have the property of providing an argument in favor of the necessity of model-theoretic semantics – some phenomenon that could not be handled by a representational level of "logical form" alone.[34] And knowing Fauconnier's work on negative polarity and "scale reversal" (Fauconnier 1975), he realized that he could probably generalize the relevant property in model-theoretic terms on the pattern of Barwise and Cooper's properties of monotonicity and persistence (Barwise & Cooper 1981); he introduced the felicitous terms *upward-* and *downward-entailing* (Ladusaw 1979). There followed a constructive exchange of dueling articles by Ladusaw and Marcia Linebarger, who argued for a configurational solution involving an abstract NEG operator in all cases, plus some pragmatic principles (Linebarger 1980, 1987; Ladusaw 1983, 1992). Much more work has been done in the intervening decades, almost all by linguists, except for Hintikka 1980, and there are still debates about the roles of syntax, semantics, and pragmatics in the phenomenon, as well as ongoing debates about whether polarity *any* and free-choice *any* should be given a unified account. For overviews of this work, see Giannakidou 2011; Tovena 2020; Homer 2021.

Events, Situations, Tense, and Aspect

The "event argument" was first argued for by the philosopher Donald Davidson (Davidson 1967a), but it entered the development of formal semantics later; it took some time before semanticists became convinced that it was, if not impossible, at least not optimal to try to analyze natural languages with just worlds, times, and entities as primitives. Linguists appreciated the arguments in Barwise 1981 to the effect that the bare infinitival complements of verbs of perception in sentences like *I saw Smith leave* should not be analyzed as propositions but should be treated as denoting situations.

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[34] Interview with the author, January 11, 2011.

Higginbotham (1983) argued that they denoted events rather than situations. Barwise and Perry (1983) took Barwise's work farther and developed "Situation Semantics," which seemed intriguing at first but was marred by an insistence on "staying extensional" and a failure to develop their semantics to include universally quantified NPs, a disqualifying flaw for some of us. While Barwise and Perry's work gradually lost favor, a different conception of situations, as parts of possible worlds, was developed by Kratzer (1989, 1995, 1998, 2002) and many subsequent works, and proved fundamental to advances in many domains.

Once something like situations or events were seen as justified additions to the basic types, with the most influential work coming from Kratzer and her students, work on tense and aspect picked up pace rapidly. Some of the groundwork on aspect had been laid in Reichenbach 1947, with his distinction between event time, utterance time, and reference time (or "topic time"). His distinction was shown to be important by Kamp & Rohrer 1983, then reinforced by Partee 1984; Hinrichs 1986; Webber 1988; the term "topic time" was introduced in the accessible and influential book Klein 1994. Attention to the Aktionsarten of verbs was added by Vendler (1957), and his work was extended with linguistic sophistication by Dowty, who had started as a generative semanticist (Dowty 1972), and who set the agenda for much work both on tense and aspect and on ways to think about derivational lexical rules in formal semantics (Dowty 1979).

One of the many contributors to new ways of thinking about tense and aspect was Dorit Abusch, whose dissertation on aspect and different types of causative verbs in Hebrew was in Philosophy (Abusch 1985, 1986), and whose innovation of "temporal *de re*" (Abusch 1988, 1991) is a classic among both linguists and philosophers.

For more on situations, some of the many ways in which they have proved fruitful in subsequent research, and for how Davidsonian events and situations can best be related, see Kratzer 2021.

Focus, Focus-Projection, Focus-Sensitive Particles, Sets of Alternatives

Focus was not a prominent issue in the philosophy of language, although Fred Dretske (1972) had observed that it could make a truth-conditional difference in counterfactual conditionals and other modal and conditional statements. Chomsky (1971a) and Jackendoff (1972) made important advances concerning the interplay of syntax, semantics, and intonation in focus sentences and made clear the interest of the phenomena for issues of linguistic theory.

Then, much as Karttunen (1977) had revolutionized the study of the semantics of questions by concentrating on embedded questions, Mats Rooth (1985, 1992) revolutionized the study of focus by concentrating on compositionality

in focus-sensitive constructions. Rooth's treatment of focus involved projecting sets of "focus alternatives" up a tree, much like the alternative sets used by Hamblin (1973) in his analysis of questions. Focus (and topic) has remained an active research area; for overviews (see Krifka 2005; Büring 2016).

Context-Dependence

Context-dependence is one of the issues which, like nondeclaratives, presupposition, and topic-focus structure, fed into the growth of formal pragmatics, as described in Kadmon 2001. Concern with context-dependence goes back to philosophy of language in the 1960s, or even to the Russell–Strawson debates, since context-dependence is absent from all the familiar logical languages such as first-order predicate logic. There were early contributions by Reichenbach and Strawson. Montague (1968, 1970) treated context-dependent expressions including tenses, first-person pronouns, and demonstratives by adding a context parameter to the parameters of evaluation. David Kaplan's 1971 underground classic paper on demonstratives (finally published as Kaplan 1989) introduced his three-way distinction among "character," intension, and extension, with character a function from context to intension.

Among logicians, "formal pragmatics" was often limited to the treatment of context-dependent expressions, as can be seen in the discussions in Staal 1969. Lenci and Sandu (2009) identify Bar-Hillel (1954a) as the source of the definition of formal pragmatics as the study of indexical expressions, i.e. words and sentences whose reference depends on the context of use. Lewis's "scorekeeping" approach was an important advance in thinking comprehensively about aspects of context (Lewis 1979), as was Stalnaker's work on assertion and the "common ground" (Stalnaker 1978). Context-dependence has continued to loom large in recent decades in connection with predicates of personal taste – on which both philosophers and linguists have worked – and knowledge ascriptions, a topic discussed more often by philosophers than linguists.[35]

By now, in 2021, there is more work involving both linguists and philosophers than anyone can keep track of, and the appreciation of each field for the value of insights from the other is probably deeply enough ingrained in most linguists and philosophers that continuing mutual influence is almost assured. It is to be hoped that the contributions in this book may inspire the next generations to further strengthen the connections between our two fields.

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[35] For some newer works that include historical looks at these issues, see Kamp & Partee (eds) 2004; Lasersohn 2005; Schaffer 2015.

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Introduction

Daniel Altshuler

I.1 Linguistics Meets Philosophy

Linguistics, like all sciences, is deep-rooted in philosophy. Perhaps the most obvious example is that linguistic meaning has been at the center of philosophic inquiry for as long as philosophic discourse has been documented.[1] Nevertheless, among the current subfields in linguistics (including phonetics, phonology, and syntax), *formal semantics* was the latest bloomer.[2] As noted in the Preface, it was not until the mid-1980s that formal semantics began to develop as an autonomous field within linguistics. And it was not until the 1990s that it became solidified as such, with the founding of the journal *Natural Language Semantics* and the conference *Semantics and Linguistic Theory* (*SALT*).[3] These venues welcomed philosophers, but their aims and scope were largely linguistic.[4]

Turning the clock to 2021, formal semantics is now cemented as part of the linguistics canon in leading linguistics departments. Linguistics students often learn core ideas from twentieth-century philosophy of language without taking a step into the philosophy department. This is an amazing turn of events for a

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[1] An oft-cited ancient text is *Cratylus*, where Plato questions how names of objects get determined. However, philosophic discussion about linguistic meaning goes as far back as Indian philosophers during the Vedic period.

[2] By 'formal semantics', I mean the scientific study of meaning which (as described in the Preface) developed from philosophy of language and philosophic logic. For a brief overview (translated into multiple languages), see: http://web.eecs.umich.edu/~rthomaso/documents/general/what-is-semantics.html.

[3] *SALT* has taken place annually for the last 31 years, typically in the United States, though in 2006 it was held at the University of Tokyo, in 2010 it was held in Vancouver, British Columbia (co-hosted by University of British Columbia and Simon Fraser University), and in 2022 it will take place in Mexico City (co-hosted by El Colegio de México and the Universidad Nacional Autónoma de México). Five years after *SALT* was founded, another formal semantics conference, *Sinn und Bedeutung*, began to meet annually, initially in Germany, and then throughout Europe. Both conferences have proceedings that are widely read and cited.

[4] This continues to be the case. *Natural Language Semantics* currently includes the following statement: '*Natural Language Semantics* publishes studies focused on linguistic phenomena as opposed to those dealing primarily with the field's methodological and formal foundations' (www.springer.com/journal/11050/aims-and-scope).

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scientific subfield that is a mere 30 years old! But it's not without its dangers. I would argue that the continued growth of formal semantics and philosophy of language is predicated on renewed conversations between linguists and philosophers. As the cliché goes: *don't forget where you came from*.

My outlook is based on personal experience. As an undergraduate student, I was privileged to study both philosophy and linguistics at one of the birthplaces of formal semantics, UCLA. My main influence was Terry Parsons, who taught in both the philosophy and linguistics departments. His philosophy course 'Pre-Fregean Logic' (co-taught with Calvin Normore) was the reason I became a philosophy major. His linguistics course 'Introduction to Semantics' was the reason I became a linguistics minor, with aspirations of becoming a 'subatomic semanticist'.[5]

As a graduate student, I was fortunate to attend Rutgers University during its 'golden era' in formal semantics (starting in the early 2000s), when linguists and philosophers were in frequent conversation, that is, when 'linguistics met philosophy'. Courses related to formal semantics were often packed with linguists and philosophers, regardless of which building, campus or department they were taught in; whether the course introduced the basics through 'Heim & Kratzer' or through Reinhard Muskens' *Compositional Discourse Representation Theory*; whether a seminar spurred discussion about reference, theory of mind, metaphor, convention, focus, (in)definites, stubbornly distributive predicates or the temporal system of Kalaallisut.[6] Friendships developed across disciplines, and conversations took place on- and off-campus among students and faculty.[7] They were constant and fruitful.[8]

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[5] Courses with David Kaplan and Josef Almog (at UCLA) and Jeff King and John Searle (at UC Berkeley) also played an important role in my philosophic education, while independent studies with Philippe Schlenker and Tim Stowell had a great influence on my choice to pursue a PhD in linguistics.

[6] Maria Bittner, Veneeta Dayal, and Roger Schwarzschild were actively teaching formal semantics in the linguistics department. In the philosophy department, there were many seminars related to core issues in formal semantics and philosophy of language, including those taught by John Hawthorne, Jeff King, Ernie Lepore, Ted Sider, and Jason Stanley. There were also seminars at the Rutgers Center for Cognitive Science (RuCCS), including those taught by Alan Leslie, Chung-chieh (Ken) Shan, and Matthew Stone, as well as the late Jerry Fodor and Lila Gleitman.

[7] These conversations were aided by annual workshops organized by Ernie Lepore ('Ernie-fests'), which brought together leading linguists and philosophers from around the world to engage with graduate students at Rutgers pursuing formal semantics. In addition to these workshops, there were weekly talks at the Rutgers Center for Cognitive Science (RuCCS) which brought linguists and philosophers in contact with faculty and students from psychology and computer science. There were also weekly basketball games organized by Ted Sider, bringing philosophers and other academics (including linguists) together from Rutgers and Princeton.

[8] Below is a website that has tracked progress of many of the graduate students involved in these conversations. Both linguists and philosophers are mentioned in tandem due to their research being in formal semantics. https://ruccs.rutgers.edu/students-recent-placement

While such conversations are now rarely fostered by graduate programs,[9] linguistics nevertheless meets philosophy, albeit in other venues. There are conferences (e.g. Amsterdam Colloquium and Semantics and Philosophy in Europe) and summer institutes (e.g. European Summer School in Logic, Language and Information and North American Summer School in Logic, Language and Information) which are regularly organized and attended by both linguists and philosophers (students and faculty alike). One of the most influential (and oldest) journals in formal semantics is called *Linguistics and Philosophy*. The current editors-in-chief are a linguist and a philosopher, promoting submissions in formal semantics from both disciplines.[10] A more recent journal, *Semantics and Pragmatics*, currently has four philosophers and six linguists as associate editors, and an impressive number of linguists and philosophers on their editorial team.

The payoff from such efforts is evident. There is a new generation of philosophers doing formal semantics of a kind that is heavily influenced by linguistics. Indeed, some of their research is indistinguishable from the kind of research conducted in linguistics. There is a true convergence of methods here! To wit, it is quite common for philosophers of language to list 'formal semantics' as an area of specialization (or competence) in their CVs (not doing so may trigger the undesirable implicature that one is not up to date on the latest developments in the field). Moreover, philosophy graduate students apply to select linguistics jobs and vice versa; some junior and senior faculty switch from one department to the other (as visitors or tenured/tenure-track faculty); some even have affiliations with both departments, within and across institutions. As a result, it's becoming more and more arbitrary whether a formal semanticist is called a 'linguist' or a 'philosopher', with the label simply signifying the name of the department to which they belong.

I hope these trends continue to grow and continue to undermine superficial boundaries imposed by institutional structures. They are only natural given the history of formal semantics described in the Preface and explored further in the chapters that follow.

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[9] There are many reasons for this. Some are systemic, others have to do with the fact that too many stars have to align to bring about consistent investment from students and faculty, across two (or more) departments, to have shared research interests and to consistently engage with those interests within a community. Among other things, this requires administrative support, community leadership, money (for good food), and endless energy.

[10] Another influential journal with similar aims is *Journal of Semantics*, which – despite having predominantly linguists on their editorial board and as associate editors – encourages submissions in 'all areas in the study of meaning, with a focus on formal and experimental methods', including 'semantically informed philosophy of language' (https://academic.oup.com/jos).

I.2   Goal and Themes of the Volume

The goal of this volume is to empower new conversations between linguists and philosophers by (i) showing how far formal semantics has come because of the interactions between the two disciplines and (ii) critically assessing prior conversations, those currently taking place and those that are in a dire need of happening.

The volume emerged from a community that was born in 2017, when I invited friends and colleagues to think about how linguists and philosophers have contributed, and continue to contribute, to the broad themes below. I chose these themes to ensure that the volume has representation of both (i) knowledge exchange that had been taking place since the birth of formal semantics and (ii) new ideas that have emerged as a result of prior or ongoing conversations.

- Reporting and ascribing
- Describing and referring
- Narrating and structuring
- Locating and inferring
- Typologizing and ontologizing
- Determining and questioning
- Arguing and rejecting
- Implying and (pre-)supposing

Each theme is explored in this volume through specific topics (see Section 0.3 for an overview), which were chosen in correspondence with the interests of the authors. I asked the authors to think about their chosen topics in light of the four questions below.

(1) Why do you think both linguists and philosophers find [topic x] interesting?
(2) What recent developments in linguistics and philosophy do you think are most exciting in thinking about [topic x]?
(3) What do you consider to be the key ingredients in adequately analyzing [topic x]?
(4) What do you consider to be the outstanding questions pertaining to [topic x]?

To give the reader access to what the authors' thought process was like, each chapter begins with the authors' answers to these questions.

While this volume covers only a small sample of topics in formal semantics, I believe it is nevertheless representative of the kinds of conversations that have taken place and are currently taking place between linguists and philosophers. Indeed, several noteworthy trends immediately emerge.

Below, I briefly summarize the main trends that I see in terms of 'the who' and 'the what'.

- THE WHO
    (1) While formal semantics in linguistics has always had a strong representation of women, the same cannot be said of philosophy, which has always been a male-dominated discipline. However, given the convergence of methods described in Section 0.1, there are signs of real progress. Many current conversations in formal semantics are a result of and driven by women linguists *and* philosophers, including the women featured in this volume.
    (2) Unfortunately, people of color are still underrepresented in formal semantics, even though there is a recent push to change this in linguistics. If history is an indicator, then linguistics will be a positive role model for philosophy in this respect.
- THE WHAT
    (1) New conversations about old problems have emerged amongst linguists and philosophers. In particular, questions have arisen about:
        (a) Whether we have been wrong to hold onto alleged axioms in formal semantics (e.g. Fregean compositionality, acquaintance relations, the idea that rejection can be reduced to assertion, strong theoretical dependence on external objects in the world or judgments of truth).
        (b) How to analyze previously excluded data (e.g. literary prose, multimodal and argumentative discourse), and adopt methodologies from neighboring fields (e.g. psychology, computer science, narratology). This volume motivates new avenues worth pursuing.
    (2) While Gricean pragmatics remains a staple in current conversations between linguists and philosophers, this volume shows that other frameworks (coherence- and question-based approaches) have taken center stage, especially in the analysis of context-dependence, discourse and information structure. The genesis of this progress is the 'dynamic turn' in the 1980s, mentioned in the Preface, which has revolutionized research at the semantics-pragmatics interface.
    (3) Since the mid-1990s, crosslinguistic research has blossomed in linguistic semantics, but not in philosophy, where fieldwork is not a practiced method of inquiry. As a result, semantics of understudied languages are rarely discussed between linguists and philosophers. This volume provides some notable exceptions (e.g. recent research on definite descriptions, tense, aspect and evidentials) which illustrate the dire need for such conversations to not only take place, but to become the centerfold of discussion moving forward.

I.3   Overview of the Chapters

Many natural language phenomena (e.g. quantification, anaphora, temporality, modality) have been the subject of semantic inquiry since antiquity. However, many insightful questions and methodologies have emerged more recently (and could have only emerged) as a result of formal semantics research. The contributions of this volume are a testament to this development. The volume proceeds as follows.[11]

I.3.1   *Reporting and Ascribing*

Chapter 1 is about attitude ascriptions and speech reports, which were at the center of attention when philosophers and logicians began to see natural languages as formal systems. In this chapter, Angelika Kratzer looks at the history of formal semantics, not for its own sake, but for lessons about how to approach attitude ascriptions and speech reports today. She suggests that linguists and philosophers have taken a few wrong forks in the road. To solve the problem of logical equivalents, Kratzer suggests that we should have listened to Rudolf Carnap, who made it clear that, even if the truth of an attitude ascription or speech report may depend on the intensional structure of the embedded clause, this in no way forces the conclusion that propositions can't be mere intensions. For *de re* ascriptions, Kratzer suggests that we should have listened to David Kaplan, who replaced names in the scope of attitude verbs with descriptions, rather than associating the individuals those names stand for with modes of presentation. What held linguists and philosophers back in both cases, according to Kratzer, was Fregean compositionality. Shedding that legacy, she presents prototypes for analyses of attitude verbs and verbs of speech within an intensional semantics where propositions are mere sets of possible worlds and *de re* ascriptions require no special technologies created just for them.

In Chapter 2, Yael Sharvit and Matt Moss defend an acquaintance-based semantics for *de re* attitude reports – an analysis that has recently been challenged by some philosophers, but has been widely adopted by linguists. Sharvit and Moss begin by surveying the philosophical literature on the logical form of *de re*, with particular attention to how acquaintance relations solve the problem posed by so-called *double vision scenarios*. Sharvit and Moss reject the view that cognitive contact with the 'res' requires causal interaction, arguing that the causal conception of acquaintance is inadequately motivated in the philosophical literature on *de re*. Subsequently, they turn to other

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[11]   The overview of chapters below features summaries provided by the authors, slightly altered by the editor for purposes of exposition.

linguistic data, showing that the *de re* analysis is needed to account for certain tense constructions. They argue that the success of this application provides a further reason to reject an exclusively causal conception of acquaintance, since the kind of cognitive contact relevant to *de re* attitudes towards times cannot plausibly be causal. Sharvit and Moss discuss objections to the *de re* analysis of tense, such as the apparent unavailability of double vision scenarios involving times. Subsequently, they consider various additional principles and constraints that further refine the theory's predictions, and they conclude that while further research is needed to fully vindicate the *de re* analysis in this application, it offers the most unified and well-motivated account of embedded tense data currently on offer.

I.3.2   *Describing and Referring*

In Chapter 3, Hans Kamp explores the meaning of definite descriptions – a research topic with which linguistics and philosophy have been intimately intertwined as long as they have been acquainted. In particular, Kamp revisits Keith Donnellan's highly influential *referential–attributive* distinction from a communication-theoretic perspective, which distinguishes between utterance production and utterance interpretation – in this case between the referential and the attributive use of definite descriptions and their referential and attributive interpretation. The framework is MSDRT (for 'Mental State Discourse Representation Theory'), an extension of Discourse Representation Theory (DRT) that provides mental state descriptions (MSDs) for utterance producers and recipients. MSDs consist of propositional attitude representations (PRs) and entity representations (ERs). ERs represent entities from the outside world (their referents), to which they are linked by causal relations and which they can contribute to the contents of the agent's PRs. The referential use and interpretation of a description are analyzed as those which producer and interpreter take to refer to the referent of one of their ERs (while the attributive use and interpretation take it to refer to whatever satisfies its descriptive content). This approach differentiates more finely between different use scenarios than other approaches and throws new light on the question whether the referential and the attributive use are mutually exclusive and whether they are jointly exhaustive.

Chapter 4 explores the meaning of definite descriptions from a crosslinguistic perspective. In particular, Elizabeth Coppock considers what further philosophic insight could be provided on this topic in the modern era, when work on definite descriptions has become less focused on English. To that end, Coppock considers one unresolved, philosophic issue that persists even in this modern era of crosslinguistic comparison, pitting *dynamic semantics* against *situation semantics*. A prominent synthesis of these competing (though

compatible) frameworks says that both are needed for so-called 'strong' and 'weak' articles, respectively. Indeed, this distinction has served as inspiration for much recent work on the crosslinguistic semantics of definiteness. Coppock shows that while this new development has led to a much richer and more well-rounded picture of definiteness as a phenomenon, the predictions of the two analyses overlap too much, leading to spurious debate when fieldworkers go to analyze a new language. The chapter aims to clarify what is at stake empirically in the choice among analyses and advocates for continued philosophical reflection as we operationalize our linguistic methods of discovery.

I.3.3   *Narrating and Structuring*

Chapter 5 focuses on the role that discourse relations and discourse structure play in semantic theorizing. This topic of inquiry was pioneered in AI research in the 1970s by Jerry Hobbs, and became of interest to linguists and philosophers in the late 1980s and early 1990s, particularly with the development of Centering Theory and Segmented Discourse Representation Theory. In this chapter, Julie Hunter and Kate Thompson provide an overview of how discourse relations not only add semantic content above and beyond the individual propositions expressed by the utterances in a discourse, but they, and the complex structures to which they give rise, can influence the interpretations of individual utterances, having an effect on the very propositions the utterances are understood to express. Subsequently, Hunter and Thompson look in detail at how theories of discourse structure can be brought to bear on current questions in formal semantics involving the distinction between so-called *at-issue* and *non-at-issue* content. The core data that they consider involves appositive relative clauses and discourse parenthetical reports. Hunter and Thompson also discuss recent efforts to use discourse structure to model conversational goals and capture the subjective nature of discourse interpretation. Finally, they consider a question that has not received proper attention in linguistics and philosophy: how to extend theories of discourse structure to multimodal discourse. Along the way, Hunter and Thompson emphasize the importance of corpus work in studying discursive phenomena and raise a series of large questions to be pursued in future work.

In Chapter 6, Pranav Anand and Maziar Toosarvandani examine a previously undiscussed interaction between tense and predicates of personal taste (PPTs) – two linguistic expressions which have independently been prominent in discussions amongst linguists and philosophers. While disagreements involving *delicious* or *fun* are generally considered faultless (i.e. they have no clear fact of the matter), Anand and Toosarvandani observe that, in joint oral narratives, this faultlessness varies with tense: if the narrative is told in the

historical present, disagreements involving a PPT are not faultless. Drawing on narrative research in psychology and discourse analysis, they propose that this contrast reflects a pragmatic convention of the narrative genre in which participants construct a consensus version of what happened from a unitary perspective. To link this pragmatics with the semantics, Anand and Toosarvandani adopt a *bicontextual semantics*, where the perspectival parameters for both PPTs and tense are located in a context of assessment (and not context of utterance). They show that when these contextual parameters are constrained by the unitary perspective of narratives, the present tense leads to nonfaultless disagreements, as its semantics tightly binds the temporal location of an event to the parameter relevant for appraisal. The past tense, by contrast, enables both faultless and nonfaultless disagreements. Anand and Toosarvandani derive this flexibility by revising the existing semantics for past tense, engendering a new perspective on crosslinguistic variation in tense usage.

I.3.4   *Locating and Inferring*

Chapter 7 considers the meaning of tense in its own right – a topic that goes back to (at least) Aristotle, who discussed in his *De Interpretatione* whether or not sentences about the future have a truth value. While philosophers originally focused on the future tense, Corien Bary argues that the present tense poses many challenges as well – challenges that are interesting for linguists and philosophers alike. These arguments were fueled by research in formal semantics in the last decade. In particular, Bary focuses on two particularly complex present tense phenomena: the present tense in complements of indirect speech and attitude reports, and the historical present. She argues that while formal semantics has provided significant insight on these phenomena, a holistic understanding of the present tense requires broader conversations between formal semantics and other fields of language study, such as psycholinguistics, cognitive linguistics, philosophy of language, mind and fiction, literary studies, and narratology.

Chapter 8 is about evidentiality, a topic that – compared to many of the others in this volume – has only quite recently been featured in conversations between linguists and philosophers. In these conversations, evidentiality is usually equated with so-called *propositional evidentiality*, i.e. evidentials that scope over propositions. In this chapter, Diti Bhadra undertakes a crosslinguistic comparative study of propositional and *nominal evidentiality*, i.e. evidentials that scope over nominals, and are fused with the determiner/demonstrative systems or with nominal tense markers. Bhadra demonstrates that there are cohesive parallels in how flavors of both propositional and nopropositional evidentiality interact with verbal and nominal tense and aspect.

She uses tools from modal logic to show that we can: (i) unify the subdomains of evidentiality using modal accessibility relations while also preserving important distinctions between them, (ii) use the same tools to compositionally capture the interaction between evidentials and tense and aspect, and (iii) have the representation of an agent's certainty of belief be reflected in quantificational force. More concretely, Bhadra proposes to encode the sub-type of evidence in the semantics of evidentials, with three distinct evidential flavors embodying three distinct spatio-temporal modal accessibility relations: direct (sensory) evidentials are temporally sensitive historical necessity relations (yielding the factive nature of perception); inferential evidentials of pure reasoning are epistemic accessibility relations; inferential evidentials of results are a combination of the above two.

I.3.5   *Typologizing and Ontologizing*

In Chapter 9, Jessica Rett explores the ontology of semantic theory – a highly controversial topic that was first taken up by philosophers and logicians who viewed natural languages as formal systems. The vast majority of formal theories employ individuals as a basic type; they represent quantification over, modification of, and reference to individuals. However, with the development of linguistic semantics, new views emerged about which basic semantic entities should be included in our formal semantic ontology, and on which principles we should include them. In this chapter, Rett explores these views in detail. She first considers various semantic theories that include additional types or entities, including possible worlds, but also less common ones like vectors. Subsequently, she considers two competing views that are currently featured in conversations between linguists and philosophers. According to the first view, types should be constrained or reduced. According to the second view, types should be proliferated. Rett presents some representative arguments on both sides and suggests a path forward in evaluating them against one another.

Chapter 10 is also about the ontology of semantic theory, but explores this topic from a different perspective. In this chapter, Gillian Ramchand argues that the ontological categories that linguists and philosophers require for understanding meaning and meaning composition in natural language cannot be exclusively proxied by external objects in the world or judgments of truth. In other words, Ramchand argues against a widely held view in formal semantics that a set of metaphysically justified ontological objects is required for natural language ontology; the latter field should be considered a distinct philosophical and analytical exercise, according to Ramchand. The chapter takes as its central empirical ground the meaning of 'nonfinite' verb forms in English. Paradoxes relating to the English progressive and passive

constructions are examined to show that lexical conceptual content needs to be defined more essentially, and that the integration of such essentialist content into forms which ultimately have extensionalist import requires the reification of the symbol qua symbol and the explicit representation of the utterance situation.

I.3.6   Determining and Questioning

Chapter 11 is about vagueness in natural language, a topic that has brought linguists and philosophers together since the birth of formal semantics. In this chapter, Sam Carter offers a synoptic survey of vagueness, with a particular focus on the discourse dynamics of vague language. He starts by briefly introducing the traditional philosophical puzzles of vagueness that have to do with indeterminacy and tolerance. From there, Carter considers research in linguistics and philosophy which suggest that vague language exhibits non-trivial discourse dynamics. Different approaches to the discourse dynamics of vagueness are then taxonomized and critically evaluated. The chapter concludes with Carter considering the prospects of leveraging an account of the dynamics of vague language to provide a solution to the traditional puzzles of vagueness.

In Chapter 12, Matthijs Westera explores the notion of 'alternative', which has been central to analyzing core phenomena at the semantics–pragmatics interface such as disjunction, focus, discourse structure, questions, and implicature. Westera shows that some basic questions concerning the various notions of alternatives have not received the attention they deserve, e.g. what exactly these notions signify, or how they are supposed to interact. The chapter reflects on such questions, centering on appeals to alternatives in characterizations of focus, disjunction, discourse goals, and interrogatives. Westera criticizes the conflation of the set of focus alternatives with the meaning of an interrogative, discusses two conceptions of the alternatives introduced by disjunction (algebraic and attention-based), and departs from the predominant view of questions under discussion as, essentially, linguistic questions that represent discourse goals.

I.3.7   Arguing and Rejecting

Chapter 13 is about argumentative discourse, which has always played a central role within logic and philosophy, but much less so in linguistics. In this chapter, Carlotta Pavese shows the importance of a linguistic perspective. She begins with an overview of recent work on the meaning of argumentative discourse, with particular attention to work on the semantics of argument connectives such as 'therefore'. Pavese considers several linguistic analyses

of this connective, including those that adopt tools from discourse coherence theory, dynamic semantics and possible world semantics. Pavese argues in favor of a dynamic semantic analysis because it can account for the multiple uses of 'therefore', in categorical arguments, as well as in suppositional and complex arguments. In the final section, Pavese overviews some issues concerning the pragmatics of argumentative discourse, such as how we are to characterize the distinctive utterance force of arguments versus explanations.

Chapter 14 is about rejection and assertion, phenomena that are foundational to formal semantics and have been vital in the development of Speech Act Theory in linguistics and philosophy. In this chapter, Julian J. Schlöder points out that some utterances have identical conditions for their correct assertion, but differ in the conditions for their correct rejection. Rejection, Schlöder claims, deserves a closer look to help us make sense of such data. Schlöder argues against the widespread view that rejection can be reduced to assertion. Adapting an observation by Huw Price, Schlöder argues that rejection is best conceived of as the speech act that is used to register that some other speech act is (or would be) violating a rule of the conversation game. The core observation is that the concept of an 'illegal move' is intelligible, so a speech act can be an assertion, despite violating the essential norm of asserting. Schlöder proposes that rejection has the function of pointing out that a move is illegal. But registering rule violations is, according to Schlöder, a precondition of playing games with rules (it is part of the concept 'game'), not itself a rule in a game. This, Schlöder concludes, means that rejection itself cannot be characterized by a norm. Instead, registering violations is a necessary condition for grasping the conversation game. Schlöder argues that a similar special role of rejection (that it is not explicable in the terms provided by a conceptual framework, but needed to grasp these terms) likely occurs in other frameworks as well, e.g. when one characterizes speech acts by commitments or their effect on a common ground.

I.3.8   *Implying and (Pre-)supposing*

In Chapter 15, Emma Borg revisits Paul Grice's seminal contribution: his motivation of the so-called 'total signification of an utterance' (i.e. the complete content someone communicates by a linguistic signal), which he then used to distinguish between 'what the speaker says' versus 'what the speaker implies'. This distinction has driven research at the semantics–pragmatics interface for the last 50-plus years, spurring fruitful conversations amongst linguists and philosophers. However, recent developments have served to throw doubt on Grice's taxonomy, with both sides of his divide coming under fire. Borg examines these challenges to Grice's framework and argues that they do not show that Grice's notion of implicature is ill-founded, nor that his

'favoured sense' of what is said is unnecessary. What they do serve to highlight, according to Borg, is a peculiar tension in Grice's original account. Borg suggests that Grice merged two distinct features when defining what the speaker says versus what the speaker implicates: the idea of a content dictated by word meaning and structure alone, on the one hand, and the idea of an asserted or directly expressed proposition on the other. Borg shows that once we resolve this tension, it is possible to deliver an account of the total signification of an utterance which is both (fairly) faithful to Grice's original account and which is able to do a great deal of explanatory work.

Chapter 16 is about presupposition, a phenomenon that is intimately related to progress in twentieth-century philosophy of language, starting with Gottlob Frege's semantic analysis (further developed by P. F. Strawson), and later with Robert Stalnaker's groundbreaking pragmatic analysis. In this chapter, Márta Abrusán presents the most influential linguistic approaches to presupposition. Going beyond the traditional analyses of the problem of presupposition projection, Abrusán considers recent developments in linguistics that link the analysis of presuppositions to general processes of cognition and reasoning, such as attention, probabilistic reasoning, theory of mind, information structure, attitudes and perspectival structure. Abrusán discusses some outstanding questions: (i) whether presuppositions form one coherent group or whether they should be thought of as different types of phenomena, (ii) why we have presuppositions at all, and (iii) why we see the presuppositions that we see (aka *the triggering problem*). The take-away of the chapter is the need to consider the intricacies of the interaction of presuppositions with the broader discourse context.

Chapter 17 concludes the volume with Matthew Mandelkern's exploration of modals and conditionals – expressions which have played a starring role in philosophical and linguistic research. The ability to think modally distal thoughts is central to the human capacity to plan and choose; and the ability to express such thoughts is central to the human capacity for collective action. Modals and conditionals have yielded a rich bounty of puzzles about logic, semantics, and pragmatics. In this chapter, Mandelkern considers three topics: the interpretation of epistemic modals, particularly how they interact with their local information; the interpretation of conditionals, with a focus on logical questions; and, finally, practical modality, with discussion of a potentially unified perspective on practical modality as essentially involving reference to actions.

I.4   Acknowledgments

Barbara Partee, and Sara White. Each subsequent chapter was shaped through conversations between the authors of this volume. Conversational partners were assigned by the editor based on selected themes and topics, with the goal of providing constructive feedback on the initial drafts. The chapters also benefited from external reviews. I'd like to thank the following individuals for their input: Luis Alonso-Ovalle, Moshe Bar-Lev, Phil Bricker, Sam Cumming, Erin Eaker, Regine Eckardt, Mitchell Green, Robert Henderson, Kristina Liefke, Emar Maier, Elin McCready, and Paul Pietroski. Thanks also to multiple anonymous reviewers provided by Cambridge University Press, as well as Helen Barton and Isabel Collins, who provided timely insight and guidance throughout the project.

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Part I

Reporting and Ascribing

1   Attitude Ascriptions and Speech Reports*

Angelika Kratzer

1.0   Questions and Answers

(1)   Why do you think both linguists and philosophers find the phenomenon in question interesting?

Attitude ascriptions and speech reports have been a litmus test for any proposed semantics for natural language. They were at the center of discussion when logicians and philosophers began to get interested in natural languages and developed various versions of an intensional semantics. The most successful ones rely on possible worlds. However, attitude and speech reports are a challenge for possible worlds semantics. They seem to call for a different foundation. The problem is that possible worlds semantics identifies logically equivalent propositions, hence seems to be unable to make enough distinctions between embedded sentences.

(2)   What recent developments in linguistics and philosophy do you think are most exciting in thinking about the phenomenon in question?

Williamson (2020) has suggested that if belief and speech reports present propositions under guises we can hold on to a notion of propositions where they are mere sets of possible worlds. Bricker (1983, 2020) has proposed to extend standard possible worlds semantics so as to include truth in mathematical systems in addition to truth in possible worlds. I think that, together, those two ideas point to a path towards solving the problem of logical equivalents without new ontologies or structured propositions. I will explore that path in this chapter. Once foundational questions are settled, semantic research will be able to put all its energy into explaining the

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distinctive properties of attitude and speech reports: *de re* and *de se* interpretations, indexical shift, reported speech, perspective-taking, the question why verbs appear with the sentential complements they do, and more.

On the linguistic side, I am excited about ongoing work at the syntax–semantics interface that sheds doubt on a fundamental assumption about attitude verbs and verbs of speech: the assumption that their sentential complements are arguments, rather than modifiers, as historical linguists have long argued. More recent articulations of that view are Kayne 2008, Arsenijević 2009, Aboh 2010, Moulton 2015, Axel-Tober 2017, and by now many others. In its most radical form, this work challenges the idea that verbs themselves have propositional arguments. There would be no such thing as a propositional attitude verb. We would need to think afresh about the building blocks that natural languages draw on to construct attitude ascriptions and speech reports (Kratzer 2016). This is for the future.

(3)   What do you consider to be the key ingredients in adequately analyzing the phenomenon in question?

My chapter ends with a critical reflection on a commonly assumed, but I think overly rigid, principle of compositionality. I believe that we will not be able to give an adequate analysis of attitude ascriptions and speech reports without loosening the grip of that principle. What hampered progress, I think, was that we were looking for more fine-grained notions of meaning, rather than considering the possibility that the intension of an expression may not merely depend on the intensions of its parts and the way they combine syntactically.

I expect future progress on the semantics of attitude ascriptions and speech reports to come from both the investigation of underrepresented languages and large-scale corpus work. We need to find out as much as we can about the technologies natural languages use to create tools for ascribing beliefs, conveying our own thoughts, and reporting what others say.

I am pursuing a research strategy that takes as its primary input the many different syntactic and morphological structures natural languages use to assemble attitude and speech reports. The goal is to figure out the meanings of those structures and explain how they manage to express the meanings they do. Like any other researcher, I am groping in the dark and am forced to take bets. I am aware that the research strategy I am betting on is just about the opposite of that taken by Hans Kamp (Kamp 2022, this book). Kamp posits representations of mental states reflecting the variety of semantic distinctions found in natural languages. The hope is that those representations can be related to their morphological and syntactic realizations in diverse languages in a realistic way. Even if this is a bit of a leap, the strategy is sure to yield

invaluable insights into how the most intricate semantic distinctions can be represented by interpretable logical forms.

(4)   What do you consider to be the outstanding questions pertaining to the phenomenon in question?

I feel we are only at the very beginning of research into attitude and speech reports. The long-term goal would be a typology of attitude ascriptions and speech reports that is generated from a universal pool of building blocks whose combinatorics produces the range of possible constructions and interpretations found in natural languages. This is the future. My chapter will begin with the past and end in the present. There are foundational issues to get out of the way.

1.1   A Litmus Test for Intensional Semantics

Attitude ascriptions and speech reports were where the action was when logicians began to see natural languages as formal systems with both a syntax and semantics.[1] They have been pivotal for any semantics for natural language ever since, deciding on its success or failure.

In the 1940s, attitude ascriptions and speech reports fueled a correspondence between Alonzo Church and Rudolf Carnap, with Frege towering in the background. Carnap had been a student of Frege's in Jena. Church was "converted" to a Fregean approach to semantics and intensional logic in the late 1930s or early 1940s (Burge 2019: xxii). He wrestled with Fregean systems of intensional logic for almost 50 years, working out revisions of his Logic of Sense and Denotation until shortly before his death (Church 1946, 1951a, 1973, 1974, 1993). Carnap began work on his method of extension and intension in 1942. A first book manuscript, *Extension and Intension*, was drafted in 1943 and sent to Church for comment. Carnap's *Extension and Intension* came out in 1947 with the changed title *Meaning and Necessity*. It contained a proposal for the semantics of belief ascriptions, which triggered controversy and the correspondence with Church.[2]

Carnap's method of extension and intension has become mainstream possible worlds semantics, except that we no longer represent possible worlds via

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[1] A survey of early formal semantics with detailed discussion of Church's and Carnap's work on intensional semantics is Rogers (1963). By then it was no longer a novel suggestion that "semantic analyses carried out with respect to formalized languages are of interest not only to students of such [formalized] languages, but also to those who are especially interested in the semantics of ordinary, unformalized languages" (Rogers 1963: 18). After all, Church had already concluded in 1951 that "although all the foregoing account has been concerned with the case of a formalized language, I would go on to say that in my opinion there is no difference in principle between this case and that of one of the natural languages" (Church 1951b: 106).

[2] The correspondence is published in Burge and Enderton (2019). Thank you to Beau Madison Mount for alerting me to this volume.

state descriptions.[3] The extensions of names are individuals, obviously. Like Frege and Church, Carnap, took the extensions of declarative sentences to be truth values. Many of us still follow Carnap in thinking of propositions as sets of possible worlds or their characteristic functions, of properties as functions from individuals to propositions (Carnap 1947: 181f.), and of intensional relations as functions from pairs of individuals to propositions (Carnap 1947: 182). With a type theory, this can go on, with assignments of extensions and intensions to natural language expressions of all categories.[4] However, Carnap knew all too well that there are syntactic environments that are neither extensional nor intensional. Substitution of extensionally or intensionally equivalent expressions in the complements of attitude verbs and verbs of speech may not preserve the truth value of the attitude ascription or speech report as a whole. Carnap proposed a tighter criterion for substitution in those hyperintensional contexts that required identity of intensional structures.

   Church's contribution to formal semantics is the typed λ-calculus of his *Formulation of the Simple Theory of Types*. Expressions of a typed λ-calculus can represent denotations for all expressions of natural languages, including logical connectives and quantifier phrases.[5] Thinking about the shape of an intensional logic, Church wrote to Carnap on February 9, 1944: "I have in mind although only in vague outline, a system based on that of my *Formulation of the Simple Theory of Types* which I would propose as a treatment of extension and intension, or of denotation along the line of Frege's ideas" (Church 2019, 1045). He continues in the same letter with a sketch of the intended ontology for his future Logic of Sense and Denotation, where the two basic types for individuals and truth values are each replaced by an infinite set of basic types: individuals, senses of individuals, senses of senses of individuals, etc., and truth values, senses of truth values, senses of senses of truth values, and so on ad infinitum. Schoenfinkeled functional types are recursively constructed from basic types, as we still do today.

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[3] Carnap's state descriptions were meant to represent Leibniz's possible worlds or Wittgenstein's possible states of affairs, and were used for the characterization of the notion of L-truth, or analytic truth. Carnap carefully distinguished between possible worlds and representations of possible worlds via state descriptions. Models took the place of Carnap's state descriptions as representatives of possible worlds in Kemeny (1948, 1956a, 1956b), Kanger (1957), Kripke (1959), Montague (1960), Carnap (1963, 1972), and Kaplan (1964). Possible worlds semantics proper, with possible worlds as primitives, began with Kripke (1963).

[4] Intensions construed as functions from possible states of affairs to extensions appear in Kaplan's dissertation under the heading "The Carnap Interpretation" (Kaplan 1964: 61). Lewis (1970) coined the term "Carnapian intensions" for functions from possible worlds to extensions, referring to both Carnap (1947, 1963).

[5] An (extensional) interpretation of the universal quantifier as a function mapping characteristic functions of sets of individuals to truth values appears in Kemeny (1948, 1956a), for example, building on Church's (1940) theory of types.

Contemporary semantic theory has adopted Church's typed λ-calculus, but not his intensional versions with their infinite hierarchies of senses.[6]

   Neither Church nor Carnap thought any version of an intensional semantics could succeed without an account of attitude ascriptions and speech reports. My chapter takes up themes from their correspondence, which are as relevant today as they were then: the problem of logical equivalents, intensional isomorphism, the status of mathematical propositions, and the question whether attitude verbs and verbs of speech establish relations to sentences. After arguing that we should set aside mathematical propositions for the purposes of natural language semantics, I will show that for the truth conditions of belief ascriptions and speech reports, various properties of the embedded complements have to be given a role. Among those properties are properties related to Carnapian intensional structures, but also aspects of the linguistic articulation of those complements and syntactic transforms. I will spell out this idea while holding on to an intensional semantics where propositions are mere sets of possible worlds. I am with Carnap in thinking that the fact that the truth conditions of attitude ascriptions do not merely depend on the intensions of their embedded sentences does not justify the conclusion that propositions cannot be intensions. In the last part of the chapter I will show that allowing semantic derivations to manipulate the shape of the sentences to be evaluated leads to an insightful account of *de re* ascriptions. There is no need for technical devices that serve the exclusive needs of *de re*: no need for movement of *res* arguments in the syntax, concept generator variables (Percus & Sauerland 2003), structured meanings (Cresswell & von Stechow 1982; Cresswell 1985), or Fregean predicate abstraction (Yalcin 2015). We do have to let go of rigid versions of Fregean compositionality, though.[7]

1.2   Intensional Isomorphism and the Problem of Logical Equivalents

A key ingredient of Carnap's analysis of belief sentences is intensional isomorphism. To see what it does, take 1(a) and (b), a pair from Bigelow (1978: 103).

(1)   a. Robin will win.
         b. Everyone who does not compete, or loses, will have done something
            which Robin will not have done.

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[6] Parsons (2001) has an application of Church's (1951a, 1973, 1974) Logic of Sense and Denotation to *de re* attitude ascriptions. Church's intensional semantics has been all but forgotten. What survives is Gallin's intensional extension of Church's typed λ-calculus, which, following Montague, adds a type s for possible worlds to Church's two types ι and o for individuals and truth values (Montague 1970; Gallin 1975).

[7] In a talk entitled "Compositionality or Systematicity?" given remotely at the Franklin Institute on April 19, 2021, Chris Potts reached a similar conclusion from very different premises.

Examples 1(a) and (b) are logically equivalent. They are true in the same possible worlds, hence have the same intensions. Yet a person might believe 1(a), but not 1(b), or the other way round. Carnap's intensional isomorphism draws the right distinction. For Carnap, two sentences are intensionally iso-morphic if they express a proposition that results from combining the same intensions in the same way, following the syntactic structure of the sentence.[8] Examples 1(a) and (b) are not built in the same way, so they cannot be intensionally isomorphic. Two sentences that might be argued to be intension-ally isomorphic are 2(a) and (b), due to Church (2019: 1072).

(2)   a. This man misappropriated his employer's funds.
       b. This man stole his employer's money.

Assuming that *misappropriate* and *steal* have the same intension, and *funds* and *money* do, too, 2(a) and (b) have the same intensional structure. If Carnap is right, then, it shouldn't be possible for a person to admit that they misap-propriated their employer's funds, but deny that they stole their employer's money. To sharpen intuitions about this prediction, we can use a technique from Mates (1952) and look at pairs like 3(a) and (b).

(3)   a. Nobody doubts that if this man misappropriated his employer's funds, he
          misappropriated his employer's funds.
       b. Nobody doubts that if this man misappropriated his employer's funds, he
          stole his employer's money.

Example 3(a) is most certainly true, while 3(b) might be false. Yet as long as *misappropriate* and *steal* have the same intension, and *funds* and *money* do, too, the two sentences embedded under *doubts* are intensionally isomorphic. Hence according to Carnap, it shouldn't be possible for 3(a) and (b) to differ in truth value. Mates (1952) thought that pairs like 3(a) and (b) showed that Carnap was wrong about proposing intensional isomorphism as a criterion for substitution *salva veritate* in hyperintensional environments. However, with this particular example, which is not Mates's, we may reply that, more likely than not, it's not Carnap, but our assumptions about the intensions of *misap-propriate*, *steal*, *funds*, and *money* that are wrong. A penniless boy who took a shilling from his boss's coat pocket stole money, but did not misappropriate funds. In fact, it is very hard to find any English pairs of words that have the exact same intension. Even the well-worn pair *eye doctor* vs. *ophthalmologist* doesn't seem to qualify. While a doctor of optometry is not a doctor of medicine, she has the same claim to the title of an eye doctor as an ophthal-mologist does. Also, a lawyer is not the same as an attorney, I've been told.

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[8] For the time being, I will leave it at this informal characterization of intensional isomorphism. I will give a (still simplifying) recipe in Section 1.5.

And there are subtle intensional differences between adjectives like *skinny* and *scrawny*, or between verbs like *pacify*, *appease*, and *placate*. Natural languages seem to do their best to avoid pairs of words with identical intensions. There is a possible explanation for this. There is a well-known constraint on word learning, the Mutual Exclusivity Constraint, biasing young children – and apparently even clever dogs – against taking new labels to stand for things that have labels already (Markman & Wachtel 1988; Pilley 2013).[9] It's not obvious, then, whether Carnap's analysis of attitude ascriptions can be brought down with pairs like 3(a) and (b) in any interesting way. That's also not why Church brought up those examples to begin with.

In his letter from February 24, 1954, Church plays along with Carnap's claim that "whoever believes a sentence must therefore also believe all intensionally isomorphic sentences" (Church 2019: 1071)[10] and mentions the pair 2 (a), (b) as part of an argument supporting Carnap's claim.

Indeed there does seem to be a difference in principle between the case of the man who admits that he has misappropriated his employer's funds but denies that he has stolen his employer's money (I assume for the sake of the argument that the two sentences are intensionally isomorphic), and the case of Fermat, who believed that $2^{32} + 1$ is prime, but disbelieved the L-equivalent sentence, that $2 + 2 = 5$. For it is reasonable to say of the thief that he knows in his heart that he has stolen, and is engaging in empty verbalism in refusing to use the word. But it would be very unreasonable to say the parallel thing about Fermat, that because he knew that $2 + 2 \neq 5$, therefore he really knew that $2^{32} + 1$ is composite and only refused to admit it. On the contrary, Fermat's belief was genuine, and the later proof by Euler that $2^{32} + 1$ is composite rather than prime has the status of a minor mathematical discovery. (Church 2019: 1072)

In this passage, Church points out a striking difference between 2(a), (b) on the one hand, and 4(a), (b) on the other:

(4)   a. $2 + 2 = 5$.
           b. $2^{32} + 1$ is prime.

While a person may give opposite responses to two intensionally isomorphic sentences like 2(a), (b), Church thinks that "it can be argued that it is reasonable in this case just to accept the consequence of the theory, that despite the

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9 Williamson (2020) mentions *furze* and *gorse*, which are names for one and the same kind of shrub. If names of natural kinds are directly referential (Putnam 1975), the fact that a person can believe that furze has yellow flowers, but gorse doesn't, can be given an analysis of *de re* ascriptions along the lines mentioned in note 19 below. Those two beliefs can be distinguished, even though the sentences that report them are intensionally isomorphic.

10 Church is being helpful here and is setting aside his disagreement with Carnap on the issue whether the objects of belief are sentences or more abstract entities like propositions. In this letter, except for the very end, he "kept in abeyance" the arguments of his paper in *Analysis* "which purport to show that, in analyzing statements of assertion and belief, the object of an assertion or belief must be taken to be a proposition rather than a sentence" (Church 2019: 1073).

overt responses he really either believes both sentences or believes neither"
(Church 2019: 1072). What Church is saying is that, assuming that *misappro-priate* and *steal* have the same intension, and *funds* and *money* do, too, I could
not sincerely assert 2(a), but deny 2(b), if I knew what those words mean. My
using learned words when asserting 2(a) wouldn't protect me from contradict-ing myself when denying 2(b). Church suggests that Carnap's intensional
isomorphism might account for this kind of intuition. If 2(a) and (b) are
intensionally isomorphic, it should be possible to substitute one for the other
anywhere *salva veritate*. Example 5(a) and (b) should be logically equivalent,
then, and whoever says (6) might be accused of contradicting themselves.

(5)   a. This man believes that he misappropriated his employer's funds.
       b. This man believes that he stole his employer's money.

(6)   I admit that I misappropriated my employer's funds, but I deny that I stole my
       employer's money.

Church is contrasting the case of the thief who stole money with the case of
Fermat, who had a wrong belief about prime numbers. Unlike 2(a) and (b), 4(a)
and (b) are mere logical equivalents, they are not intensionally isomorphic.
Hence if Carnap is right, says Church, we shouldn't expect that one can be
substituted for the other in sentences embedded under attitude verbs and verbs of
speech *salva veritate*. This expectation seems to be borne out. On Carnap's
analysis, 7(a) and (b) are not predicted to be logically equivalent. And, intui-tively, they aren't. Example 7(b) happens to be true, but 7(a) is most certainly
false. There is also no sense whatsoever that Fermat had contradictory beliefs.

(7)   a. Fermat believed that $2 + 2 = 5$.
       b. Fermat believed that $2^{32} + 1$ is prime.

Should we conclude, then, as Church suggests, that it's Carnap's intensional
isomorphism that explains the striking difference he drew attention to? Is the
reason that 7(a) and (b) can differ in truth value that the two embedded
sentences, while being logically equivalent, are not intensionally isomorphic?
I don't think that would be the right conclusion to draw.

Look again at Bigelow's pair 1(a), (b). The beauty of Bigelow's example is that
it's not a mathematical example and it doesn't use fancy words. Examples 1(a)
and (b) are logical equivalents, but they are not intensionally isomorphic. They are
constructed from different building blocks. On Carnap's analysis, since 1(a) and
(b) are not intensionally isomorphic, 8(a) and (b) are not logical equivalents, and it
should thus be possible for 8(a) and (b) to have different truth values.

(8)   a. Marian believes that Robin will win.
       b. Marian believes that everyone who does not compete, or loses, will have
           done something Robin will not have done.

Examples 8(a) and (b) can have different truth values. It seems to me, though, that the pair 8(a), (b) is not that different from the pair 5(a), (b) with respect to the question we are probing into. That is, whatever Marian's initial responses to sentences 1(a), (b) may be, we could try to convince her that it is simply impossible for her to believe one, but not the other. In the back of my mind, I hear myself starting an argument with Marian: Listen, Marian – don't you see that if Robin loses, she will be among those who either don't compete or lose? But wouldn't 1(b) then imply that Robin will have done something she hasn't done? Whatever my success with Marian may be, no such strategy could be employed to convince anybody that if Fermat believed 4(b), he also believed the contradiction in 4(a).

To have a bigger sample to test intuitions, compare the cases in (9) to the parallel cases in (10).

(9)   a. We took for granted that Robin won, but we didn't take for granted that everyone who didn't compete, or lost, did something Robin didn't do.
        b. They all agreed that Robin won, but they didn't agree that everyone who didn't compete, or lost, did something Robin didn't do.
        c. It was established that everyone who didn't compete, or lost, did something Robin didn't do, but it was never established that Robin won.
        d. We were informed that everyone who didn't compete, or lost, did something Robin didn't do, but we were never informed that Robin won.

(10)   a. We took for granted that $2 + 2 \neq 5$, but we didn't take for granted that $2^{32} + 1$ isn't prime.
        b. They all agreed that $2 + 2 \neq 5$, but they didn't agree that $2^{32} + 1$ isn't prime.
        c. Euler established that $2^{32} + 1$ isn't prime, but he never established that $2 + 2 \neq 5$.
        d. We were informed that $2^{32} + 1$ isn't prime, but we were never informed that $2 + 2 \neq 5$.

Examples 1(a) and (b) are true in the same possible worlds. In possible worlds semantics they thus express the same proposition. When the two sentences are embedded under different verbs, as in 9(a) to (d), the question we are asking ourselves is whether the way p is put into words gives a faithful representation of whatever was taken for granted, agreed on, established, or conveyed by the information given. More generally, 9(a) to (d) raise the question whether the way p is put into words matters at all for the truth of the sentence as a whole. If it doesn't, then 9(a) to (d) are plain contradictions. One and the same proposition is taken for granted and not taken for granted, agreed on and not agreed on, established and not established, and contained and not contained in the information given to us. I myself am inclined towards a contradictory interpretation for 9(a) to (d). But my intuitions are far from firm and clear, and I am not out to push judgments in one or the other direction. What I find truly remarkable, though, is that similar questions do not even arise

with 10(a) to (d). Here judgments *are* firm and clear. Examples 10(a) to (d) are not contradictory on anybody's watch. What we should conclude, then, is that it's not the lack of intensional isomorphism of the embedded complements that protects 4(a) and (b) from being perceived as contradictories. The members of the pair 1(a), (b) aren't intensionally isomorphic, yet questions of consistency still come up, and can be insisted on, when one member of the pair is affirmed and the other denied. The difference that matters seems to be a difference between mathematical and nonmathematical cases of logical equivalents.

1.3   Setting Aside Mathematical Propositions

Contemporary possible worlds semantics largely neglects the problem of logical equivalents. We tend to close our eyes and cover our ears when the issue is raised. This is a more recent attitude. Even in the eighties, we still worried greatly. We still thought the problem shook the foundations of our discipline. Many were ready to walk away from possible worlds semantics, others launched defenses.[11]

> . . . possible worlds construals of properties and propositions precipitate what, at least for certain purposes, look like too weak identity criteria: any two entities that have the same extension at all worlds are identified. Thus, in particular, any two logically equivalent structures are collapsed into the same object. (Chierchia, Partee, & Turner 1989: 2)

I am glad we forgot about mathematical statements for a while, mentioned them no more. I now think we should unashamedly and unapologetically set them aside. I think that failing to recognize the difference between mathematical and nonmathematical cases of logical equivalents sent us down a wrong path. We thought it was unavoidable to adopt more structured, more fine-grained, notions of propositions that mirror the way linguistic expressions are built. As Richard (1990: 16) put it, "we have a reason – not demonstrative, but a reason nonetheless – for supposing that propositions have a structure that, to some extent, apes that of the sentences expressing them."

   I think it was too quick to jump to the conclusion that propositions have a structure that "apes that of the sentences expressing them." At least for mathematical propositions, we should have considered the possibility that there might be a more fine-grained, structured, reality that our statements could be about. The content of what we say does not only distinguish between possible worlds. It may also distinguish between mathematical systems. If there is a line and a point not on it, for example, the question whether there is exactly one, none, or infinitely many lines through that point that doesn't intersect the first

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[11] To get a sense of the worries, see Cresswell (1985) and the papers in the two volumes of
    Chierchia, Partee, and Turner (1989), for example.

line depends on the system of geometry assumed. It doesn't depend on the way a world might be. This brings us to Bricker (1983, 2020).

For Bricker, mathematical propositions are contingent. While being true in all possible worlds, they don't have to be true in all mathematical systems. "That every number has a square root is contingent, true in some mathematical systems and not others, just as that every house has a square window is contingent, true in some worlds and not others" (Bricker 2020: 19).

Statements do not neatly divide into mathematical and nonmathematical ones, however. There are mixed cases, as illustrated in (11), from Mates (1952).

(11)   a. Jones believes that he has one nose.
       b. Jones believes that the number of his noses is equal to $-e^{\pi\,i}$.

(Mates 1952: 214)

For a theory that distinguishes mathematical, nonmathematical, and mixed statements, we may turn to Bricker (1983) and evaluate statements with respect to pairs $<w, \sigma>$ consisting of a possible world w and a mathematical system σ. Nonmathematical statements only place a condition on the world of such pairs, mathematical statements only affect the mathematical system, and mixed statements target both. To illustrate, the nonmathematical statement 1(a) would be true at any $<w, \sigma>$ just in case 1(a) is true in w. In contrast, the mathematical statement 4(a) would be true at any $<w, \sigma>$ just in case 4(a) is true in σ.

I took Church's observation as pointing to a striking difference between mathematical and nonmathematical propositions. Bricker (1983) gave us the formal tools to distinguish the two. Mathematical propositions are 'nonworldly', they impose no constraints on the possible worlds where they are true. Nonmathematical propositions are 'worldly', they impose no constraints on the mathematical systems where they are true.[12] Mixed propositions are neither worldly nor nonworldly.

Worldly and Nonworldly Propositions
Propositions are subsets of $W \times M$, where W is the set of possible worlds and M is the set of possible mathematical systems. A proposition p is worldly iff whenever $<w, \sigma> \in p$ for some mathematical system σ, then $<w, \sigma> \in p$ for all mathematical systems σ. A proposition p is nonworldly iff whenever $<w, \sigma> \in p$ for some world w, then $<w, \sigma> \in p$ for all worlds w.

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[12] My worldly propositions correspond to Bricker's "thoroughly contingent propositions," assuming that the mathematical worlds of Bricker (1983) can be identified with mathematical systems, as in Bricker (2020). "Now a proposition is thoroughly contingent just in case whenever it is true at a possible world relative to one mathematical world, it is true at that possible world relative to all mathematical worlds. That captures the idea that a thoroughly contingent proposition says nothing about mathematics" (Bricker 1983: 103f.). I changed the terminology to avoid possible confusion about the term "contingent."

It follows from this definition that the empty proposition and the universal proposition W × M are both worldly and nonworldly.

Since worldly propositions carry no information about mathematical content, we might as well identify them with the set of possible worlds where they are true. This delivers the standard notion of proposition in possible worlds semantics, which is the notion of proposition that I will be concerned with in the rest of the chapter.[13]

The Standard Theory of Propositions
Propositions are subsets of W, where W is the set of all possible worlds.

I will set aside nonworldly and mixed propositions. Nonworldly and mixed propositions are not banned from semantic theory altogether, though. They are still there at the foundation. The full theory still needs to come in when we want to account for what imaginary mathematicians might say to each other in Kreyòl, Igbo, Farsi, Arabic, Japanese, or English when gathering in places like Oberwolfach, talking mathematics from dawn to dusk. No doubt, the languages those scholars speak *are* natural languages – Kreyòl, Igbo, Farsi, Arabic, Japanese, or English. Yet mathematicians have additional knowledge most of us don't have. They know how to relate statements in their native language not only to possible worlds, but also to complex mathematical systems. This kind of knowledge is not part of every native speaker's knowledge of language. Yet it's knowledge that seamlessly blends in with every native speaker's knowledge of language. All natural languages come with an architecture that makes talk about mathematical systems possible.[14]

To conclude, as practitioners of natural language semantics, we can legitimately set aside mathematical propositions. That doesn't mean, though, that all challenges to standard possible worlds semantics have now gone away. We are still forced to identify propositions that are true in the same possible worlds, and we thus still only have a single logically true and a single logically false proposition to play with. But once we have set mathematical propositions aside, formal semantics for natural languages becomes a different game.

1.4   Logically Equivalent Propositions and Their Guises

That logical equivalents might spell trouble for possible worlds semantics, even after setting aside mathematical propositions, was already illustrated by

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[13] I am neglecting here for mere convenience the important fact that there is also spatiotemporal dependence, and possibly other dependencies, for propositions expressed in natural languages. None of those dependencies helps with the problem of logical equivalents.

[14] See e.g. the MIT-Haiti Initiative described in DeGraff (2020).

Bigelow's pair 1(a), (b). The problem is brought out even more dramatically with 12(a) from Williamson (2020: 246).

(12)   a. Jack does not know whether it is not not not not not not not not not not not both raining and not raining.

            b. Jack doesn't know whether it's snowing if it's snowing.

If there is just one logically true proposition – the set of all possible worlds, and just one logically false proposition – the empty set, then 12(a) is a complicated way of saying that Jack doesn't know which of those two propositions is true. The interrogative complementizer *whether* in 12(a) and (b) embeds the exact same proposition. In possible worlds semantics, 12(a) is a complicated way of saying things like 12(b).[15]

Like any other proposition, the logically true and the logically false proposition can present themselves clothed in a boundless variety of different wordings. Suppose you have it in for Jack and insist on 12(a). I can defend him by accusing you of falling prey to an analogue of Eubulides's fallacy of the veiled man.

Fallacy of the Veiled Man

ME: (pointing at a veiled man) Do you know this man?
YOU: No.
ME: This man is your father. So you don't know your father.

Fallacy of the Veiled Proposition

YOU: Do you know whether it is not not not not not not not not not not not both raining and not raining?
JACK: No.
YOU: The proposition that it is not not not not not not not not not not not both raining and not raining is the same as the proposition that it's snowing if it's snowing. So you don't know whether it's snowing if it's snowing.

The lesson from the fallacy of the veiled man is that not recognizing your father under some guise doesn't mean you don't know your father. Likewise, Jack's not recognizing the logically true proposition under the guise of some sentence doesn't mean that he doesn't know whether that proposition is true. He might recognize the proposition under the guise of some other sentence.

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[15] The denotation for *whether* I am assuming is: $\lambda p \, \imath q \, (((q = p) \vee (q = \neg p)) \, \& \, q(w_0))$. That is, when embedded under a verb like *know*, the *whether*-clause picks out the mentioned proposition or its negation, whichever is true in the world of evaluation, the actual world in this case.

Williamson (2020: 250) suggests that a knowledge ascription like 12(a) would be less concisely, but more accurately, formulated as (13):

(13)   Jack does not know under the guise of the sentence "It is not not not not not not not not not not both raining and not raining" whether it is not not not not not not not not not not both raining and not raining.

Believing a proposition under the guise of a sentence is a particular way of believing that proposition. Williamson's proposal for knowledge ascriptions thus falls in the category of "nonnaïve" analyses of attitude ascriptions in the sense of Crimmins (1992). For Crimmins, nonnaïve analyses of attitude ascriptions involve a three-place, rather than a mere two-place, relation. The relation connects a holder of the attitude, a proposition, and a way of believing that proposition.

For 12(a), Williamson takes the guise to be the mentioned English sentence, as spelled out in (13). What exactly is the theoretical status of the relation between 12(a) and (13), though? For Williamson, 12(a) is a "fast and frugal" (Williamson 2020: 250) shortcut for (13). What relates 12(a) and (13) is a convenient, but fallible, heuristic. The more accurate statement (13) is clumsy. It uses the sentence embedded under *whether* twice: once as the guise, and once to convey a proposition. Why bother to spell out the guise if it's so obvious what it is? Why fuss over use versus mention of one and the same sentence – you can't hear the difference anyway? There are good reasons, then, why humans might use a heuristic that reduces (13) to 12(a).

The proposal that attitude ascriptions may involve three-place relations between people, guises, and propositions is momentous for possible worlds semantics. If defensible, it might salvage the much contested idea that the kinds of propositions semanticists are interested in are mere sets of possible worlds. Yet Williamson's implementation of the proposal needs more scrutiny. There is a snag. Look at (14).

(14)   Thousands of students around the globe do not know whether it is not not not not not not not not not not both raining and not raining.

Example (14) might report the conclusion of an experiment where thousands of students around the globe were given translations of Williamson's sentence in their native languages to test their logical deduction abilities. If (14) was the result of the very same shortcut that led from (13) to 12(a), the fully articulated version of (14) would be expected to be 15(a). But that expectation is not borne out. The fully articulated version is a sentence like 15(b).

(15)   a. Thousands of students around the world do not know under the guise of the sentence "it is not not not not not not not not not not not both raining and not raining" whether it is not not not not not not not not not not not both raining and not raining.

  b. Thousands of students around the world do not know under the guise of
     the sentence "it is not not not not not not not not not not not both raining
     and not raining" **or a translation of that sentence** whether it is not not
     not not not not not not not both raining and not raining.

Cases like (14) point to a more systemic problem. Williamson's proposal is
vulnerable to Church's (1950) translation argument. Here is how the argument
might go in this case. We begin by noting that there are perfect translations of
12(a) into whatever language you may choose. Let's pick a German translation
(no glosses needed).

(16)   Jack weiß nicht ob es nicht nicht nicht nicht nicht nicht nicht nicht nicht nicht
        nicht der Fall ist, dass es sowohl regnet als auch nicht regnet.

Example (16) is a good translation of 12(a). Minimally, good translations of a
sentence should be logically equivalent to the original. Examples 12(a) and (16)
should be logically equivalent, then. Following Williamson, the fully articulated
version of 12(a) is (13), which reports that Jack doesn't know the logically true
proposition under the guise of the mentioned English sentence. But the fully
articulated version of (16) is a sentence that reports that Jack doesn't know the
logically true proposition under the guise of the mentioned German sentence.
But then 12(a) and (16) aren't logically equivalent. Consequently, (16)
shouldn't be a good translation of 12(a). In fact, there couldn't be a good
translation of 12(a) into any language. That consequence isn't right.

Church's translation argument was a major topic in his correspondence with
Carnap. Church used it against Carnap's analysis of belief sentences. Carnap
vigorously resisted the attack. That resistance is relevant to my project here. If
Carnap was right in insisting that Church's argument didn't apply to his analysis,
we might be able to pursue a Carnapian analysis of attitude ascriptions and speech
reports that solves the problem of logical equivalents without running into Church's
translation argument. This is the path I am going to explore in what follows.

1.5   Carnapian Intensional Structures Again

Carnap (1956, 1963) defends the idea that the belief relation is a relation to
sentences. He points out that a person can be related to a sentence in many
ways. There could be a belief-relation B so that for Pythagoras to stand in the
B-relation to the English sentence "The earth is round," he doesn't have to be
disposed to an affirmative answer to that English sentence, nor does he even
have to know English. Pythagoras can stand in the B-relation to the English
sentence "The earth is round" just in case he stands in the B-relation to some
intensionally isomorphic sentence in some language (Carnap 1956: 231f.).
Two sentences are intensionally isomorphic if they have the same intensional
structure. What are intensional structures, though? Carnap himself doesn't give

us a definition of what intensional structures are.[16] He only defines intensional isomorphism, a relation between linguistic expressions. Here is a recipe for building intensional structures that will do for our purposes here.

Recipe for Intensional Structures and Intensional Isomorphism
Take a sentence and parse it into syntactic constituents, assuming at most binary branching (Heim & Kratzer 1998). Next, identify nonterminal syntactic constituents with the unordered set of their daughters. Finally, replace terminals with their intension.

Here is an illustration of what an intensional structure for a simple sentence may look like. For any expression α, $[\![\alpha]\!]$ is the intension of α.

Illustration of Intensional Structure
Syntactic parse   [*Marian* [*believes* [*that* [*Robin* [*will win*]]]]]
Intensional structure {$[\![$*Marian*$]\!]$, {$[\![$*believes*$]\!]$, {$[\![$*that*$]\!]$, {$[\![$*Robin*$]\!]$,
                       {$[\![$*will*$]\!]$, $[\![$*win*$]\!]$}}}}}

The terminal elements, the minimal building blocks, for a syntactic parse are usually morphemes, but bigger building blocks may have to be considered on a case-by-case basis. Sometimes, morphemes don't have intensions at all, only constructions they are part of do. Also, we often want to be able to compare intensional structures in different languages, and different languages don't always package meanings in the same way. One language may have a single morpheme for a meaning that another language distributes over two. Another difference between languages concerns linear order. Linear order of constituents doesn't seem to matter for semantic interpretation, only their hierarchical relationship does (Heim & Kratzer 1998). This is why intensional structures can be unordered sets. Intensional structures are semantic entities. They are not linguistic expressions in any particular language, even though they may reflect syntactic properties of linguistic expressions.

Without a definition of intensional structures, Carnap ended up with a much-criticized belief-relation that related people and sentences in possibly very indirect and artificial ways. If Carnap had taken propositions to be intensional structures, his semantics for *believe* could have related people and intensional structures. The intension of *believe* could have been a function mapping pairs of individuals and propositions to propositions, the kind of intension Carnap posited for other transitive verbs. What held him back? I think it wouldn't be

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[16] Definitions are given in Lewis (1970), Cresswell (1975), Bigelow (1978), and Cresswell (1985). These works explore an "analysis of propositions which assumes that they are *structured* entities and that the clue to their structure is found in the sentences that express them. And we want to do this while preserving the highly desirable connection with the possible worlds approach to semantics" (Cresswell 1975: 27).

too bold a speculation to say that he knew that such an intension was not an option. Take (17).[17]

(17)   Rose believes that Marian believes that Robin won.

If ⟦*believe*⟧ – the intension of *believe* – were a function operating over intensional structures, then, in the case of (17), it would have to operate over a set, one of whose members has ⟦*believe*⟧ as a member, leading to paradox:

Paradox Lurking
{⟦*Marian*⟧, {⟦*believes*⟧, {⟦that⟧, {⟦*Robin*⟧, ⟦won⟧}}}}

Cresswell (1985) suggests that we can avoid paradox in most cases by being flexible about the choice of minimal building blocks for intensional structures. In the case of (17), for example, Cresswell would allow the intensional structure {⟦*Marian*⟧, ⟦*believes that Robin won*⟧}, a set that no longer contains a set containing the intension of *believe*. Cresswell thinks that "most cases of iterated attitudes can be accommodated in this way. The remaining ones appear to have a 'believe' that really does make reference to itself" (Cresswell 1985: 91). In that case, Cresswell says, one could have recourse to a type theory like that of Church (1951a), which has an infinite hierarchy of different meanings of *believe*. The lower *believe* could operate over senses of senses of propositions. The higher *believe* could operate over senses of propositions, and the whole sentence would express a proposition. This proliferation of types is precisely what Carnap's method of extension and intension was out to avoid. This avoidance came at a price, though. In *Meaning and Necessity*, the verb *believe* all by itself isn't given any interpretation at all, it is interpreted syncategorematically (Carnap 1956: 62). For Carnap, the truth of a belief ascription depends on a relation between the believer and a sentence, and that relation in turn depends on the intensional structure of the sentence. But his is not a theory of structured meanings. For Carnap, embedded sentences do not denote intensional structures, the verb *believe* does not denote a function that

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[17] The danger of paradox with iterated hyperintensional operators is discussed in Cresswell (1975). Iterations of hyperintensional operators were ever-present in the correspondence of Church and Carnap at least since Church's letter of February 9, 1944, when Church described to Carnap his own ideas of an intensional typed *λ*-calculus with its infinite hierarchies of the two basic types for individuals and truth values. In this letter, Church was responding to Carnap's manuscript *Extension and Intension*: "I believe that the same considerations which make it necessary on the basis of the method of denotation to introduce not only senses of names but also senses of names of such senses, and so on to infinity, will compel us on the basis of the method of extension and intension to introduce not only intensional places but also intensionally intensional places, and so on to infinity. Hence I venture to prophesy that the method of extension and intension, when fully worked out and formalized, will be found to be less simple and convenient than the method of denotation" Church (2019: 1047).

operates over intensional structures. To accommodate hyperintensional contexts, Carnap was willing to compromise on Fregean compositionality.

1.6   Combining Carnap and Hintikka

What we say and believe cannot be intensional structures. That idea would land us in the jaws of paradox. What if propositions were just sets of possible worlds, but might be presented under guises, as Williamson has suggested? Can we get around Church's translation argument?

Properties of guises may not be that obvious in attitude reports, but they can be very present in speech reports. Speech reports can mimic prosody, an accent, or stammering, as in the following sentence (Partee 1973: 326).[18]

(18)   She giggled that she would feel just too, too, liberated if she drank another of those naughty Martinis.

Embedded sentences can play multiple roles. In addition to contributing a proposition, they can also indicate properties of the guise under which the proposition is presented. Among those properties is the property of having a particular intensional structure. The computation of meanings may have to retrieve multiple properties from one and the same sentential complement, then.

Below I spell out a meaning rule for *say* that formalizes the idea that in speech reports, propositions may be presented under guises, and that among the properties of guises, intensional structure may be the relevant factor. The rule doesn't run into paradox, nor is it vulnerable to Church's translation argument. The rule is presented as a prototype illustrating a design idea for interpretations of verbs of speech. Since the rule is sensitive to intensional structure, but not to other potential properties of guises, it is equally relevant for attitude verbs. Depending on the verb and context, there may be more or less sensitivity to intensional structure. In fact, we already saw variation with respect to sensitivity to intensional structure in 9(a) to (d) above. Depending on the verb and context, the rule could be adapted to be sensitive to other properties of the original utterance, too, like those exemplified in (18).

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[18] Partee's sentence shows that speech reports can be iconic: the way the embedded complement is realized in the actual speech context mirrors properties of the reported speech event. Davidson (2015) presents an account of iconicity in speech reports that makes a connection with iconicity in sign languages. Bary and Maier (2020) survey the entire landscape of speech reports from a crosslinguistic perspective. As they make clear, some of the iconic meaning components conveyed in speech reports are not truth-conditional, but use-conditional, not-at-issue, meaning components. The stammering in (18) is of this kind. For theories of use-conditional meanings see Potts (2005) and Gutzmann (2015, 2019). Hunter and Thompson's chapter in this book (Hunter & Thompson 2022) also discusses not-at-issue meaning components.

For the following, assume that $[\![\ ]\!]$ is a function assigning to English expressions their intension, and that $[\![\ ]\!]_I$ is the associated function assigning intensional structures.

Prototype of a Rule for Say
$[\![\ \ulcorner \text{ say that } \alpha \urcorner \ ]\!](x)(w) = 1$ iff there is a sentence α' in any language L so that

(i)   the intensional structure of α' as a sentence of L is $[\![\alpha]\!]_I$,
(ii) x says α' in w and her saying α' is an assertion,
(iii) in all worlds w' that are not ruled out by x's assertion in w, $[\![\alpha]\!](w') = 1$.

As stated, the rule assumes that English *say* (as used in our metalanguage) compositionally combines with direct objects referring to linguistic expressions. We say a few words, a prayer, the same sentence in different languages. English *say* would not compositionally combine with a *that*-clause, then. I posited a noncompositional, syncategorematic rule for this case. This raises a question about intensional structures for sentences containing *say*. To illustrate, look at (19).

(19)   Rose said that Marian said that Robin won.

When constructing the intensional structure of (19), we have to replace the two occurrences of *say* and the two occurrences of *that* by their intensions. The intension of *that* could be the identity function from propositions. I have assumed that the intension of *say* is a function that operates over linguistic expressions, not propositions. In the intensional structure for (19), then, the intension of *say* could not combine with the intension of its sister constituent. Technically, this is not a problem. Given my recipe, there is no requirement that the intensions figuring in intensional structures have to be able to semantically compose with each other.[19]

According to my rule, when *say* embeds a *that*-clause, there is an implication that a sentence was produced in some language, and that that sentence had the same intensional structure in its language as the sentence embedded under *say* in English. The rule introduces a Carnapian intensional isomorphism requirement (Carnap 1956: 62). But the semantics is still a Hintikka semantics

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[19] Eventually, we would look for a more insightful way of relating the two uses of *say*. Kratzer (2016) argues that transitive attitude verbs and verbs of speech generally have the same interpretations in constructions with *that*-clauses and in direct object constructions like *say a few words*, *believe a rumor*, *think outrageous thoughts*, *suspect a murder*, etc. The source of the semantic differences between the two constructions is in the *that*-clause. On the analysis of quotation in Maier (2020), for example, it's not *say* that is treated syncategorematically, but an operator in the embedded clause.

(Hintikka 1962), and the propositions expressed by the sentential complements of *say* are mere sets of possible worlds. The rule holds up against Church's translation argument,[20] and distinguishes structurally different logically equivalent sentences. In the way of illustration, look at the pair of Bigelow sentences in 20(a) and (b).

(20)   a. Marian said that Robin won.
        b. Marian said that everyone who did not compete, or lost, did something Robin did not do.

Imagine perfect translations for 20(a) and (b), which I will refer to as 21(a) and (b) – no reason to bother with actual translations. Assume that perfect translations are intensionally isomorphic. The embedded sentences of 20(a), 20 (b), 21(a), and 21(b) all express the same proposition. The members of the pair 20(a) and 21(a), as well as the members of the pair 20(b) and 21(b), are perfect translations of each other by assumption. Given my rule, the members of each pair also wind up as logical equivalents. In contrast, the members of the pair 20 (a) and 21(b), or the pair 20(b) and 21(a), can't be considered translations of each other on anybody's watch. They also don't come out as logical equivalents on my analysis.

Regarding condition (ii) of the definition, it's important to see that merely saying a sentence doesn't necessarily commit you to the truth of what you said. In contrast, imagine, for example, that you said that you had dinner in New York. In that case, you didn't just utter an example sentence. You made an assertion (Brasoveanu & Farkas 2007).

Finally, condition (iii) brings in a standard Hintikka-style semantics. Figure 1.1 gives the essential steps of the computation of the truth conditions of (19).

The rule for *say* distinguishes between logically equivalent structurally distinct sentential complements. This is no small thing. But – following the precedent of Carnap – the rule also commits what might be considered a mortal sin in contemporary formal semantics. It does not obey a principle of compositionality that says that the meaning of a sentence is a function of the meanings of its parts and the way they are put together. My meanings are intensions, but the truth conditions of a sentence like (19) do not just depend on the intensions of its parts. The intensional structure of embedded sentences plays a role, too. This violation of compositionality is no small thing either. What to do? Which way to go? In the next and final section of this chapter

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[20] Clause (i) is a modern way of implementing Carnap's way of making reference to intensional structures in definition 15-1 of *Meaning and Necessity*. My take on Carnap's definition is in line with his corrected definition 15-1 in the second edition of *Meaning and Necessity* (Carnap 1956 vs. 1947: 62).

⟦*said that* [*Marian said that Robin won*] ⟧(Rose)(w$_0$) = 1 iff

In w$_0$, Rose said a sentence that was intensionally isomorphic to *Marian said that Robin won*, her saying that sentence was an assertion, and in all worlds w that are not ruled out by Rose's assertion in w$_0$, ⟦*said that Robin won*⟧(Marian)(w) = 1 iff

In w$_0$, Rose said a sentence that was intensionally isomorphic to *Marian said that Robin won*, her saying that sentence was an assertion, and in all worlds w that are not ruled out by Rose's assertion in w$_0$, Marian said a sentence that is intensionally isomorphic to *Robin won*, her saying that sentence was an assertion, and in all worlds w' that are not ruled out by Marian's assertion in w, Robin won.

Figure 1.1 Computation of truth conditions for (19)

I will present another case for a compositionality violation with attitude and speech reports. I will show that allowing syntactic transforms of embedded sentences in the derivation of truth conditions leads to an insightful account of *de re* ascriptions in the spirit of Kaplan (1968–69).

1.7   *De Re* Ascriptions

My meaning rule for *say* identifies the proposition conveyed by the reported speech event with that expressed by the sentential complement of *say*. This identification is not always made in speech reports, nor is an analogous identification made in attitude ascriptions. To illustrate, take Quine's Ortcutt (Quine 1956). There was that man in a brown hat who Ralph glimpsed on several occasions under questionable circumstances and who he thought was a spy. And there also was that grey-haired man who Ralph was aware of as a pillar of his community and who he had seen once at the beach. Unbeknownst to Ralph, those men were one and the same, Bernard J. Ortcutt. Suppose C_1 is an individual concept that assigns to every possible world w (in its domain) the unique man in w that Ralph glimpsed with a brown hat under questionable circumstances, and C_2 is an individual concept that assigns to every possible world w (in its domain) the unique grey-haired man in w that Ralph was aware of as a pillar of his community and who he had seen the beach. Then Ralph believed the proposition $\lambda w\ \text{spy}(C_1(w))(w)$, but he didn't believe the proposition $\lambda w\ \text{spy}(C_2(w))(w)$. Our semantics has to make clear how the proposition $\lambda w\ \text{spy}(C_1(w))(w)$, which is a proposition Ralph actually believes, is related to the distinct proposition expressed by the embedded sentence of (22), which is $\lambda w\ \text{spy}(\text{Ortcutt})(w)$ – the same proposition as $\lambda w\ \text{spy}(C_1(w_0))(w)$.

(22)   Ralph believes Ortcutt is a spy.

To make connections like that between $\lambda w\ \text{spy}(\text{Ortcutt})(w)$ and $\lambda w\ \text{spy}(C_1(w))$ (w) in Quine's example is the major challenge for any account of *de re* ascriptions. The following definition is a step towards making that connection.

Transforms for De Re *Ascriptions*
If α is any sentence, then α' is a transform of α for a person x in world w iff α' differs from α at most in that one or more referential expressions δ have been replaced by suitable definite descriptions δ' so that:

(i) $[\![\delta]\!](w) = [\![\delta']\!](w)$
(ii) there is an acquaintance relation R so that for all w′, $[\![\delta']\!](w') = \iota y\ R(x, y, w')$.

Referential expressions are names of individuals and kinds, referential pronouns, demonstratives, and referential definite descriptions. I didn't mention variables and traces in this list, for good reasons, which I will get to shortly. For this definition to work, assume that definite descriptions denote individual concepts, and referential expressions denote constant individual concepts.

For Quine's example, the definition of transforms has the effect that 23(b) winds up as a transform of 23(a) for Ralph in the actual world, assuming Quine's story is true.

(23)   a. Ortcutt is a spy.
          b. The man Ralph glimpsed with a brown hat under questionable circumstances
               is a spy.

Example 23(b) results from 23(a) by replacing the name *Ortcutt* with a long definite description denoting C_1.[21] The conditions for transforms seem satisfied, since $[\![Ortcutt]\!](w_0) = C_1(w_0)$, and for all worlds w′, $C_1(w')$ is the unique man Ralph is related to by having glimpsed him with a brown hat under questionable circumstances. This relation is an acquaintance relation. The definite description used as a replacement for the name *Ortcutt* seems suitable,

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[21] A distinctive feature of my approach to *de re* ascriptions is that it pairs names, not individuals, with descriptions. If an individual is referred to by several names, then, it would be contextually appropriate for the choice of description to be sensitive to the name that is being replaced. My analysis is thus not vulnerable to the argument Lederman (2021) constructed against the concept generator approach of Percus and Sauerland (2003). An important type of acquaintance relations relates us to individuals (including kinds) via their names. For example, as mentioned in note 9, *furze* and *gorse* name the same kind, but Ed may be acquainted with the flowering stage of the plant under the name *furze*, but with the flowerless, brown, stage of the plant under the name *gorse*. Consequently, Ed may believe that the hill is covered with gorse but may at the same time also believe that it is not covered with furze (Lewis 2020b: 125). On a Lewisian analysis, there would be two counterparts of the actual kind gorse/ furze in Ed's doxastic alternatives, one called *gorse*, the other called *furze*.

too. What is it that makes a description suitable, though? The question is discussed at length in Sharvit and Moss's chapter in this book (Sharvit & Moss 2022). I will look at a couple of examples.

Suppose Ralph found a letter Ortcutt wrote under a rock. Then there is a relation R that connects Ralph uniquely to Ortcutt as the author of the letter he found under a rock. This relation is an acquaintance relation in a broad sense. It is the kind of relation that Lewis (1970: 541) lists as making *de re* belief possible: Ralph is acquainted with Ortcutt via a trace he left in the world. That the relation is right doesn't mean that a description based on that relation is suitable for just any *de re* belief ascription about Ortcutt. To illustrate, the description of Ortcutt in 24(a) is suitable for the *de re* ascription in 24(b), but not for that in 24(c).

(24)   a. The person who wrote the letter Ralph found under a rock
         b. Ralph believes Ortcutt has the handwriting of a six-year-old.
         c. Ralph believes Ortcutt wrote the letter he found under a rock.

The fact that Ralph believed that the person who wrote the letter he found under a rock wrote the letter he found under a rock wouldn't justify the claim that Ralph believed Ortcutt wrote the letter he found under a rock. On the other hand, if Ortcutt happened to overhear Ralph mumbling that the person who wrote the letter he found under a rock had the handwriting of a six-year-old, Ortcutt might be hurt by the fact that Ralph believed he had the handwriting of a six-year-old. The example shows that some choices of descriptions are bad choices for logical reasons, even though they are based on the right acquaintance relations. It seems that the description 24(a) is unsuitable as a replacement for *Ortcutt* in 24(c) since the resulting transform would be logically equivalent to the presupposition of the description used for the replacement. The replacement would result in an "incrementally trivial" proposition in the terminology of Hawthorne and Manley (2012: 44).

Contexts can cut down the range of options for suitable descriptions of a *res*. An example from Schiffer (1977) illustrates. In Schiffer's example, Jones snatches Thelma's purse. She sees him run away with it, but can't identify him at the police station. Pointing at Jones, she emphatically denies that it was him who snatched her purse. She has no clue that the man in front of her is the thief. Yet he is the man she saw fleeing with her purse. That is an acquaintance relation linking her to the man she is pointing at. That acquaintance relation can't seem to give us a suitable description of the thief in the context of the police station, though. In that context, Thelma is in direct visual contact with the thief. This makes that acquaintance relation stand out. It seems that contexts can eliminate certain acquaintance relations by making others salient. If this assessment is correct, we should see a wider range of suitable descriptions in contexts where multiple acquaintance relations have been made salient, or in cases where

no or little context is provided. This expectation is borne out. Imagine asking (25) to solicit evidence for your suspicion that Ortcutt is a spy, or in contexts where several of Ortcutt's contacts have been mentioned.

(25)   Who all believes Ortcutt is a spy?

Among the people who believe Ortcutt to be a spy may be the barber who shaved off his moustache, the kid who saw him sneak into an alley, the bellhop who carried his suitcase upstairs, the neighbors who heard him talk through the walls, and last not least Ralph, who saw him hide that letter under a rock. All those people are acquainted with Ortcutt in their own ways. Each of those ways matters for an exhaustive answer to (25).

Here is a prototype for a meaning rule for *believe* that uses transforms with descriptions based on acquaintance relations.

Prototype of a Rule for De Re *Ascriptions*
$[\![\ulcorner believes\ \alpha \urcorner]\!](x)(w) = 1$ iff there is a sentence α' that is a transform of α for x in w, and in all worlds w′ that are not ruled out by x's beliefs in w, $[\![ ]\!](w') = 1$.

The analysis of belief ascriptions implemented by this rule is in the spirit of Kaplan (1968–69), but combines it with a Hintikka-style semantics.[22] It implies that the truth of 26(b) below is sufficient for the truth of 26(a) in the actual world, assuming that the description δ is suitable.

(26)   a. Ralph believes Ortcutt is a spy.
                b. $\exists\delta$ (Ortcutt = $[\![\delta]\!](w_0)$ & in all worlds w that are not ruled out by Ralph's beliefs in w_0, $[\![\ulcorner \delta$ is a spy $\urcorner]\!](w) = 1$)

Given Quine's scenario, we correctly predict that Ralph believes that Ortcutt is a spy, and we also predict that he believes that Ortcutt isn't a spy. Note that while 26(b) quantifies over descriptions, there is no implication whatsoever that a witness for 26(b) should be a description that Ralph himself would use to describe Ortcutt. The description may be in a language Ralph doesn't understand, or it may be based on a relation R that Ralph cannot put into words.[23] In fact, there is no principled obstacle against using descriptions that contain indexicals – I am neglecting context-dependency here merely for convenience.

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[22] For attitude verbs like *believe*, we would ultimately need egocentric descriptions based on relations to centers of centered worlds. In this chapter, I have to gloss over all aspects of *de se* for reasons of space, but see Lewis (2020a: 107f.) for a cute example showing the need for egocentric descriptions.

[23] There is a crucial difference between my 26(b) and the logical forms that Kaplan (1968–69) considers. Adjusted to the current semantic framework, Kaplan would have (i) instead of my 26(b):

(i) $\exists\delta$ (Ortcutt = $[\![\delta]\!](w_0)$ & in w_0, Ralph believes $\ulcorner \delta$ is a spy $\urcorner$).

Imagine, for example, that Ralph thinks he has the rare gift of being able to literally smell spies when they are near him. Ralph might have become acquainted with Ortcutt via Ortcutt's unique body odor, which he classified as that of a spy. In all of Ralph's doxastic alternatives, then, the unique person that smells the way Ortcutt does in the actual world is a spy. A transform of 23 (a) for Ralph in the actual world could be (27).

(27)   The person who smells that way is a spy.

My rule requires an acquaintance relation for successful *de re* ascriptions. *De re* belief might be possible without acquaintance, though. Lewis (1979) considers the possibility that we might have beliefs *de re* about individuals via descriptions that capture their essence. Beliefs about mathematical objects may fall in this category. However, as Lewis remarks, "seldom do we know essences; seldom do we believe *de re* by ascribing properties to individuals under descriptions that capture their essences" (Lewis 1979: 542). Sharvit and Moss point out that we can have *de re* beliefs about things we can construct from things we are acquainted with, like the day that comes a week after today or a year from now (Sharvit & Moss 2022, this book). Even setting aside beliefs about mathematical objects or times, there are still examples that have been taken to show that acquaintance relations aren't necessary for *de re* ascriptions. The Tennis example, reported in Recanati (2012), is a case in question.[24]

Tennis
Ann is a six-year-old girl, whom John has never met and whose existence he is unaware of. But John believes that every six-year-old can learn to play tennis in ten lessons. So, meeting Ann, I tell her: John believes that you can learn to play tennis in ten lessons. (Recanati 2012: 152)

(28)   John believes you can learn to play tennis in ten lessons.

It might appear that, by saying (28), I ascribe a *de re* belief about Ann to John, even though John is not acquainted with Ann. This does not seem to be a true *de re* ascription, though. Here is why. The embedded clause of (28) presupposes that Ann exists. In the context of Tennis, Ann is also presupposed to be six years old. It's in view of her being six years old that she is supposed to be

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Unlike my 26(b), (i) implies that the belief relation is a relation to sentences and thus raises the question whether it also implies that Ralph should be able to put into words the way he is acquainted with Ralph. Kaplan discusses the issue but leaves it unresolved.

[24] Sosa's Shorty example (Sosa 1970) is another often-mentioned case of this kind. Recanati reports that the Tennis example was discussed in Gilles Fauconnier's graduate seminar in the early eighties. The example is also discussed in Blumberg and Holguín (2018, 2019) and Blumberg and Lederman (2021).

able to learn to play tennis in ten lessons. What I am saying with (28) is that John's beliefs and the mentioned presuppositions together entail that Ann can learn to play tennis in ten lessons. This species of presupposition-dependent entailment is no stranger in semantics. It has been sighted elsewhere. It is the Strawson entailment of von Fintel (1999, 2001). (28) would then amount to a conditional belief ascription. If attitudes correspond to modal operators, conditional attitudes correspond to restricted modal operators, assuming the restrictor view of conditionals (Kratzer 1978, 2012).[25] Conditional beliefs are restricted beliefs, just like conditional modalities and probabilities are restricted modalities and probabilities. John's conditional beliefs if Ann exists and is six years old are not the beliefs he has if Ann exists and is six years old, but the set of beliefs that results if we add the proposition that Ann exists and is six years old to his actual beliefs. When I say (28), then, I am not implying that John himself has any beliefs about Ann. I am reporting the result of my updating John's actual beliefs with the assumption that Ann exists and is six years old. John had nothing to do with my update.

That (28) ascribes a conditional belief is supported by the fact that, in the context of Tennis, (29) sounds a little more natural than (28).

(29)   John would think you can learn to play tennis in ten lessons.

That Strawson-entailment can be more generally appealed to in belief ascriptions and speech reports is suggested by the following examples that have puzzling presupposition triggers in their embedded clause.

(30)   Imagine two kids, John and Mary, talking to each other on the phone. Mary's parents have no clue that John is in bed, maybe they don't even know John.
John: I am already in bed.
Mary: My parents think I am **also** in bed.
(Heim 1992: 209)

(31)   Suppose Mary has been visiting Santa Cruz every year for the last twenty years, and this is common knowledge among John and Ann. Sam met Mary during her visit to Santa Cruz last week. He has no clue that Mary had been to Santa Cruz before.
Sam to John: Mary visited Santa Cruz last week.
John to Ann: Sam said that Mary visited Santa Cruz **again**.
(Brasoveanu & Farkas 2007: example 31)

I conclude that (28) in Tennis is not a *de re* ascription.[26] The example in no way undermines the generalization that run-of-the-mill *de re* ascriptions

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[25] Blumberg and Holguín (2019) coin the term "attitude conditionals" for these cases.

[26] There are still issues to sort out. Suppose that John is acquainted with Ann, but wrongly believes that she is only four years old. In that case, my belief ascription in (28) seems plain false. We wouldn't want it to come out trivially true just because John's beliefs conflict with our

require acquaintance relations. The example does show, though, that not every attitude ascription with a name in its embedded clause is *de re*.

Like the rule for *say*, the rule for *believe* does not merely use the proposition expressed by the embedded sentence in the semantic computation. In fact, that proposition doesn't have to be used at all, the computation immediately switches to a transform of the embedded sentence. Transforms cannot be algorithmically derived from a given sentence. This indeterminacy reflects the fact that, in a *de re* ascription, there is a disconnect between the proposition expressed by the sentential complement and the proposition the attitude holder is said to have an attitude towards.

My analysis of *believe* can account for complicated embeddings of *de re* ascriptions by applying the rule repeatedly. Spy Confusion illustrates.

Spy Confusion
Amy ran into Ralph while taking a walk at the beach. Ralph told her that he had just seen a red-haired man with a moustache hide a letter under a rock, and that he thought that man was a spy. Amy believed what Ralph told her. She continued her walk on her own and spotted a red-haired man with a moustache who was talking in Russian on his mobile phone. She thought that man was the same man Ralph had told her about and thus concluded that Ralph believed that man to be a spy. It turned out, though, that, unbeknownst to Amy or Ralph, the man Ralph saw was Bernard Ortcutt, but the man Amy saw was Rudolf Lingens.

On the Spy Confusion scenario, (32) below has a *de re* interpretation where it is true. After all, Amy was looking straight at that red-haired Lingens when she concluded that that man was the man Ralph believed to be a spy.

(32)   Amy believes Ralph believes Lingens is a spy.

To solidify intuitions, we could imagine that years later, when Ralph and Amy have become friends with Lingens, Amy confesses to Ralph: You know, when I first saw our friend Lingens at the beach, I thought it was him who you believed to be a spy. Amy may even tell Lingens himself: Way back when, when I saw you at the beach and heard you talk in Russian, I thought you were the man Ralph told me about and who he suspected to be a spy.

The meaning rule for *believe* delivers the right result for (32) on the Spy Confusion scenario. On the intended interpretation, (32) says that Amy has a *de re* belief about Lingens under some concept, and in each of her doxastic alternatives, Ralph has a *de re* belief about whoever Amy's concept of Lingens

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presuppositions. Intuitions get murky if John believes that there happen to be no six-year-olds (Blumberg & Lederman 2021).

> a.   *Ralph believes Lingens is a spy.*
> b.   *Ralph believes the red-haired man with a moustache who Amy spotted talking in Russian on his mobile phone is a spy.*
>
> In w_0: (b) is a transform of (a) for Amy, since Lingens is the red-haired man with a moustache who Amy spotted talking in Russian on his mobile phone.
>
> c.   *The red-haired man with a moustache who Amy spotted talking in Russian on his mobile phone is a spy.*
> d.   *The red-haired man with a moustache who Ralph saw hide a letter under a rock is a spy.*
>
> In all worlds w that are not ruled out by Amy's beliefs in w_0: (d) is a transform of (c) for Ralph, since the red-haired man who Amy spotted talking in Russian on his mobile phone is the same person as the red-haired man Ralph saw hide a letter under a rock.
>
> Finally, in all worlds w' that are not ruled out by what Amy believes Ralph believes, the red-haired man with a moustache Ralph saw hide a letter under a rock is a spy.

Figure 1.2 Semantic proof of the truth of (32) on the Spy Confusion scenario

picks out in that world.[27] Figure 1.2 sketches a semantic proof for the truth of (32) on the Spy Confusion scenario. The derivation proceeds by making two successive substitutions before a proposition is evaluated in Ralph's doxastic alternatives. Each substitution is tied to semantic conditions.

The semantics I suggested for *de re* ascriptions is simple and intuitive. It requires no specialized *de re* devices affecting the grammar as a whole: no *res* movement, no concept generators, no structured propositions, no Fregean predicate abstraction. It can deal with challenging cases of *de re* ascriptions. Yet it flies in the face of a notion of compositionality that is often taken as nonnegotiable in contemporary formal semantics. The semantic derivation for (32) goes through a series of syntactic transforms before it arrives at a sentence that is assigned a proposition. This kind of derivation has a precedent in substitutional quantification. With substitutional quantification, the meaning

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[27] Examples like (32) make good cases for comparison with the concept generator approach of Percus and Sauerland (2003), which enriches syntactic representations with concept generator variables that serve the unique purpose of *de re* ascriptions. To get the reading of (32) we are interested in, Percus and Sauerland would have to move the name *Lingens* in two steps, leaving an intermediate trace in the lower complementizer projection. An interpretable Logical Form with two concept generators could look as in (i).

(i)   [Amy believes λG_1 [[G_1 Lingens] λx [Ralph believes λG_2 [[G_2 x] λy [y to be a spy]]]]].

I am assuming that an individual concept C (type $\langle se \rangle$) can directly combine with a property P (type $\langle e \langle st \rangle \rangle$) to yield the proposition $\lambda w\ P(C(w))(w)$. In addition to concept generator variables, the analysis also requires the attitude verbs in (i) to denote functions from concept generators to propositions, rather than just propositions.

of the logical form 33(b) of the sentence 33(a), for example, is not computed via 33(c), which is not given any interpretation at all, but via transforms of 33 (c) that replace the free variable with names in a relevant domain.

(33)   a. Ralph believes everyone to be a spy
       b. Everyone x [Ralph believes x to be a spy]
       c. Ralph believes x to be a spy.

Actually, to be viable, my rule for *de re* ascriptions needs to be implemented in a semantics where variables and traces are interpreted by substitutional quantification. Only then can the truth conditions for 33(b) be straightforwardly computed using the rule for *believe*.[28] Philosophers have scoffed at substitutional quantification (e.g. van Inwagen 1981). But their objections don't apply here, since my use of substitutional quantification is not meant to avoid objectual quantification. The names used for substitution might very well be Lagadonian (Bigelow 1975a, 1975b; Lewis 1986, 2020c). A Lagadonian name for a thing is that thing itself. Substitutional quantification is a way of doing objectual quantification.[29]

To conclude this section and this chapter, I have proposed two prototypes for semantic rules that are meant to deliver principled solutions for two properties of attitude and speech reports. Both prototypes allow the truth conditions to depend not just on the proposition expressed by sentential complements, but also on other properties of those complements, their intensional structure, their linguistic articulation, even transforms. The prototypes can be used in meaning rules for actual verbs in various ways: separately, together, combined with yet other meaning components, with modifications. Each prototype stands for a single design idea.

The rule for *say* targets the problem of sentential complements that are logically equivalent. It combines a Carnapian and a Hintikka-style semantics. The design idea was to use both intensional structures and propositions in the semantic computation, but, crucially, without identifying propositions with intensional structures. Propositions are mere sets of possible worlds.[30]

The rule for *believe* targets *de re* ascriptions. *De re* interpretations are interpretations triggered by certain verbs embedding sentential complements.

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[28] With substitutional quantification, different instances of the same variable have to be replaced with the same name. Yet when we create transforms of sentences, there is no requirement that different instances of the same name have to be replaced with the same definite descriptions. The facts discussed in Charlow and Sharvit (2014) suggest that this is a very desirable feature of the proposed analysis.

[29] "How concatenate a man with a word to make a Lagadonian sentence? Maybe you take the sequence, understood set-theoretically – that's how Quine taught us to concatenate generally. ... How do you utter or write a Lagadonian sentence? – You don't. So what?" (Lewis 2020c: 586).

[30] They could also be parts of possible worlds, of course.

They derive from lexical properties of those verbs, hence should be introduced by lexical rules for those verbs. The major design idea for the proposed rule was the use of transforms. Transforms are already used in substitutional quantification, a technique that is as good as any for interpreting quantifier structures in natural languages. My rule for *believe* combines a Hintikka-style semantics with a semantics that is in the spirit of Kaplan.

All of this came at a price. Both of my rules violate the principle of compositionality as it is commonly understood with reference to Frege. The intensions of complex expressions are no longer always predictable from the intensions of their parts and the way they are put together. But who says they should be? Is there empirical support for this version of a compositionality principle? Where does the principle come from anyway?[31]

[C]ompositionality is a widely accepted methodology, if not the standard one. But it cannot be said that it is the only one, or the one favored for principled reasons. Sometimes ontological considerations cause a different approach to be advocated, and, more frequently, in cases where a phenomenon is studied in which there is a strong influence from context, non-compositional methods are used without hesitation.

Generally speaking, the wide support for compositionality is not for principled, but for practical reasons (Janssen 2012: 46).

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[31] A great resource on compositionality is *The Oxford Handbook of Compositionality* (Werning, Hinzen, & Machery 2012).

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2   Acquaintance Relations

Yael Sharvit and Matt Moss

2.0   Questions and Answers

(1)   Why do you think both linguists and philosophers find acquaintance relations interesting?

Philosophers have long been interested in the following metasemantic question: how are facts about meaning determined by other more basic facts? Theories of acquaintance answer an instance of this question: what relation between an agent and an object determines whether the object can be referred to by that agent in utterances or thoughts? There exists a century-old philosophical debate about whether epistemic or causal connections between agent and object are constitutive preconditions of successful reference. Understood in this way, acquaintance is a putative metasemantic relation whose existence and character has been contested in analytic philosophy of language since its inception. Emerging from the same literature is a distinct question whose legacy lies in semantics: what is the logical form of 'de re' attitude ascriptions? In this area of investigation, which has its origins in postwar work on belief contexts, acquaintance relations are part of the formal semantic representation of different possible readings of an attitude ascription. They are a tool in the formal treatment of semantic phenomena (see question (3)), and are not themselves semantic phenomena.

(2)   What recent developments in linguistics and philosophy do you think are most exciting in thinking about acquaintance relations?

The classic application of the acquaintance-based 'de re' analysis of attitude ascriptions is to so-called *double vision* cases. These are scenarios where an utterance coherently ascribes seemingly conflicting beliefs about an object to an attitude holder. An active program of research aims to generalize this analysis to handle different and more complex data. Applications include the semantics of tense, discussed below in Section 2.4.2, where a successful approach has relied on acquaintance relations to distinguish readings of embedded tense constructions. Philosophy has meanwhile seen a recent revival

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in anti-acquaintance arguments, with particular focus on how the phenomenon of singular thought comes apart from that of the linguistically 'de re'.

(3)   What do you consider to be the key ingredients in adequately analyzing acquaintance relations?

As clarified in question (1), acquaintance relations in semantics are not on the side of phenomena but on that of theory. They figure in the analysis of certain linguistic data, and are not themselves an object of linguistic analysis. For philosophers interested in the metasemantic notion, intuitions about when an agent can genuinely have a singular thought about some object, as well as general theoretical principles, may be appealed to. For example, the defender of acquaintance might offer principles for how causal facts and norms of justification determine what objects a speaker can and cannot refer to, as part of a more general account of the metaphysics and epistemology of content.

(4)   What do you consider to be the outstanding questions pertaining to acquaintance relations?

One outstanding question is whether the acquaintance-based 'de re' analysis needs further modification for the case of tense: the analysis is descriptivist in that it assumes the attitude holder is related to the object by distinct descriptions or concepts. But it is less obvious in the case of tense whether it makes sense to say the attitude holder is related to times under different descriptions. For philosophers, questions about the metasemantic notion of acquaintance are ultimately questions about one of the biggest outstanding questions in philosophy: how are the projects of the theory of content and the theory of knowledge connected?

2.1   Introduction

What is the correct analysis of 'de re' attitude ascriptions? Suppose that Ralph utters *The man in the brown coat is a spy* and I know the identity of the person referred to, Ortcutt. If I understand Ralph's utterance on its 'de re' interpretation, then I can report Ralph's belief as (1), which on its 'de re' reading characteristically entails (2):

(1)   Ralph believes that Ortcutt is a spy.

(2)   Ortcutt is such that Ralph believes of him that he is a spy.

That is, the object the 'de re' attitudes is about, the 'res' (in this case, the individual picked out by *Ortcutt*), can be existentially generalized on and the belief relation situated within the existential's scope, i.e. $\exists x(x = $ Ortcutt, and Ralph believes of x that x is a spy). It has been recognized that 'de re' attitude ascriptions characteristically license this inferential move, *exportation*, since at

least Quine's seminal (1956) paper on propositional attitudes. Quine further observes that Ralph can have different 'de re' beliefs simultaneously ascribed to him concerning the 'res' without contradiction or conflict which, in an unembedded form, do conflict. This is the *double vision* problem.[1] The problem is illustrated by the following observation: (3) is felicitous, and need not attribute to Ralph conflicting (or even near-conflicting) beliefs, despite the fact that (4a) and (4b) pragmatically conflict with each other (in most plausible contexts).

(3)   Ralph believes that Ortcutt is a murderer and that Ortcutt is a pillar of the community.

(4)   a. Ortcutt is a murderer.
         b. Ortcutt is a pillar of the community.

The term *double vision* refers to the fact that what makes (3) felicitous on the nonconflicting reading is Ralph's having seen the individual named Ortcutt on two different occasions, without realizing that he saw the same individual on both occasions. Since the problem generalizes to any other forms of sense perception, as well as to mere testimony, we will speak more generally of Ralph's being *acquainted* with Ortcutt in nonequivalent ways. An acquaintance relation is whatever cognitive contact the attitude holder has with the 'res', and in virtue of which one or more attitudes are held towards one and the same 'res'.[2] Exactly what suffices for the relevant cognitive contact is controversial, but it is widely assumed that both direct perception and certain kinds of indirect perception are paradigmatic ways to be in cognitive contact with something. (More on this below.)

The double vision problem bears an interesting relationship to other familiar problems about belief contexts, notably Frege's puzzle (Frege 1892). Where Frege's puzzle is about why co-referring terms are not allowed unrestricted substitution in attitude reports, the double vision problem is about why a term can be referentially transparent in an attitude report, despite this not corresponding to the perspective of the attitude holder. And, just as with Frege's puzzle, one of the conspicuous possible routes to a solution is to assume that more semantic structure mediates between the attitude holder and the term in question. What we will call the *acquaintance-based solution* or *'de re' analysis* – also sometimes called the *descriptivist* solution to the double vision problem in the literature – has its origins in the discussion of Quine's work in Kaplan (1968). On Kaplan's telling, 'de re' ascriptions turn out to be a special kind of 'de dicto' ascription, but where the descriptive content corresponds to whatever description the

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[1] The *double vision* label for Quine's original puzzle is due to Klein (1979). The problem, as well as the type of solution we will be discussing, are sufficiently familiar as to have textbook treatments, see for example Chierchia & McConnell-Ginet (2000).

[2] *Cognitive contact* is the term preferred by Cresswell in his (1985) and elsewhere.

attitude holder associates with the 'res'. The attitude ascription is thus analyzed not just as a relation between the attitude holder and the 'res', but includes a third element, a relational property that must hold between the 'res' and the attitude holder in the world of the matrix clause.[3]

2.2   The Acquaintance-Based Solution

The 'de re' analysis of *Ralph believes that Ortcutt is a murderer*, first given a systematic treatment and defense in Cresswell and von Stechow (1982), assumes that an acquaintance relation holds between Ralph and Ortcutt in the matrix world;[4] the same relation may pick out an individual distinct from Ortcutt in Ralph's doxastic alternatives in w (i.e. Ralph's candidates in w, for the individual he is and the world he inhabits – labeled DOX(Ralph, w)).

(5)   *Ralph believes that Ortcutt is a murderer* is true in world w iff there is a
         suitable relation R such that:[5]
         (i) Ortcutt = (the unique z such that R_w(Ralph, z)), and
         (ii) in all (x, w′) of DOX(Ralph, w)):
              MURDERER$_{w'}$(the unique z such that $R_{w'}$(x, z)).[6]

  Applying the same analysis to (3) exploits the assumption that two different acquaintance relations may hold between Ralph and Ortcutt in the world at which the matrix clause is evaluated.

(6)   *Ralph believes that Ortcutt is a murderer and that Ortcutt is a pillar of the*
         community is true in world w iff there is a pair of suitable relations R1,R2
         such that:
         (i) Ortcutt = (the unique z such that $R1_w$(Ralph, z)),
         (ii) Ortcutt = (the unique z such that $R2_w$(Ralph, z)), and
         (iii) for all (x, w′) of DOX(Ralph, w):
              MURDERER$_{w'}$(the unique z such that $R1_{w'}$(x, z)), and
              PILLAR$_{w'}$(the unique z such that $R2_{w'}$(x, z)).

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[3] The label *descriptivist* is inappropriate insofar as we need not assume acquaintance relations could always be articulated as explicit descriptions. This is an implausible requirement.

[4] I.e. the world of evaluation for the matrix clause, in the one-dimensional intensional framework we are assuming here. We avoid using the term *world of evaluation* here because of its undesired Kaplanian connotation of a two-dimensional semantic framework. We note in this connection that the semantic approach to attitude reports we assume, with its basis in intensional logic, has been criticized as inadequate for capturing their full complexity. For an alternative approach motivated by this line of criticism, see Kamp's application of Mental State Discourse Representation Theory (Kamp, this volume).

[5] We are not concerned here at all with the compositional derivation of the meaning. For two commonly used apparatuses, see Heim (1994) and Percus and Sauerland (2003).

[6] We include a parameter for the attitude holder here due to the fact that in this subliterature on 'de re' and 'de se' attitudes, there are frequently cases discussed where this parameter's value matters to the truth of the sentence.

Observe that not just any pair of relations will do. As we noted previously, R1 and R2 are, intuitively, supposed to correspond to ways Ralph perceives or thinks about the individual, Ortcutt. We are concerned with what makes the relations referred to in (5) and (6) count as *suitable*, in the technical sense that they must express contents that could in principle characterize and explain Ralph's ability to have thoughts about Ortcutt.

In practice, the term *suitable relation* and *acquaintance relation* are used interchangeably. Philosophers have been concerned with acquaintance in two historically related ways. Firstly, and at its inception, acquaintance was a mainly epistemic notion, with debate focusing on its nature and possible objects. This has only a tenuous and incidental bearing on whether assuming acquaintance relations gives the correct logical form to 'de re' ascriptions, our topic here.[7] Secondly, and in the sense more germane to linguistics, philosophers have been interested in what role certain causal-informational connections might play in explaining successful reference.

In the linguistics literature (e.g. Cresswell & von Stechow 1982; Percus & Sauerland 2003), it is assumed that a necessary condition on suitable relations in belief reports is that they be acquaintance relations, where this terminology is understood as involving cognitive contact between the believer and the 'res'. For example, a value for R in (5) that meets this condition is: $\{(w, (x, y))|$ x sees y wearing a gray coat in w$\}$. Our goal is to show that there is no single notion of acquaintance that fits all kinds of 'de re' ascription, because an important subclass of such ascriptions involves reference to times. As we will argue in Section 2.4, the successful extension of the 'de re' analysis to embedded temporal expressions (and the resulting puzzles about what it is for an acquaintance relation to be suitable with respect to a time) means that the causal-informational notion of what suitability consists in cannot be

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[7] This tradition was inaugurated by Bertrand Russell in his (1911). Russell appears to have picked up the term *acquaintance* from his reading of William James (cf. Proops 2014). Russell means something that does not often coincide with what later philosophers have meant by the term, and which is in any event not how we intend it in our treatment of the acquaintance-based analysis of 'de re' attitudes. Russell understood acquaintance to be whatever noninferential, non-propositional cognitive relation to an object is such that successful reference to that object is guaranteed, as is knowledge of when one is referring to the same object via distinct propositions – "a kind of revelation or immediate presentation" (Hawthorne & Manley 2012: 19). This had the seemingly absurd consequence, but which Russell accepted, that we can have unmediated knowledge of almost none of the objects that our thoughts are intuitively about. More particularly, Russell held that the sorts of things we can successfully refer to are, at most, our particular sensations, general properties, and maybe oneself. Subsequent attempts to define a notion of acquaintance all have as their goal finding some more modest cognitive relation that does not yield the skeptical consequences that Russell's notion invites. Despite the decisive role Russell's work had in paving the way for formal semantics, his own motivations were thus fundamentally at odds with the goals and methods that came to characterize semantics as a branch of empirical linguistics.

generally accepted as a feature of the analysis (whatever its merits in the classic version of the double vision puzzle).

2.3   The Philosophical Angle

We take as our starting point the two philosophical topics that most directly bear on the 'de re' analysis: firstly, what notion of cognitive contact was intended by philosophers who pushed this style of solution to the double vision problem in the first instance (Cresswell, Kaplan, Lewis); secondly, how Kaplan's well-known shortest spy argument makes a positive case for there being the aforementioned suitability constraint on relation R in the 'de re' analysis. Again, here we will not go into the deep historical origins of acquaintance in philosophy, nor will we have anything to say about the extralinguistic legacy this earlier work has had in epistemology and the philosophy of mind. Semanticists who use acquaintance-based frameworks are often reluctant to enter into substantive theorizing about acquaintance itself.[8] Usually there is at most an allusion to some of the (older) philosophical literature. Although linguists' disinclination to wade into the issue makes sense, it leads to a certain unclarity about what role the notion originally had in the discussions of Lewis (1979), as it was influenced by that of Kaplan (1968). Getting clear on this background to the 'de re' analysis is crucial for understanding what is prima facie problematic about its extension to tense.

2.3.1   Causal Theories of Acquaintance

Let us start by assuming the notion of acquaintance operative in the term *acquaintance relations* is that of some causal-informational connection. On this understanding – by far the most common – acquaintance relations are some special subclass of causal chains, those where the chain of causes is of the right sort to allow someone at the end of the chain to count as thinking about the object at its start. It is assumed that repeated use of a referential term likewise inherits its denotation from some prior established usage. In the simplest case, this kind of causal contact obtains simply between a person and the very object referred to in an utterance, paradigmatically by direct sensory perception; or more indirectly, through some appropriate chain of causal links that preserve reference, a picture familiar from Kripke (1980) inter alia. In effect, this frames the question of what it takes to be acquainted with some object in the following terms: what kind or varieties of casual

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[8]   To pick just one example, in one of her papers on 'de se' attitude reports, Hazel Pearson writes in a footnote: "I won't have much to say about what exactly acquaintance relations are" (Pearson 2018: 8, n. 5). This bracketing of metaphysical questions about acquaintance is pervasive among semanticists working on the 'de re', whether explicitly stated or not.

connection between a speaker and object are sufficient for us to count a speaker as successfully referring to that object?

Notably it is taken for granted by philosophers in this tradition, such as Kaplan and Lewis, that we have some pre-theoretical sense of when we can and cannot successfully refer to, however vague.[9] So, for example, beliefs about objects we have perceived directly with our own senses, or of which we have certain kinds of recordings or testimony or traces, can all involve successful reference to the relevant objects. To use Kaplan's metaphor, a photocopy of a photocopy of a photocopy may come to look entirely unlike an original, and yet still count as an image of that original. Similarly, on the 'de re' analysis, relation R might dramatically mislead the attitude holder as to the genuine properties of the referent – say, by seeing the 'res' very imperfectly, but still counting as seeing that very thing. It is this link that makes a relation available for use in the 'de re' analysis.[10] By contrast, we cannot refer to an individual, even if we are guaranteed of their existence by the truth of some claim, in the situation where the claim is general and descriptive in character, where there is no relation R at all. This is the upshot of Kaplan's shortest spy argument, to be discussed in the next section.

Lewis explicitly cites Kaplan as showing that 'de re' belief reports require that the believer bear a suitable relation to the entity that the belief is about. This requirement is where acquaintance enters the picture: the unsuitable relations are just those where the attitude holder is not acquainted (i.e. in cognitive contact) with the 'res' of the 'de re' ascription. To see why a workable criterion of suitability is called for, consider a formulation of Lewis's analysis with the term *acquaintance* cut out (and where temporal reference is suppressed for simplicity):

(7)   An agent x believes, in w, that y is F, relative to a relation R iff:
  (i) x bears R uniquely to y in w, and
  (ii) for all pairs z, w′ of DOX(x, w), the unique y′ such that $R_{w'}(z, y')$ has
      property F in w′.

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[9] Cf. Lewis (1979: 539–540).

[10] One difficulty for this causal-informational view, and one we cannot begin to address in the context of this discussion, is how to handle borderline cases. It is common (cf. Lewis 1979: 541) to count ourselves as acquainted with individuals based on "legible traces," i.e. signs of the individual's causal influence, and not to count ourselves as acquainted with individuals who perhaps have a very entangled causal relationship with – suppose it is some anonymous neighbor or coworker one never meets or has occasion to form beliefs about, but whose actions influence one's own life in myriad, fairly immediate, and highly sensitive ways. Hence, there will be borderline cases of acquaintance, where it is vague whether the influence of the 'res' on the attitude holder is sufficient for a 'de re' attitude to be truly ascribed. We set this issue aside, however.

The relation R we can suppose corresponds to different descriptions under which x might think of y. Hence, on Lewis's view, what is ascribed by a 'de re' belief ascription is a belief that is directly about the 'res', but insofar as the 'res' is taken by the believer to satisfy some description. The worry, as Lewis anticipated, is that not just any relations – or corresponding descriptions, in his formulation – will do.

In particular, it is widely assumed that these relations must have something to do with whatever explains how x is in a position to have beliefs about the individual, y. Recall that Lewis talks about this in causal-informational terms: x must have some causal interactions with y such that this interaction is a reliable way for x to get information about y. Again, such relations will include those of direct perception and testimony. Our focus here is not on problems that arise when one tries to spell this out further. Following Ninan (see his 2012: 11), we might even suppose something quite minimal and unconstrained, namely that R is "any relation that underwrites an agent's ability to have a thought about an object." We could then leave it open which ways – other than causal-informational routes, as supposed by Lewis – this relation might obtain. As we will argue, the semantic analogies linguists are interested in may not even have anything to do with acquaintance per se, at least on the causal-informational construal. Having sketched the causal understanding of acquaintance operating in the background, we turn to Kaplan's argument that there must be a further constraint on R in the 'de re' analysis.

2.3.2   *The Shortest Spy Argument*

Before laying out Kaplan's argument in detail, some scene setting is called for. It is common in philosophy to understand Kaplan as providing a positive argument for thinking that an attitude ascription is only legitimately 'de re' when the attitude holder stands in some highly nontrivial relation to the 'res', a relation Kaplan himself tried to spell out in causal-informational terms. This argument has it that in cases of successful reference something puts the attitude holder *en rapport* with the object (to use Kaplan's own terminology), in contrast to cases where, intuitively, an attitude holder is not entitled to a 'de re' belief about the object.[11]

We should be clear about what we take the argument to show, purely for the purposes of the formal semantic proposal. On our understanding of the shortest

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[11] Note that in Kaplan's original conception, not only does causal interaction with the 'res' count towards its being a legitimate object of 'de re' attitudes, but there is an additional factor to consider, what Kaplan calls *vividness*. Roughly this means that rich and truthful descriptive contents are associated with the term denoting the 'res'. Since Kaplan later abandons vividness as a condition on 'de re' belief (see Dennett 1987: 189), we do not engage with it here.

spy argument, it aims to show that not just any descriptive content can be what relation R corresponds to, i.e. that only some relations provide the right sort of cognitive contact and are suitable in that sense.[12] We do not take Kaplan's argument to show that cognitive contact is a necessary precondition for reference in general. Nor do we take on board the idea that a causal component is necessary to make sense of an attitude holder's cognitive contact with the 'res' of a 'de re' attitude. Indeed, the application of the 'de re' analysis to tense that we will discuss in Section 2.4.2 below gives us independent reason to reject this causal requirement.

Here is the background to Kaplan's argument. Suppose that Ralph believes that there are spies. However, he suspects no specific person of being one. He reasons on the basis of his belief that there must be some individual who is the shortest spy. Suppose further that the individual who is in fact that shortest spy is Ortcutt, but that Ralph is unaware that Ortcutt even exists, let alone that he is the shortest spy. Now consider the following sentences evaluated in the context just described:

(8)   (a) Ralph believes that at least one person is a spy.
        (b) There exists at least one person that Ralph believes to be a spy.
        (c) Ralph believes that the shortest spy is a spy.
        (d) Ralph believes that Ortcutt/he/that man is a spy.

(8a) seems true and is entailed by Ralph's general belief, while (8b) is false, i.e., exportation from belief contexts is not valid in general. (8c) has two obvious interpretations: on the 'de dicto' reading it expresses a trivial belief, but is false when interpreted 'de re' (Ralph has no beliefs about Ortcutt at all). Lastly, (8d) is false.

Kaplan's argument, building on these observations, is the following: if there were no restriction on relation R in the proposed semantic analysis, we could illegitimately infer (8d) on the basis of (8c). Hence, there must be some restriction on R, that explains why the inference is illegitimate in this case and (8d) is false, whereas in other contexts (8d) might be true. The solution that suggests itself is to say Ralph is not appropriately related to the embedded proposition's main constituent, the individual, the 'res'. An acquaintance relation, then, is just some particular way of spelling out what this appropriate relationship has to be like. And philosophers have tended to think that this

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[12] In their (2012: 37), Hawthorne and Manley consider how the spy argument could be marshaled in favor of the view that reference requires acquaintance quite generally, an argument they reject. As they note, however (see p. 25), rejecting the shortest spy argument on this construal is compatible with taking the intuition behind the argument seriously, i.e. that certain exported belief reports, like *The shortest spy is such that Ralph believes that he is a spy*, are inappropriate unless Ralph is having a singular thought about the denotation of *the shortest spy* (however it is that one goes on to spell out what singular thought consists in).

relationship is best spelled out in causal-perceptual terms, i.e. the attitude holder has been in the right kind of contact with the 'res' to be able to refer to it. Of particular importance for Kaplan was that acquaintance relations guarantee there exists some unique entity being thought of, irrespective of how mistaken the attitude holder is about the entity's properties. Recall the photocopy analogy: the ability to think about the object survives the attitude holder's mistakes and misrepresentations in large part because the attitude holder is causally affected by the object.

What all this means is that potential counterexamples to the 'de re' analysis would take a particular form: they must be cases in which exportation is licensed, but where it is impossible that the attitude holder be acquainted with the 'res'. One prominent example of this type of case is that which Kaplan labeled the *pseudo 'de re'* in his (1989), and is helpfully illustrated in Wettstein (1986: 205):

Tom, a new faculty member, is told about all the new funding that the dean has arranged for faculty research. He says, not having any idea of who the dean is, "The dean is obviously very smart." I report to Barbara that Tom believes that Mike is very smart or that Jonathan's soccer coach is very smart (in case Barbara, say, characteristically refers to the relevant individual as "Mike" or is most familiar with him in his role as Jonathan's coach).

This presents the following difficulty for the 'de re' analysis: if acquaintance is a necessary condition for the suitability of R, then Wettstein's example is not accounted for. The utterance *Tom believes that Mike is very smart* ascribes a 'de re' belief to Tom, but one that Tom would not recognize as his own belief, without the additional information that the dean is Mike. What this suggests is either that there are ways R can be suitable other than via the standard case of cognitive or perceptual contact, or that there is a pragmatic mechanism (some form of accommodation) that allows the speaker to report an entailment of Tom's belief that Tom is not himself in a position to recognize. We do not take a stand on this issue here, but merely note that the proponent of the 'de re' analysis must choose among these and similar alternatives to account for the pseudo 'de re'.[13]

2.4   The Linguistic Angle

We turn now to some challenges to the acquaintance-based 'de re' analysis that semanticists have identified, having to do with recalcitrant or ambiguous data. We have focused so far on expressions that pick out individuals (names such

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[13] Salmon (2004) takes these pseudo 'de re' examples as helping to constitute a positive argument for *latitudinarianism* about attitude reports, the view on which we drop the acquaintance requirement altogether.

as *Ortcutt*, definite and indefinite noun phrases, etc.). We now ask whether other types of expressions may be interpreted 'de re'.

It is claimed in Percus (2000) that a main predicate in the complement clauses of an attitude verb is not interpreted transparently. What this means is that (9a) can be used to report the thought in (9b) (where *this guy* picks out Sal's actual brother), but cannot be used to report the thought in (9c) (where *these people* picks out the set of actual relevant Canadians).

(9)   a. Mary thinks that Sal's brother is Canadian.
        b. This guy is Canadian.
        c. Sal's brother is one of these people.

For Percus, world variables are represented in the logical forms of sentences. The missing reading of (9a), according to Percus, is a direct result of a constraint on verbs (or verbs phrases) that requires their world pronouns to be locally bound (i.e. bound by the attitude verb). The constraint is met in (9b), where *Canadian* is anchored to Mary, but not in (9c), where *Canadian* is anchored to the speaker. This explanation seems natural since bound pronouns in general obey locality constraints. For example, (10) reports multiple suicide attempts, not multiple murder attempts. Presumably, this is because the pronoun *himself* must find a binder in its local syntactic domain.

(10)   Each guard testified that at least one of his prisoners tried to kill himself.

However, Percus's constraint directly conflicts with the position taken in Cresswell and von Stechow (1982) regarding (11a). They point out that (11a) is not trivially true, hence, a 'de dicto' interpretation of *prime* cannot be the only one made available by the grammar.[14] They propose that the predicate *prime* can be interpreted 'de re' (or, since we are dealing with properties/qualities, 'de qualitate', to borrow an expression from Schwager 2011), as in (11b).

(11)   a. John knows that seven is prime.
        b. 7 is prime, and there is an acquaintance relation R1 and an acquaintance relation R2 such that 7 is the unique individual that John is actually related to via R1, and PRIME (the property of being a prime number) is the unique property that John is actually related to via R2, and in John's doxastic alternatives, the unique individual John is related to via R1 has the unique property John is related to via R2.

As pointed out in Schwager (2011), the analysis in (11b) massively over-generates, in a way that is reminiscent of Kaplan's shortest spy problem: (11a) is too easily verified if John believes, e.g. that ODD holds of 7. This is clearly

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[14] For an in-depth discussion of the methodological questions raised by the semantics of belief reports containing mathematical terms, see Kratzer, this volume.

counterintuitive. Although Schwager herself rejects Percus's empirical claim (even regarding (9a)), she does not think that a 'de re' analysis, where suitability is equated with acquaintance, accounts for (9a), and concludes that other mechanisms are needed to account for substitutions of main predicates as well as nonmain predicates (as in some cases discussed by Fodor 1970).

Even if we accept Schwager's conclusion, the question of whether the 'de re' mechanism itself is applicable to terms other than individual-denoting terms still remains. Some scholars of 'de re' attitude reports have appealed to the mechanics of 'de re' ascription to solve some puzzles concerning morphological tense (such as the present/past alternation of *be* reflected by the morphological alternation *is/ was*). Among these works are Abusch (1994, 1997), Heim (1994), Ogihara (1996) and von Stechow (1995). This raises some questions about suitability which must be addressed if the 'de re' analysis of tense is to be adopted.

2.4.1   'De Re' Attitude Reports about Time

Applying the 'de re' analysis to temporal expressions presupposes that the analysis is not restricted to expressions that pick out individuals, be they referring expressions such as the name *Ortcutt* (as in *Ralph believes that Ortcutt is a spy*) or quantificational expressions such as *some student* (as in *Ralph believes that some student is a spy* on the reading where *some student* takes wide scope). In fact, it presupposes that any time-denoting expression, such as *today*, and any quantificational expression, such as *at some point in the past*, may be interpreted 'de re'. If this is indeed the case, (12) – where the referring expression *today* appears in the complement clause of *think* – receives the interpretation in (13). Presumably, *today* refers to $TODAY_{w,t}$ – the calendar day that surrounds the matrix evaluation time t in w. John's doxastic alternatives are his candidates for the individual he is, the world he inhabits, and the time he occupies.

(12)   John thinks that Mary is away today.

(13)   (12) is true in w at t iff there is a suitable relation R such that:[15]
  (i) $TODAY_{w,t}$ = (the longest t′ such that $R_{w,t}$(John, t′)), and
  (ii) in all (x, w′, t″) of DOX(John, w, t): there is a time t* such that $AWAY_{w',t*}$(Mary) and t* = (the longest t′ such that $R_{w',t''}$(x, t′)).

Two potential objections, or concerns, come to mind; we discuss them in turn.

Firstly, if the 'de re' analysis is generalized to times in this way, (14) is predicted to have the truth conditions in (15). This seems implausible, if suitability is equated with acquaintance.

(14)   John thinks that Mary will be away tomorrow.

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[15] We are simplifying. *Mary* is also interpreted 'de re'.

(15)   (14) is true in w at t iff there is a suitable relation R such that:
   (i) TOMORROW$_{w,t}$ = (the calendar day that follows in w the calendar day surrounding t in w) = (the longest t′ such that R$_{w,t}$(John, t′)), and
   (ii) in all (x, w′, t″) of DOX(John, w, t): in all w″ accessible from (w′, t″), there is a time t* such that AWAY$_{w″,t*}$(Mary) and t* = (the longest t′ such that R$_{w′,t″}$(x, t′)).

The objection is that R is not suitable because there cannot be cognitive contact between John and TOMORROW$_{w,t}$. In fact, no relation that would pick out TOMORROW$_{w,t}$ in the world w and time t implies acquaintance, for the simple reason that individuals cannot be acquainted with a time that is in their future. This problem arises against the background of the general puzzle about how to understand time perception vis-à-vis other more familiar types of sensory cognition. The metaphysical objection specific to future times seems to be supported by the linguistic fact that future reference is always expressed (at least in English) with a modal operator such as *will* or *would*, and not simply with a tense, as opposed to present and past reference (see Cariani & Santorio 2018), as the contrast between (12) and (14) shows.

From a philosophical standpoint, the worry is twofold: first, times are not metaphysically suitable objects to play the 'res' role; second, even if we accept a view on which times are, or can be harmlessly construed as, the 'res' of a 'de re' attitude, there is no sense to be made out of persons being acquainted with such objects, as the analysis requires. A range of possible responses to both questions is helpfully mapped out in Tsompanidis (2015), which seeks to vindicate the notion of 'de re' attitudes towards times. As regards the metaphysical worry, it is widely recognized that many objects with peculiar metaphysical profiles – groups, holes, fictional individuals, etc. – are the objects of 'de re' attitudes. It is generally taken to be a constraint on the correct metaphysics of such putative objects that the metaphysics not render singular thoughts about them straightforwardly impossible. That is, excepting strongly revisionary views about the relevant domain of discourse, realists and anti-realists alike seek to show that the metaphysical view they offer is compatible with the corresponding 'de re' attitude ascriptions. As Tsompanidis suggests, the foundational debates in the metaphysics of time – for example, substantivalist versus relationalist views about time's fundamental nature, the reality or irreality of time – are simply orthogonal to whether times can be a suitable 'res' in a 'de re' attitude, since the methodological bias in metaphysics favors not massively falsifying folk beliefs. Hence times are no worse off than any other putative object which, despite having a peculiar metaphysical status, is clearly the referent of a commonly used noun phrase.

The issue of how persons are acquainted with times is more difficult, and has more of a history in the literature. How is cognitive contact with a time achieved? Hawthorne and Manley (2012: 29) bring up the point, made in prior work due to McGinn (1980: 160), that we refer to objects that do not apparently have a causal-perceptual effect on us, with temporal pronouns as the specific case chosen. In uttering *today* or *tomorrow*, the thought goes, I am not referring to an object that has causally affected me, as I might in uttering *Bob Ross* or *this stepladder*. So there cannot be an acquaintance requirement on reference generally, including in the case of 'de re' attitude reports, according to this line of argument.

While we do not dispute that acquaintance with a time may not be perfectly analogous to familiar and mundane cases of sensory perception, we take it that well-established facts about human time perception – reliable judgments of simultaneity, the so-called *specious present*, and the phenomenology of being situated at different temporal distances with respect to different past events – favor the view that we are in cognitive contact with times, or at least experience ourselves as being so. As we argued when considering the metaphysical objecthood of times, we can appeal here to the methodological bias on which semantics should reflect folk belief, and hence ground the 'de re' analysis in commonplace subjective time experience and language reflective of it. Although further empirical findings about time perception in psychology may further complicate the picture, it seems that our innate mental capacity to recognize temporal order, experience relative duration, and mentally represent future times by analogy with our present and past are sufficient evidence that we cognize times, both in relation to one another and to ourselves. It therefore makes sense to say we can be acquainted with a time, despite this not being in the causal-perceptual way that was taken to be characteristic of acquaintance in the earlier literature, e.g. Kaplan and Lewis.

A different worry ties the present section back to where we started: if the 'de re' analysis is generalized to times as in (13) and (15), we expect to be able to easily construct well-formed double vision examples that report beliefs about times. However, for many speakers (16) is incoherent when John does not mistake Mary for someone else (assuming that John does not think that one can be simultaneously sitting and standing).

(16)   John thinks that Mary is sitting right now, and that she is standing right now.

(17)   (16) is true in w at t iff there is a pair of suitable relations R1,R2 such that:
   (i) $\text{RIGHT-NOW}_{w,t}$ = (the immediate time surrounding t in w) = (the longest t′ such that $\text{R1}_{w,t}(\text{John}, t′)$),
   (ii) $\text{RIGHT-NOW}_{w,t}$ = (the immediate time surrounding t in w) = (the longest t′ such that $\text{R2}_{w,t}(\text{John}, t′)$), and
   (iii) for all (x, w′, t″) of DOX(John, w, t):
         $\text{SITTING}_{w′,(\text{the longest t* such that } \text{R1}_{w′,t″}(x, t*))}(\text{Mary})$ and
         $\text{STANDING}_{w′,(\text{the longest t* such that } \text{R2}_{w′,t″}(x, t*))}(\text{Mary})$

We suggest that both these objections can be addressed if we give up the idea that the term acquaintance means the same thing for attitudes towards normal individuals (such as the individual called *Ortcutt*) and attitudes towards times. Suppose that the value of R in (15) is simply $\{((w^*, t^*), (x, t'))|$ t′ is the calendar day that follows, in w*, the calendar day surrounding t*, in w*$\}$. Acquaintance, here, is not achieved via cognitive contact with a future time, but rather indirectly, via cognitive contact with the current time. We are all acquainted with the time of our present thinking, even if we may not be able to identify it in relation to a clock or calendar. And we can all have in mind a specific time that precedes the time we live in, overlaps it, or follows it. While more could be said to address metaphysical worries about the notion of 'de re' attitudes towards times, we take ourselves to have shown this is neither incoherent nor implausible, and hence there is nothing objectionable about a semantics that relies on it.

We further propose that for a relation R between times and individuals to be suitable, it has to fulfill what is referred to in Sharvit (2020) as the Temporal Alignment Constraint (TAC), which requires that the attitude holder know where he is located in relation to the 'res', even if he does not know where his temporal location is. Thus, John cannot have a belief today, about our tomorrow, thinking that it precedes his now. In addition, John cannot have, at noon in our today, a belief about our tomorrow thinking that it is two calendar days into his future (indeed, when John is correct about his temporal location, (14) cannot imply that in his mind, Mary is away after his tomorrow). But John need not have lived through our tomorrow in order to be acquainted with it. As for (16), the difficulty it poses for many speakers is expected given the TAC.

To sum up, neither the assumption that individuals are not acquainted – in the strict sense – with times in their future nor the challenging example (16) provide an argument against the use of the 'de re' mechanism in attitude reports about times.

Still, an argument in favor of the 'de re' analysis, in the temporal domain, has not – as of yet – been provided, since – given that double vision scenarios are not easy to construct – (12) and (14) could well be assigned a simpler analysis, without using the 'de re' mechanism at all, as in (18) and (19), respectively.

(18)   (12) is true in w at t iff in all (x, w′, t″) of DOX(John, w, t): there is a time t* overlapping t″ such that $AWAY_{w',t^*}$(Mary) and t* $= TODAY_{w,t}$.

(19)   (14) is true in w at t iff in all (x, w′, t″) of DOX(John, w, t): for all w″ accessible from (w′, t″), there is a time t* following t″ such that $AWAY_{w'',t^*}$(Mary) and t* $= TOMORROW_{w,t}$.

However, the analysis in (19) predicts that in some instances where John is mistaken about the time he lives in, (14) reports that John thinks that Mary is away after his tomorrow. Such an interpretation is, of course, blocked in (15) by the TAC. While judgments regarding (14) are far from clear, examples where the tenses support a potential ambiguity do provide an argument for the 'de re' mechanism. We turn to such cases now.

2.4.2   'De Re' Tense

Consider (20) and (21). In (20), the main verb (*tell*) appears in the past tense and the embedded verb (*be*) appears in the present tense. In (21), the main verb (*tell*) appears after the future marker *will*, and the embedded verb (*be*) appears in the present tense.

(20)   Two months ago, John told his mother that he is rich.

(21)   Two months from now, John will (finally) tell his mother that he is rich.

The available and unavailable readings of (20) and (21) are given in (22) and (23), respectively. The judgments regarding (20) have been discussed extensively in the literature (see Smith 1978; Enç 1981; Ogihara 1996; Abusch 1997 among others); some of the facts about (21) are less well-known, though similar examples are discussed in Higginbotham (2001) and Ogihara and Sharvit (2012).

(22)   Judgments regarding (20)
    a. Shifted reading, forward; unavailable.
       John: "I will be rich (in two months)."
    b. Shifted reading, backward; unavailable.
       John: "I was rich (but now I'm broke)."
    c. Double-access reading; available.
       John: "I am rich now and will be for some time."
    d. Simultaneous reading; unavailable.
       John: "I am rich now (but I'll be completely broke tomorrow)."

(23)   Judgments regarding (21)
    a. Shifted reading, forward; unavailable.
       John: "I will be rich."
    b. Shifted reading, backward; available
       John: "I was rich two months ago."
    c. Double-access reading; available.
       John: "I am rich now and have been for some time."
    d. Simultaneous reading; available.
       John: "I am rich now (but I was completely broke before)."

    The contrast between (20) and (21) regarding the availability of shifted readings (a–b), as well as the similarity between them regarding the

availability of a double access reading (c), are explained by the assumption that a present embedded under a past tense is interpreted 'de re', as picking out a time that overlaps the evaluation time of the sentence as a whole (the matrix evaluation time – namely, the utterance time). For current purposes, it does not matter whether we follow Partee (1973) and Abusch (1994, 1997), and treat tenses as pronouns that pick out times (just like *Ortcutt* or *he* picks out an individual), or we treat tenses as wide-scope existential quantifiers over times. Suppose (20) and (21) have the following simplified meanings.

(24)   (20)-de-re is true in world w at time t iff there is a time t' preceding t by exactly two months, a time t'' overlapping t and a suitable R such that:
   (i) t'' = (the largest t^* such that $R_{w,t'}$(John, t^*)), and
   (ii) in all (x, w', t''') of DOX(John, w, t'):
        $RICH_{w',(\text{the largest } t^* \text{ such that } R_{w',t'''}(x, t^*))}(x)$.

(25)   (21)-de-re is true in world w at time t iff there is a time t' following t by exactly two months, a time t'' overlapping t and a suitable R such that:
   (i) t'' = (the largest t^* such that $R_{w,t'}$(John, t^*)), and
   (ii) in all (x, w', t''') of DOX(John, w, t'):
        $RICH_{w',(\text{the largest } t^* \text{ such that } R_{w',t'''}(x, t^*))}(x)$.

A suitable R for (20)-de-re that meets the TAC might be $\{((w, t), (x, t'))| t'$ is the nine-week period that begins at the beginning of t}; it yields a double-access reading (the 'res', described in (24(i)), overlaps both the telling time t', which precedes the matrix evaluation time t, and the matrix evaluation time t). A suitable R for (21)-de-re that meets the TAC might be $\{((w, t), (x, t'))| t'$ is the nine-week period that ends at the end of t}; it also yields a double-access reading (the 'res', described in (25(i)), overlaps both the telling time t', which follows the matrix evaluation time t, and the matrix evaluation time t). Importantly, (21)-de-re has an option for R that (20)-de-re lacks, namely, a past-oriented R such as $\{((w, t), (x, t'))| t'$ is the one-week period that precedes t by exactly two months}. The latter relation delivers – for (21) – a 'res' that overlaps the matrix evaluation time, but does not overlap the telling time. It is this option that allows (21) to have a backward-shifted reading. The same relation fails to deliver for (20) a 'res' that overlaps the matrix evaluation time; indeed, a backward-shifted reading is unavailable for (20).

On the other hand, neither (20) nor (21) can choose as their R the future-oriented $\{((w, t), (x, t'))| t'$ is the one-week period that follows t by exactly two months} (which would yield a forward-shifted reading, a reading that is unavailable both for (20) and for (21)). In the case of (21), this is expected: a future-oriented R would fail to pick out a 'res' that overlaps the matrix evaluation time. In the case of (20), the reason for the unsuitability of such an

R is that it fails to comply with an independent suitability constraint, referred to in Abusch (1988, 1994, 1997) as the Upper Limit constraint (ULC).

(26)   ULC:
         The now of an epistemic alternative is an upper limit for the denotation of tenses.

An *epistemic alternative*, in this context, is an individual-world-time triple (x*, w*, t*) whose now is t*. In complement clauses of attitude verbs, the relevant epistemic alternatives are what we have called the doxastic alternatives of the attitude holder in w at the time where the attitude takes place. Thus, R cannot yield a time that begins after the attitude holder's now. This rules out a forward-shifted reading for (20).[16]

Finally, the contrast between (20) and (21) regarding the availability of a simultaneous reading is explained by the following two assumptions (Abusch 1994, 1997; Ogihara 1996): (i) *will* is composed of a future modal (*woll*) and present tense, and (ii) by a special Sequence of Tense rule, a present tense embedded under another present tense may be interpreted as making no semantic contribution (thus reflecting the relative now, rather than the utterance time).

(27)   (21)-relative is true in world w at time t iff there is a time t′ following t such that in all (x, w′, t″) of DOX(John, w, t′): $RICH_{w′,t″}(x)$.

The Sequence of Tense rule is motivated by the fact that quite generally, a tense embedded under a morphologically agreeing tense makes no semantic contribution. For example, (28) has a simultaneous reading (i.e. a reading that reports John having said *Mary is pro-choice*; Jespersen 1931; Ladusaw 1977; Comrie 1985).

(28)   John thought that Mary was pro-choice.

On the other hand, a present tense embedded under a nonagreeing tense (e.g. past, as in (20)), and a past embedded under present (as in *John thinks that Mary was pro-choice*), cannot be understood as making no semantic contribution. Accordingly, only the 'de re' option is available to (20).

Crucially, there seems to be no way to derive the contrasts and similarities between (20) and (21) without the 'de re' mechanism. Treating the embedded present as relative (i.e. as effectively making no semantic contribution),

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[16] See Ogihara (1996) and Klecha (2016) for two very different attempts to derive the ULC from independent principles. In particular, for Klecha, ULC effects are verb-dependent (for example, tenses in the scope of *hope* can be future-oriented).

regardless of what the embedding tense is, would fail to predict the lack of a simultaneous reading in (20). Treating the embedded present as a wide-scope quantifier without a suitability-based 'de re' mechanism, would yield (29) and (30), respectively.

(29)   (20)-non-de-re is true in world w at time t iff there is a time t′ preceding t and a time t″ overlapping t such that in all (x, w′, t‴) of DOX(John, w, t′): $RICH_{w′,t″}(x)$.

(30)   (21)-non-de-re is true in world w at time t iff there is a time t′ following t and a time t″ overlapping t such that in all (x, w′, t‴) of DOX(John, w, t′): $RICH_{w′,t″}(x)$.

The problem with the analyses in (29)–(30), is this: even if the ULC correctly rules out a forward-shifted reading for (20), it still cannot rule out a backward-shifted reading for (20) in some cases where John is mistaken about the time he occupies. However, such a reading is always unavailable, regardless of whether John is mistaken about the time he occupies. On the assumption that the 'de re' mechanism includes the TAC, it is correctly predicted that John can be mistaken about the time he lives in, but he is not allowed to be mistaken about where he stands in relation to the 'res'.

Several additional points are worth highlighting. Firstly, we prefer the TAC to the weaker requirement in Abusch (1997) – temporal isomorphism – because of the oddity of *When I talked to him two years ago, Ralph said that Mary is pregnant* (see Smith 1978 and Enç 1981). Temporal isomorphism allows the relevant acquaintance relation to pick out a shorter pregnancy time in Ralph's doxastic alternatives, as long as it overlaps Ralph's now (in other words, it allows the pregnancy time to be shorter than two years in those doxastic alternatives). We also prefer the TAC to the requirement in Ogihara (1996) – Temporal Directionality Isomorphism – because of (21). Temporal Directionality Isomorphism requires the attitude holder to have, at the time of the attitude, the same orientation towards the 'res' as the speaker has at the utterance time.

Secondly, as Abusch stresses, the ULC applies specifically to tenses; it is not a blanket constraint on acquaintance relations. For if it were, (14) would not be coherent.

Thirdly, the ULC is consistent with the fact that (28), with past tense in both the main and embedded positions, has a simultaneous reading and a backshifted reading, but not a forward-shifted reading, as shown in (31).

(31)   (28)-de-re is true in world w at t iff there is a time t′ preceding t, a time t″ preceding t and a suitable R such that:
(i)   t″ = (the largest t* such that $R_{w,t′}(John, t*)$)
(ii)   in all (x, w′, t‴) of DOX(John, w, t′): $PRO\text{-}CHOICE_{w′,(the\ largest\ t*\ such\ that\ R_{w′,t″}(x,\ t*))}(Mary)$.

However, the 'de re' analysis does not account for all available readings of a past embedded under a past, in all constructions, and the Sequence of Tense rule discussed above is needed in addition to the 'de re' mechanism.[17] Thus, the simultaneous reading of (28) has two sources, but some simultaneous readings of a past embedded under another past have only one source (for specific examples, see, among others, Heim 1994; Ogihara 1996; Abusch 1997).

Fourthly, many scholars (e.g. Gennari 2003; Altshuler & Schwarzschild 2013; Klecha 2016; Kauf & Zeijlstra 2018, Bary this volume) have claimed, implicitly or explicitly, that there is no justification for a 'de re' analysis. They suggest that the double access reading of (20) comes about through other mechanisms, though they endorse different mechanisms. It seems to us that none of these approaches can successfully account for both (20) and (21). The main challenge, as we saw, is to predict a shifted reading in the case of (21) while ruling it out in the case of (20) (and allowing a double access reading for both). It is worth noting, in this connection, that a specific objection to the 'de re' analysis mentioned in Bary (this volume), echoing an objection made in several places in the literature, is not sufficient to discredit the analysis. The objection relies on the following scenario given by Klecha in his (2015):

(32)   Mary puts a balloon under her shirt. John then observes her in this state, and then says to everyone: "Mary is pregnant!" Later that day, Mary takes the balloon out from under her shirt and pops it. Bill, aware of everything that happened, says to Mary: "(Earlier today,) John told everyone that you're pregnant."

The example would be problematic if the 'de re' construal of the present tense relied on the balloon still being under Mary's shirt by the time Bill speaks. But no such requirement is placed by the semantics. While the time of the balloon being under Mary's shirt is a natural candidate for the denotation of the present tense, the relevant relation R could deliver a time that overlaps both the telling time and Bill's utterance time (an option raised by Dorit Abusch in personal communication with Bary). In Ogihara's system, relation R holds between Bill and a certain state whose time overlaps the utterance time. While the state of Mary holding the balloon under her shirt is a natural candidate, there are many others; among them are states whose time overlaps Bill's utterance time.

We conclude, then, that it is not only possible to extend the 'de re' mechanism that accounts for Ortcutt-examples to tenses, but also that it is necessary, as originally argued by Abusch and by Ogihara (see Tsilia 2021 for additional arguments). On the other hand, if the 'de re' tense mechanism

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[17] See Gennari (2003), Altshuler and Schwarzschild (2013), Kauf and Zeijlstra (2018) for alternative explanations for the ambiguity of (28).

(constrained by the ULC and the TAC) exists alongside other interpretation mechanisms, that allow substitutions not predicted by the 'de re' mechanism, we should be able to find examples that defy both the ULC and the TAC. An example that defies the TAC is given in (33) (cf. Sharvit 2018; see Tsilia 2021 for other counterexamples), evaluated against the scenario in (34). The speaker simply substitutes her time of alleged nervousness (which is in the past) with John's (which is his now).

(33)   John thinks that Mary was nervous.

(34)   John wakes up from a coma. He does not know where he is, who he is or what time it is. He looks at the calendar on the wall according to which the date is March 12, 2019 (in fact, it is one month later). He hears Mary talk on her cell phone and thinks: "This woman is very nervous."

An example that defies the ULC is given in (35) (see Altshuler & Schwarzschild 2013). It was uttered in an airport, by a passenger telling an airline employee about what he was told during the flight, regarding his luggage (presumably: *The airline will have your bags*).

(35)   The flight hostess told me that you have my bags.

It is not clear, as of yet, what mechanism accounts for these examples (to the extent that they are genuine counterexamples to the 'de re' theory).

2.5   Conclusion

We have argued that fruitful extensions of the 'de re' analysis require rethinking the causal-informational picture that early proponents of the 'de re' analysis relied on in unpacking the notion of cognitive contact. As the case of tense indicates, extending the analysis to account for other sorts of embeddings, apparently so unlike the traditional double vision cases, may require that philosophers of language and linguists look for novel accounts of how the attitude holder is related to the 'res'.

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Part II

Describing and Referring

3 Referential and Attributive Descriptions

Hans Kamp

3.0 Questions and Answers

(1) Why do you think both linguists and philosophers find the phenomenon in question interesting?

One reason why philosophers have been interested in reference is that it is one way, and perhaps the purest way, in which the mind makes contact with the outside world. In fact, the concern here isn't, or shouldn't be, just with reference in language, but also – and perhaps primarily – with reference in thought. But the ways in which we make our referential intentions concrete and public through our use of referential expressions arguably provide the best access to the question how reference in thought (our referential mental acts) connects us to the world in which we live. The most dramatic example of how analyses of how reference works can have a profound influence in philosophy were the changes in epistemology and metaphysics brought about by Kripke's work on proper names, Kaplan's work on indexicals and demonstrative phrases (those noun phrases that begin with *this* or *that*) and Donnellan's work on the referential use of definite descriptions. It is as true today as it was at the time when these changes occurred that what they brought about deserves to be considered a revolution. But many problems about how we make contact with the world – how our thoughts can be of entities in the external world – will be with us for a long time to come (and perhaps they will remain philosophical questions forever).

For linguists, or at any rate for the semanticists among them, reference is important because it is an inalienable part of predication, the construct from which all propositional information is built. (Even quantified propositions, which do not involve reference to any particular entities, are built from predications consisting of predicates and terms capable of referring to particular arguments, as Frege may have been the first to see with full clarity.) But the details of how different linguistic expressions and constructions can be used to refer vary considerably, both within and between languages. How particular referential devices function – which parts of an independently identified

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spectrum of possible referential mechanisms they cover – is an interesting crosslinguistic question about 'function packaging': what are the natural dividing lines within the spectrum? Perhaps such investigations may even lead to the discovery of new neo-Whorfian effects.

(2)   What recent developments in linguistics and philosophy do you think are most exciting in thinking about the phenomenon in question?

 (i) Distinguishing explicitly between the productive side of verbal communication – how do speakers choose the referring expressions they use? – and the interpretational side – how do the recipients of referring expressions go about interpreting them? – but then using this distinction in a communication-theoretic framework that treats the productive and the interpreting aspects of reference as different sides of a single coin.

 (ii) Relating reference through the use of linguistic expressions to reference in thought.

(iii) Embedding the semantics and pragmatics of language use and language structure within a general theory of perception, action and interaction, in which verbal interaction is one important aspect.

(iv) Discoveries about how reference works in an ever broader spectrum of different human languages, including in particular sign languages.

(3)   What do you consider to be the key ingredients in adequately analyzing the phenomenon in question?

Developing well-motivated and effective hypotheses about the mental representations of the things that we can refer to in language. In my perception there has been a deep-seated suspicion within (in particular) formal semantics against formulating hypotheses about the form of mental representations of what can be expressed in the languages we speak and about their use in the exercise of our linguistic faculties. There were, and still are, good grounds for this suspicion: So long as reliable sources of information about mental representation of linguistically expressible contents from other disciplines (such as cognitive psychology) are lacking, the formulation of hypotheses about such mental representations and their mental manipulation is threatened by circularity and self-deception. But I also believe that if we do not push ahead with such hypotheses in spite of these dangers, we will find ourselves stuck in the same place and the same grooves. We have reached a point where we are close to the limits of what can be accomplished without such hypotheses.

(4)   What do you consider to be the outstanding questions pertaining to the phenomenon in question?

(This is going to be pretty much a repetition of what has been said in my answers to the other three questions.)

 (i) The relations between reference in language and reference in thought.
 (ii) Arriving at an independently motivated crosslinguistic identification of
      the set of linguistically possible reference mechanisms (a kind of seman-
      tic universal), so that we can then investigate which parts of this set are
      covered by which referential devices, (a) within single languages and (b)
      between languages.
(iii) Studying the use of referential devices in speech acts of other types than
      assertions. An important type are utterances that serve to draw the
      attention of one's interlocutor to the target of one's reference (see the
      seminal work of Clark (1996) and references therein). Other speech act
      types that are of interest in this connection are offers, requests and
      grantings of permissions, instructions for servicing complex devices like
      pumps, engines, and so forth, and dialogues about the execution of such
      instructions (cf. B. Grosz 1977); but the list should probably be a good
      deal longer.

3.1   Problem and Approach

This paper is about Donnellan's distinction between referential and attributive
uses of definite descriptions. We will concentrate on what are probably his best
known examples, (i) *the man with a martini*, said at a party of a man standing
in the opposite corner of the room and who, unbeknownst to the speaker, is
holding a glass of water, and (ii) *Smith's murderer*, said by someone at the trial
for Smith's murder. The main point Donnellan made with the first of these is
that definite descriptions can be used successfully even in cases where their
descriptive content isn't satisfied by the entity the speaker wants to refer to.
The second example, *Smith's murderer*, can serve to illustrate this point as
well, but Donnellan's central observation is here that the same description can
be used referentially or attributively in the same situation, focusing on what the
distinction between referential and attributive use comes to in this case.

   Many of the discussions that the referential–attributive distinction has pro-
voked in the more than 55 years since Donnellan introduced it focus on the
intentions of the speaker: the speaker can intend to refer to who or whatever it
is that uniquely satisfies the description she uses, often without having any
other way of identifying this entity – this is the attributive use – or she can have
a specific entity in mind, one that she has identified in other terms, and then
use a description to refer to that entity – the referential use. But what the
speaker intends to do with the description she uses is only one side of the story.
The recipient of her utterance will have to make sense of her utterance; he will
have to zero in on her intentions in order to faithfully capture what she wants to
convey to him. Utterances are successful only when they enable the recipient
to do this – to successfully reconstruct what the speaker wants her utterance to

tell him. That goes for the uses of definite descriptions just as for any other expressions.

In this paper we have a look at referential and attributive uses of descriptions that encompasses both the intentions of the speaker and the interpretation by the hearer and the possibility of effective, successful communication on the basis of their knowledge of the language they share. But that requires a framework in which it is possible to talk, with formal precision, about the semantics of the linguistic expressions involved as well as about speaker's intentions, that is: about something to do with the speaker's state of mind; and likewise about the recipient's understanding of what the speaker has said, which, I take it, is about the mind of the recipient. In other words, our framework must enable us to talk both about the meanings of natural language expressions and about the contents of mental states and about the connections between them.

The framework I will be using for this purpose is MSDRT (for Mental State Discourse Representation Theory), an extension of Discourse Representation Theory (DRT) which not only provides Logical Forms for sentences and bits of discourse from the natural languages under study but also a formalism for the description of the mental states of discourse participants. Since MSDRT is not yet very well known,[1] a good part of this essay, all of Section 3.2, will be devoted to a presentation of it. The presentation will be confined as much as possible to those aspects that are directly relevant for the discussion of definite description uses that follows in Section 3.3. Section 3.4 is a very short and very nearly bare coda.

3.2   Formal Background

3.2.1   Outline of MSDRT

MSDRT has inherited from DRT the overall architecture of a *logical form approach* to natural language semantics. In a logical form approach semantic representations are assigned to expressions of the natural language L under study. These semantic representations belong to a formal representation language that comes with its own syntax and a model-theoretic semantics for that syntax. Sentences and multi-sentence texts and discourses of L get their semantics via the semantic representations[2] assigned to them: their semantics

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[1] The most detailed published account of MSDRT to date is Kamp (2003), a German translation of an English ms. which itself has not been published. (In this piece the name 'MSDRT' is not yet used.) Applications of MSDRT, with brief informal introductions like that in the present paper, can be found in Kamp and Bende-Farkas (2019) and Kamp (2021d).

[2] I use the terms 'semantic representation' and 'logical form' as synonyms.

is given by definition as the model-theoretic semantics of those representations. I assume that the reader has some basic familiarity with DRT and will focus on aspects of MSDRT in which it extends beyond DRT.[3]

The extension of DRT to MSDRT was motivated by the observation that attitude reports – sentences and bits of discourse in which speakers describe the beliefs, desires and other attitudes of one or more agents (the 'attributee(s)') – are much more diverse and complex than had been assumed implicitly in semantic treatments of such reports. More often than not, attitude reports are not restricted to a single attitude – a single belief or desire or other type. And reports involving more than one attitude often convey semantic connections between the different attitudes of which they speak that are crucial to the meaning of the report as a whole. A proper theory of attitude reports must account for those connections. Furthermore, attitude reports are not limited to describing an attributee's mental state at just one time, but also serve to describe how attitudes change in the course of time – how people change their minds is often just as important to us as what states they are in at any one particular moment. Attitude reports with such more complex contents can take a wide and open-ended range of different forms, and they often consist of several sentences rather than just one.

In the light of these considerations, the nearly exclusive preoccupation with simple single sentence reports of the form 'x believes/desires/. . . that φ' (where φ is typically some *that*-complement of the attitudinal verb), which has dominated the literature for most of half a century, seems curiously parochial. And the method mostly used for the semantics of these simple reports does not seem capable of dealing with the much wider and diverse linguistic repertoire regularly and naturally used by speakers of English and other natural languages.[4]

In MSDRT propositional attitude reports are analyzed as descriptions of the mental states of the attributees. These descriptions assume that mental states have much more structure than has been assumed by analyses based on modal logic, in which propositional contents are identified with sets of possible worlds. This is so in more than one respect. As noted, attitude reports often describe their attributees' mental states as consisting of several attitudes of distinct 'attitudinal mode', for instance as consisting of both beliefs and

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[3] For a compact up to date introduction to DRT see Beaver et al. (2005). More detailed and comprehensive expositions of DRT can be found in Kamp and Reyle (1993) and Kamp et al. (2011). The unpublished Kamp (2021c) is as far as I know the currently most comprehensive account of how DRSs (for Discourse Representation Structures, the semantic representations of DRT) can be computed from syntactic parses as inputs. Its DRS constructions proceed bottom-up, in lieu of the top-down constructions of Kamp and Reyle (1993).

[4] The prevalent method for dealing with the semantics of simple propositional attitude reports has been the one based on the formal semantics of modal logic that was developed in the fifties and early sixties, most decisively through the work of Kripke (see especially Kripke 1963). The extension of this method to the semantics of attitude reports goes back to the work on knowledge and belief in Hintikka (1962).

desires. Furthermore, the contents of attitudes of distinct attitudinal mode are often 'referentially connected'.[5] To account for such reports, which attribute several referentially connected attitudes of different modes, the mental state descriptions of MSDRT have to be fairly complex. Details will follow as we go along. Since 'mental state description' is somewhat of a mouthful, I will use the abbreviation 'MSD' for the mental state descriptions of MSDRT.

When MSDRT is used in the semantics of attitude reports, its MSDs occur as parts of DRSs that serve as the logical forms of attitude reports. These DRSs constitute a 'second level' of MSDRT, so to speak. But MSDs also have a different application, viz. as characterizations of the mental states of language users. In this application utterances are analyzed as vehicles employed by speakers and authors to transfer information represented in their own minds to the minds of the recipients of their utterances: The producer has, as part of her mental state, a representation of a certain thought or complex of thoughts, and the utterance she produces as expression of that thought or thought complex will produce a representation of a thought or thought complex in the mental state of the interpreter; there is communicational success when the representation constructed by the interpreter suitably matches that of the producer. It is in this second way, as a formalism for describing the mental states of language *users*, that MSDRT will be used in this paper.

The assumptions that are made in MSDRT about the form of MSDs vary somewhat between its different applications. But in all applications it is assumed that among the constituents of MSDs are (i) descriptions $<MOD,K>$ of Propositional Attitudes (PRs, for 'Propositional representations') and (ii) Entity Representations (ERs). A PR $<MOD,K>$ consists of (a) a *Mode Indicator* MOD, which indicates the 'attitudinal mode' of the represented attitude, i.e. whether it is a belief (in which case MOD is BEL), a desire (MOD = DES), an intention (MOD = INT), and so forth (the list of Mode Indicators may vary between applications); and (b) a DRS K from the DRS language of MSDRT that has been adopted for the application at hand.[6] The MDS formalism used in this chapter will eventually go beyond this basic repertoire, in Section 3.3.2.

In the application of MSDRT to the analysis of the referential–attributive distinction ERs play a central part.[7] Since their form and role is central to

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[5] As for instance in the attribution: "Ponce de Leon believed that there was a source with rejuvenating water in Florida and wanted to go and find it," where the pronoun *it* in the desire part is anaphoric to the indefinite *a source with rejuvenating water* in the belief part.

[6] It is here that the full recursiveness of MSDRT representations is hidden, which makes it possible to represent nested attitudes, for instance Fred's belief that Bill thinks that Mary is in Paris. The key to this recursion is the predicate *Att*: K can contain *Att*-predications that contain mental state descriptions, which can contain PRs with content representations K' that contain *Att*-predications … (For the predicate Att see Kamp and Bende-Farkas(2019)).

[7] As they also do in MSDRT applications to other questions about reference by noun phrases; see Kamp (2015), Kamp and Bende-Farkas (2019), Kamp (2021d, 2021a).

this application, the next section has been set aside for a more detailed discussion of these.[8]

3.2.2   Form and Role of Entity Representations

The form we adopt for Entity Representations is given in Definition 1.

(1)   **Definition of 'Entity Representation'**

An *Entity Representation* ('ER', for short) is a triple
$< [ENT, x], K_{descr}, \mathcal{K}_{anch} >$, where

(i.a) ENT is a Mode Indicator, indicating that the MSD constituent to which it belongs is an Entity Representation (and thus not a propositional attitude of any mode);

(i.b) x is a discourse referent, the *distinguished dref* of the ER.

(ii) K_{descr} is a DRS, which contains certain kinds of information about the entity represented by the ER.

(iii) $\mathcal{K}_{anch}$ is a set of *internal anchors*. Internal anchors will be defined below.

Before saying more in general terms about the form and role of ERs and about the MSDs that contain them as constituents, let me show an example of an MSD – one that describes a mental state that consists (among other things, presumably) of (i) an ER for Smith and (ii) an ER for his murderer, together with (iii) the belief that the entity represented by the second of these ERs is insane.

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[8] Both in DRT and in MSDRT a large part of the work consists in spelling out the rules for constructing DRSs from syntactic sentence structures. (How those syntactic structures are obtained from the raw input – sequences of sounds or signs – is left to other modules of a comprehensive theory of language production and reception). I note in passing a fundamental problem for semantic theories which assume that semantic representation starts only after full syntactic parses have been obtained for complete sentences. Notoriously, syntactic and semantic parsing go hand in hand while the input – the linearly ordered sequence of sounds or signs – is received. For a theory with the psychological commitments of MSDRT this is a particularly serious issue. In MSDRT the DRS construction rules must be understood as interpretation rules in an unequivocally psychological sense: they are rules that the interpreter uses to update his mental state with a representation of the information yielded by the incoming utterance. (An example of work that takes the problem of online syntactic and semantic processing by the horns is Brasoveanu and Dotlacil (2020).)

One important feature of the construction rules of MSDRT is that they can make use of other parts of the interpreter's own mental state, and in such a way that the constructed semantic representation becomes an integrated part of the interpreter's mental state, with connections to other constituents of that state which may influence its truth conditions. Since the producer's representation, which she uses her utterance to express, is likewise tied to other parts of her mental state, which may affect its truth conditions in their way, it might be suspected that communicational success is hard to achieve: Intuitively, success should minimally require that the representations of producer and interpreter determine the same truth conditions; but how can we expect this to be the case – even when producer and interpreter strictly follow the rules of the language – when those representations are tied to other parts of their mental states, which may pull their truth conditions in different directions? As it turns out, this isn't as much of a problem as one might have feared. The reason for this will become clear in Section 3.3. In this chapter no DRS construction rules will be stated.

(2)

$$\left\{ \begin{array}{l} \Big\langle [ENT, y]\ ,\ \boxed{\begin{array}{c} \\ \hline \text{person}(y) \\ \text{Named}(y, Smith) \end{array}}\ ,\ \mathcal{K}_{Smith}\ \Big\rangle \\[2em] \Big\langle [ENT, x]\ ,\ \boxed{\begin{array}{c} \\ \hline \text{person}(x) \\ \text{murderer-of'}(x, y) \end{array}}\ ,\ \mathcal{K}_{man-in-dock}\ \Big\rangle \\[2em] \Big\langle BEL, \boxed{\begin{array}{c} s \\ \hline n \subseteq s \quad s\text{: insane'}(x) \end{array}} \Big\rangle \end{array} \right\}$$

As this simple example illustrates, one role of ERs is to serve as a kind of interface between the propositional contents of thoughts and the outside world. On the one hand ERs can enter into the representations of such propositional contents. In the formal implementation of this adopted in MSDRT they do this via their distinguished drefs. Thus the distinguished dref x of the second ER in (2) occurs as an argument term in the content representation of the belief in (2). Because of this the propositional content of this representation is a *singular proposition*, which is true in any possible world w iff the person represented by the ER (in the actual world, via its anchor set) is insane in w.[9]

Which entity is represented by an ER depends on the process responsible for its formation and sometimes also on its subsequent use. The first example, used as illustration in the early days of MSDRT, was that of an agent who observes an unfamiliar entity and forms, as part of her perception, an ER representing this entity. This ER has a *perceptual anchor*, which acts as a record of the visual experience to which the ER owes its existence – an anchor of the form 'I am seeing α', where α is the ER's distinguished dref.[10]

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[9] For an introduction to the notion of a singular proposition see e.g. the article 'Singular propositions' in the Stanford Encyclopedia of Philosophy.

[10] The exact format for perceptual anchors has been a matter of debate. I assume that there is a special repertoire of DRSs that is available for this purpose, but won't spell this repertoire out explicitly. Perceptual anchors resulting from visual perceptions may be assumed to have the form shown in (3a) for as long as the perception is lasting and that in (3b) after the perception has come to an end:

(3)

a.
$$\boxed{\begin{array}{c} s \\ \hline n \subseteq s \quad s\text{: see}(i, \alpha) \end{array}}$$

b.
$$\boxed{\begin{array}{c} e \\ \hline e \prec n \quad e\text{: see}(i, \alpha) \end{array}}$$

(3a) says that there is a current state to the effect that the agent (represented by i) is seeing the entity represented by α, (3b) that there has been an event of i seeing α at some past time.

A second type of anchor are *vicarious anchors*. According to MSDRT, ERs can also be formed when the recipient of an utterance that contains a referring expression α takes the producer of the utterance to have used α to refer to an entity for which she, the producer, has an ER ER_{prod}. The ER ER_{recip} that the recipient can then form for the entity to which the producer has referred will have a vicarious anchor to record that the ER represents whatever it was that the producer referred to by using α on the given occasion, and thereby makes ER_{recip} to a representation of this referent.[11]

Once a PR or ER has become a constituent of an agent's mental state, it will tend to persist there, though it may fall into oblivion at some later point or even be razed from memory altogether. While such a constituent is part of the agent's mental state, it can partake in various kinds of mental processes. One important use of previously acquired ERs is in entity recognition: When the agent encounters an entity represented by an ER in his mental state and he recognizes this entity as one that is familiar to him, then according to MSDRT this will take the form of reactivating this ER and recording the present recognition through the addition of a new anchor to the ER's anchor set. (In this way the anchor sets of ERs can keep growing after the ER has first been formed.) Among the new encounters with an entity that is already familiar, in the form of an ER representing it, there are on the one hand those where the agent meets the entity face to face, so that he can see the entity (or directly perceive it in some other way, e.g. by hearing the sounds it makes). In such cases the new anchor will be a perceptual anchor. But there are also the cases where a familiar entity is mentioned by someone else. In this case the new anchor will be a vicarious one. This second kind of recognition will be central to our discussion of referential uses of descriptions in Section 3.3.

It is important to keep in mind that the internal anchors of ERs are 'records', available to the agent at a mind-internal level, of her exposures to the entities they represent. The real link between an ER and the entity it represents resides in the ER's actual causal history, starting with the occasion on which it was

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[11] (4) gives one possible form for this vicarious anchor (Kamp 2021d).

(4)

$$
\begin{array}{|c|}
\hline
e \\
\hline
e \prec n \\
e{:}\ \mathrm{ref}(z,\alpha,x) \\
\hline
\end{array}
$$

'ref' denotes the 4-place relation that holds between e, z, α and x iff e is an event of z using the expression α to refer to entity x. Here x is the distinguished dref of the ER ER_{recip}; x represents the referent of ER_{recip} as argument of 'ref' and thereby renders ER_{recip} a representation of the entity that the producer z referred to by her use of α. Often z will be the distinguished dref of another ER, which the recipient has for the producer of the utterance. In the present paper this will always be the person that is talking to the recipient.

first formed and then subsequently enhanced on the later occasions when it was reactivated in new encounters with the referent. Indeed, it is possible for an anchor to give a false account of the history of its ER, for instance when an ER with a perceptual anchor is the result of an optical illusion.[12]

Descriptive Content of ERs The second component of an ER consists of descriptive information about the represented entity. This information is given in the form of a DRS, in which the distinguished dref of the ER may have multiple occurrences. Exactly what information is supposed to go into this component is an unresolved question and perhaps one that cannot be resolved once and for all. Descriptive information that an agent associates with the entity represented by one of his ERs can be roughly divided into what is constitutive of his grasp of the entity's identity and what can be separated from this grasp. Information of the first kind should according to MSDRT belong to the second component of the ER itself, whereas information of the second kind should take the form of beliefs about the entity represented by the ER – information that in MSDRT is given by a DRS K of a PR $<BEL,K>$ that will contain one or more occurrences of the ER's distinguished dref.

But how is one to draw the line between what is essential to the agent's conception of the represented entity and what is contingent given that conception? This isn't just a matter of theoretical unclarity or uncertainty. From the agent's own perspective the line will in general not be carved in stone, but may shift as a function of the agent's fluctuating perspective. One day she may think of Aristotle as Plato's star student, of whom she also takes herself to know that he was the author of *De Interpretatione* and the Nicomachean Ethics. On other occasions she will conceive of Aristotle as the author of these works and take it as a contingent fact about him that he was taught by Plato. In our terms: the agent has a single ER for Aristotle, but that he was Plato's student may be part of the ER's own descriptive content at one time, while at some other time it is conceived as information about an independently identifiable person, and thus as the content of a separate belief.[13]

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[12] Cases where anchors are incorrect records are a topic in its own right. (For some discussion see Kamp 2021a.) Another type of case, more directly relevant to the topic of this paper, is that where the recipient of an utterance containing a phrase α erroneously takes the speaker to have used α to refer to the entity represented by his ER *ER*, but where the speaker has in fact used α to refer to some different entity. In this case there will be a conflict between the different anchors in *ER*'s new anchor set, with one anchor linking *ER* to the referent the speaker did refer to and one or more other anchors linking it to the referent for which *ER* was originally introduced. Another possibility is that the speaker didn't use α to refer to some particular thing she had in mind, in which case the anchor doesn't provide a link to an ER of the speaker and thus is a false record.
    In this paper all such anchoring mishaps are set aside; we will assume throughout that the causal relations witnessed by anchors are as the anchors imply.
[13] This kind of fluidity in what the agent considers essential or identifying information may be reminiscent of Searle's Cluster Theory of Names (Searle 1958, 1982; Kripke 1980). Note well,

For these reasons MSDRT is uncommitted to exactly which information that the agent assumes to be true of the entity represented by an ER of his goes into the second component of the ER itself and which is represented elsewhere. But there are a couple of conventions about what goes into the descriptive component of an ER that I will stick to throughout: (i) when the agent knows the entity by name (or by one or more of its names), then the information that N is a name of the entity is always part of the second component of the ER, in the form of a DRS condition of the form 'Named(x,N)', where x is the distinguished dref of the ER; (ii) taking oneself to be familiar with an entity in the form of having an ER for it entails that one takes the entity to belong to some particular ontological category – artifact, living creature, person, place, time, event, disposition, and so on. This kind of sortal information is also assumed to be part of the ER's second component.

To conclude, ERs can change in the course of their existence not only in their anchor sets but also in their descriptive components, as a function of (a) what information about the entity is known at any time to the agent, and (b) which parts of that information represent part of her conception of the represented entity at that point.[14]

3.2.3   Entity Representations and Articulated Contexts

Entity Representations also play a pivotal role in another extension of DRT, the Entity Representations and Articulated Contexts framework of Kamp (2021a, 2022). The ER & AC framework was developed to deal with a very different problem from that which gave rise to MSDRT. One objection to DRT in its original form is that it only makes room for anaphoric interpretations of definite descriptions. In its original formulation (see in

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however, that in MSDRT this fluidity does not affect the actual link between the ER and the entity it represents, so long as its anchor set is not empty; that link is determined solely by the causal connection between ER and entity, as witnessed by the anchor set. (Also note that the anchor sets of our current ERs for entities that like Aristotle have not been in physical existence for a long time consist exclusively of vicarious anchors.) For more discussion see Kamp (2021d, 2022).

[14] In current MSDRT ERs with empty anchor sets are admitted as well as ERs whose anchor sets are nonempty. ERs with empty anchor sets differ from ERs with nonempty anchor sets in that for them it is their descriptive content which determines what they represent: An ER with an empty anchor set represents the unique satisfier of the descriptive information contained in its second component. It may be a point of debate whether such ERs should be admitted at all: Is it possible to make the unique satisfiers of descriptive contents into the referents of singular thoughts and statements by what may look like a mere sleight of hand? My own inclination is that we can fix reference through the mere use of uniquely identifying description – along the lines of what for instance Kripke proposes in *Naming and Necessity* about the introduction by definition of names like *Neptune*. But I do not see my way through to an argument for this position that should persuade those who hold that an agent cannot turn unique satisfaction into direct reference by mere stipulation. When ERs with empty anchor sets are admitted, this raises interesting questions for the referential–attributive distinction as we will analyze it in Section 3.3. But a proper discussion would have required considerable additional space, so it had to be dropped from the present chapter.

particular Fraurud 1990) the objection targeted Heim's File Change Semantics (FCS) (Heim 1982, 1988), but this is just as much an objection to DRT, as soon as DRT is extended to cover definite descriptions as well as pronouns. Heim analyses the difference between definite and indefinite descriptions as that between familiarity and novelty: indefinite descriptions introduce new entities into the discourse, definite descriptions refer back to entities that have already been introduced. The problem that Fraurud and others pointed out is not one for Heim's novelty–familiarity distinction as such, but for the particular way in which it is implemented in her File Change Semantics. In this setup the only entities that are available as anaphoric antecedents for definite descriptions at any given point in the course of semantically processing a text or discourse are the ones that have been made available in the text or discourse itself. But that is highly unrealistic. Many of the definite descriptions found in actual texts (such as newspaper articles, for instance) refer to things that have not been previously mentioned in the text. (For many texts this is true for well over 50 percent of all the definite descriptions that can be found in them.) Nevertheless the reader may have little difficulty in understanding the text, and the reason for that is clear enough: Authors and readers are immersed in the same culture, with its large repertoire of widely known people, places, events, and so on. As a member of this cultural community the reader will come equipped with representations for these various entities, as part of the large 'ER libraries' that most of us carry around with us as we make our way through life. In terms of the ER & AC framework this means that his entity library will have ERs for those various entities, which he can use when those entities are mentioned by name, and also by definite descriptions that make use of properties of their referents that are generally known. This entity library will enable him to make sense of all or most of the discourse-new definite descriptions he will encounter.

It is more or less obvious how this problem should be tackled within the formal setting of a framework like FCS or DRT: the theory has to adopt a more comprehensive notion of context, which includes besides the 'discourse context' – in DRT this is the discourse representation that has been constructed for the part of the text that has been read so far – additional sources of contextual information, with something like an 'entity library' as part of it. Other kinds of contextual information may be needed too. For instance, discourse and text processing often require various kinds of world knowledge for the verification that an entity which has been selected as possible referent of a definite description does have the properties that the description attributes to it and that competing candidates do not.

These considerations have led to the following notion of an *Articulated Context*.[15]

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[15] The 'articulated' of 'Articulated Context' is to be understood in the sense in which 'articulated' occurs in the expression 'articulated lorry' – a vehicle consisting of several parts connected in a

(5)   **Definition**
An *Articulated Context* (AC) is a 4-tuple $< K_{dis}, K_{enc}, K_{gen}, K_{env} >$, where
  (i) K_{dis} is the representation of the discourse context;
  (ii) K_{enc} is a set of representations of "known entities";
  (iii) K_{gen} is a set of representations of items of "nonepisodic world knowledge";
  (iv) K_{env} is a set of representations of elements from the immediate
         environment, perceptually accessible to the discourse participants.

So far this definition is only a shell. To make the ER & AC framework useful in formal semantics we need to say more about what the four components K_{dis}, K_{enc}, K_{gen}, and K_{env} of an Articulated Context are like. Here follows what we will need for the purposes of this paper.

The two AC components of special importance for what follows are K_{enc} and K_{env}. As definition (5) indicates, these are both collections of entity representations. And in the ER & AC framework, as in MSDRT, entity representations take the form of ERs. But ERs are mental entities, so these two components of ACs must be understood as parts of agents' mental states. Since the discourse contexts of ACs – their K_{dis}-components – are constructed with the help of K_{enc} and/or K_{env}, and thus often contain the distinguished drefs of ERs belonging to these components, they too should be seen as constituents of mental states, for instance as the content representations of beliefs, which is what I will assume here, simplifying somewhat.[16] About the remaining AC component, K_{gen}, little will be said in this paper. But in this case too, a psychological interpretation is plausible. After all, the general knowledge that an agent makes use of when interpreting a linguistic input must be available to him. I assume that it is available to him in the form of his K_{gen}, whatever the precise form this part of his mental state may have (something about which not much has been said in MSDRT up to now).

The upshot of this is that ACs are to be considered parts of mental states. More specifically, they are parts of the mental states of agents that process verbal inputs when they start the interpretation process and also while this process is going on, changing the AC – mostly its K_{dis}, but often other components as well – and therewith the interpreter's mental state as a whole. Whether a psychological conception of ACs, of the sort that I will assume when using them in my analysis of the referential–attributive distinction in Section 3.3, is inevitable, or whether a user-neutral, nonpsychological conception is possible as well, will be briefly discussed in the final section of this chapter.

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way that allows for a certain flexibility in how each part moves. The name was chosen because the different components of an Articulated Context mostly work in tandem, while at the same time each has a certain degree of individual autonomy.

[16] Interpreters must first form a representation of the content of what they read or hear before they can adopt the represented contents as beliefs, or alternatively, reject them as false or save them for subsequent verification. These two stages of language processing, content identification and deciding on an attitudinal mode towards the thus identified content, are well known in particular from the work of Stalnaker. See e.g. Stalnaker (1999).

This concludes the formal background to our explorations of referential and attributive description uses in the next section.

3.3   Applying MSDRT to the Referential–Attributive Distinction

We are now ready for a closer look at the two Donnellan examples *the man with a martini* and *Smith's murderer*.

3.3.1   The Man with a Martini

Recall the situation: *A* and *B* are standing in one corner of a room in which a party is going on, *A* says to *B*, looking or gesturing in the direction of the opposite corner,

(6)   The man with a martini is a Formula 1 racing driver.

In this utterance *A* is using *the man with a martini* to refer to some particular person on whom her vision is focused. In the terms of our approach this means that *A* has an ER for the person whom she is looking at, with a current perceptual anchor as witness of the visual contact. Since *A* is in a position to say of this person that he is a Formula 1 driver, her ER for him must date from an earlier time, at which she acquired this information. (This also means that the ER's anchor set will have besides the mentioned current perceptual anchor some other anchors as well. About what these other anchors might be there is no need for us to speculate.) Since *A* refers to the referent of her ER as 'the man with a martini', she will presumably also believe of him that he is holding a martini. If so, then the relevant part of her mental state must be as in (7).

(7)

$$\left\{ \begin{array}{l} \left\langle [ENT, x_A], K_A \oplus \boxed{\begin{array}{c} \\ \text{person}(x_A) \end{array}}, \ \mathcal{K}_A \cup \left\{ \boxed{\begin{array}{cc} \multicolumn{2}{c}{s} \\ n \subseteq s & s\text{: see}(i, x_A) \end{array}} \right\} \right\rangle \\[4ex] \left\langle BEL, \boxed{\begin{array}{c} s \\ n \subseteq s \\ s\text{: Formula-1-racing-driver'}(x_A) \end{array}} \right\rangle \\[4ex] \left\langle BEL, \boxed{\begin{array}{c} s \ y \\ n \subseteq s \quad \text{martini}(y) \\ s\text{: hold'}(x_A, y) \end{array}} \right\rangle \end{array} \right\} \quad {}^{17}$$

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[17] The sign $\oplus$ denotes *merge* of DRSs. The merge of two DRSs K and K' is a DRS whose Universe is the union of the Universes of K and K' and whose Condition Set is the union of the Condition Sets of K and K'. The subscripts $_A$ have been added to some of the items in (7) to distinguish these components from corresponding components in the description of the mental states of *B* in (9) below, which are marked with the subscript $_B$.

   Note also that the belief DRSs of (7) represent singular propositions about the referent of the ER whose distinguished dref they contain, i.e. about the man that they are both looking at. Thus the proposition expressed by the first DRS is one that is true in any possible world w iff this man is a Formula-1-racing-driver in w.

If A is in a mental state of the kind described in (7), then it is legitimate for her to use *the man with a martini* to refer to the entity represented by the ER of (7). That she actually chooses this description as device for referring to the person she intends to refer to is a further matter. We will assume that this choice takes the form of a *referential intention*, the intention to refer to the entity represented by the given ER by means of the chosen expression. This intention is a PR that gets introduced as a constituent of A's mental state when the intention is formed, and that remains there until it is discharged by its execution (in the present instance: through A's utterance of (6)). We assume further that the propositional content of this PR is as in (8).[18]

(8)

$$\left\langle INT, \begin{array}{|c|} \hline e \\ \hline n \supset\subset e \\ e: \text{ref}(i,\alpha,x) \\ \hline \end{array} \right\rangle$$

The predicate 'ref' in (8) is the same as that occurring in (4) of note 11 for the general form of vicarious anchors. Furthermore, in the instance of (8) that is part of A's intentions when she utters (6), α is the description *the man with a martini*, i is once again the special dref used for the mind-internal representation of the self (see note 10) and x is the distinguished dref of the ER in (7).

A's use of *the man with a martini* in (6) to refer to the person represented by her perceptually anchored ER in (7) is our first example in this section of the referential use of a definite description.

We now turn to the interpretation of (6) by B. First, let us assume that B already has an ER for the person to whom A has used *the man with a martini* to refer, that B is also looking at this person when A is saying (6) to him and that B also believes that this person is holding a martini. In other words, the relevant part of B's mental state when he starts his interpretation of (6) looks much like the corresponding part of A's state:[19]

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[18] Often speakers have several options for referring to the entities they want to refer to. How they choose between such options is a question that to my knowledge hasn't been given much attention. One important factor is evidently whether the audience can be expected to identify the referent the speaker intends from the expression she uses. For instance, a speaker shouldn't use a description to refer to the entity she has in mind if she has reason to think that her addressee cannot identify this entity from the property her description attributes to it. In the case at hand the choice of *the man with a martini* is a sensible one so long as A has reason to assume that B can see that the intended referent is holding a martini, and that no one in his immediate vicinity does. (And note that it isn't necessary that A herself believe this of the man. She herself may know that's he is drinking water, but since she believes that B thinks the man is holding a martini, she may decide that using the description *the man with a martini* will be the most straightforward strategy for getting him to focus on the man she wants to tell him something about.)

[19] As regards the subscripts $_B$ in (9) recall note 17. The point made there can now be slightly amplified: The descriptive component of the ER that B has for the man with a martini need not be the same, in either form or content, as the descriptive component of A's ER for the man.

(9)

$$\left\{ \begin{array}{l} \left\langle [ENT, x_B]\ , K\ \cup\ \boxed{\begin{array}{c} \\ \hline \text{person}(x_B) \end{array}},\ \mathcal{K}_{\mathcal{B}} \cup\ \left\{ \boxed{\begin{array}{c} s \\ \hline n \subseteq s \\ s\text{: see}(i, x_B) \end{array}} \right\} \right\rangle \\[3em] \left\langle BEL, \boxed{\begin{array}{c} s\quad y \\ \hline n \subseteq s \quad \text{martini}(y) \\ s\text{: holds'}(x_B, y) \end{array}} \right\rangle \end{array} \right\}$$

In the situation in which *A* says (6) to B, it is plausible for *A* to assume that she is referring to someone that they can both see. But that assumption he can only make if B has an ER for the person *A* is referring to. If he does have such an ER, he will then make use of it in his interpretation of *A*'s utterance of *the man with a martini*. This will lead him to the construction of a representation of *A*'s utterance in which the dref introduced by its grammatical subject phrase *the man with a martini* is set equal to the distinguished dref x_B of the ER described in (9). The resulting DRS is shown in (10).[20]

(10)

$$\boxed{\begin{array}{c} s \\ \hline n \subseteq s \\ s\text{: Formula-1-racing-driver'}(x_B) \end{array}}$$

The use and interpretation of *the man with a martini* in the communication just described are examples of the *deictic* use and interpretation of definite descriptions. Deictic uses and interpretations of noun phrases are those in which the phrase is used or interpreted as referring to an entity in the physical environment within which the communication takes place. In MSDRT deictic

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[20] One of the assumptions of MSDRT is that communication events like that consisting of *A*'s utterance of (6) and *B*'s interpretation of it create or reinforce a link between ERs used by the producer to refer to entities and by the recipient to interpret those references. These links take the form of the interpreter adding to his ER a vicarious anchor that records the fact that his ER represents whatever is represented by the producer's ER. Such links are central to MSDRT's account of the so-called Causal Theory of Names (Chastain 1975; Evans & Altham 1973; Kripke 1980) and more generally to the ways in which words and their denotations can spread through a speech community. Communication events and the vicarious anchors that they give rise to lead to networks of linked ERs in the minds of different members of the community; it is these networks that ground the possibility that different members can use the same name to refer to the same bearer even though none of them know much about how the bearer got the name, or in fact about the bearer at all. For details see Kamp (2015, 2021d, 2021b). In the present chapter ER chain building isn't centrally important. But see the remarks on links between existing and newly introduced ERs in Section 3.3.3.

noun phrase uses are distinguished by the fact that the ERs involved in use and interpretation belong to the K_{env} components of the ACs of speaker and recipient; in other words, these ERs must each have a current perceptual anchor. Evidently this condition is satisfied in the case just considered: Both A's ER in (7) and B's ER in (9) have such an anchor at the time when (6) is uttered and interpreted.[21]

The analysis just presented makes it easy to see and state why referential uses of definite descriptions can be successful even when they misdescribe the intended referent – that was one of the central points that Donnellan used *the man with a martini* to illustrate. Suppose that A and B are both mistaken about what is in the glass held by the man jointly represented by their respective ERs displayed in (7) and (9). Then A will think that using *the man with a martini* is a legitimate and helpful way to refer to this person and B can be expected to zero in on this person and employ the ER of (9) to interpret A's use of it and to construct as Logical Form for (6) the DRS in (10), which correctly captures the content of what A wants to say: both this DRS and the first belief DRS in (7) express the singular proposition about the person represented by his ER that this person is a Formula 1 driver. That is what A wanted to convey to him. So the communication is a success, in spite of the fact that the description *the man with a martini* has done its work in a way that it wasn't meant to do it. In fact, A and B will go on to be wrong about what the man is drinking, but for the success of what A wanted to accomplish this is irrelevant.

This is not the only scenario in which A can use *the man with a martini* successfully to refer to the person represented by the ER described in (7) in spite of the fact that the description isn't uniquely satisfied by the man. Another scenario is that in which A thinks that the man does satisfy the description, but B does not. In that case it might well be that the circumstances in which A utters (6) make it clear to B which individual she is trying to refer to – e.g. because in the direction in which she is looking there is only one person who is holding a glass of any kind. If so, B may once again use the ER of (9) in his interpretation of A's words and once again correctly capture the propositional content of A's assertion. He may then consider whether he should point out to A that the man she has referred to isn't drinking a martini. But since this is irrelevant for what he has concluded she wants to tell him, he may decide that correcting her on this point would just be pedantic.

[21] For a related treatment of the deictic use of demonstrative phrases (those that in English begin with *this* or *that*) see Kamp (2021a).

There are further scenarios that illustrate the point as well. *A* may know that the man she wants to refer to is drinking water, but have good reasons to assume that *B* thinks he is drinking a martini, since that is the kind of glass the man is holding. So she decides to refer to the man as *the man with a martini* as the most effective way of drawing *B*'s attention to him. And her strategy may work: *B* identifies the person she wants him to, makes use of the ER described in (9) to interpret her words and is thereby led to the correct understanding of them (see also note 18).

These three scenarios may not exhaust the list, but they suffice for Donnellan's general moral: Referential uses of descriptions can work even when they misdescribe what they are being used to refer to. Furthermore, as our discussion has made plain, this is possible either because speaker and hearer are victim to the same misconception about the intended referent, which the communication will not reveal to them in spite of its success, or because one of the interlocutors compensates for the misconception of the other.

3.3.2   Smith's Murderer I: Referential Use and Utterance Motive

In the second Donnellan example mentioned in Section 3.1 the speaker *A* and her interlocutor *B* are attending the trial for Smith's murder. Donnellan uses this example to illustrate the difference between the referential and the attributive use: *A* can make both a referential and an attributive use of *Smith's murderer* in the setting he considers, where at some point *A* addresses *B* with the words:

(11)   Smith's murderer is insane.

We start with what Donnellan presents as an example of the referential use of *Smith's murderer*: *A* uses *Smith's murderer* to refer to the man in the dock, motivated to make her statement (11) by the bizarre behavior he is displaying while she and *B* are watching. What *A* wants to express by uttering (11) in this case is the singular proposition about the man in the dock that he is insane, a claim that is independent of whether this man really is the one who murdered Smith or isn't.

From the perspective of the present chapter this case is closely similar to the one discussed in the last section. Once again, and in line with what Donnellan says about this use of *Smith's murderer*, we can assume (i) that both *A* and *B* have ERs for the man in the dock, with anchors reflecting their current perception of him, (ii) that *A* uses *Smith's murderer* to refer to

the man represented by her ER and (iii) that *B* makes use of his ER for the man to interpret her use of the description. Note that the current perceptual anchors of the ERs involved make *A*'s use of *Smith's murderer* and *B*'s interpretation of it instances of the *deictic* use and interpretation of definite descriptions, just as the use and interpretation of *the man with a martini* in the last section. And that makes the use and interpretation of *Smith's murderer* we are considering also instances of the referential use and interpretation.

What distinguishes Donnellan's discussion of this example from the *the man with a martini* case is his bringing up of *A*'s motive. This was no doubt a good way to make it clear to his readers that *A*'s use of *Smith's murderer is* referential: *A* wants to say something about the man in the dock and uses *Smith's murderer* to draw *B*'s attention to this man, so that he will interpret her statement as expressing a (singular) proposition about this man. We should keep firmly in mind, however, that having a motive of this sort isn't a necessary precondition for the referential use. We will see this more plainly when we come to Donnellan's presentation of an attributive use of *Smith's murderer* in the next section.

But first, let us reflect more closely on why *A*'s motive in the present case seems to add so much force to the claim that her use of *Smith's murderer* is referential. The intuitive reason for that, I take it, is that the motivating belief – that the behavior of the man in the dock is of the sort one would expect from someone insane – does not depend on whether the man in the dock is the one who murdered Smith. Therefore, the statement that is motivated by that belief should presumably be one that does not depend on this question either. And that condition is satisfied by the proposition which asserts of the man in the dock that he is insane (and not by a proposition in which the descriptive content of *Smith's murderer* is logically included; see the next section).

How can we articulate this intuitive explanation in the formal terms of our MSDRT-based approach? Let us approach this problem indirectly, by first considering an analogous one for *A*'s addressee *B*. *B*, who has also observed the strange behavior of the man in the dock, can be expected to see that behavior as an explanation for what he takes to be the content that *A* communicates to him by uttering (11), much as *A*'s observation of that behavior was her motive for making her utterance. That is, the mental state that *B* is in as a result of interpreting *A*'s statement and concluding that what *A* is saying is plausible given the man's behavior in the dock (and accepting what *A* is saying as true on account of this), can be described by the following MSD:

(12)

$$
\left\{
\begin{array}{l}
\left\langle [ENT, a_B],\ \boxed{\begin{array}{c} \\ \mathrm{person}(a_B) \\ \mathrm{Named}(a_B, \text{`}A\text{'}) \end{array}},\ \mathcal{K}_{a,B} \right\rangle \\[2em]
\left\langle [ENT, sm_B],\ \boxed{\begin{array}{c} \\ \mathrm{person}(sm_B) \\ \mathrm{Named}(sm_B, Smith) \end{array}},\ \mathcal{K}_{sm,B} \right\rangle \\[2em]
\left\langle [ENT, md_B],\ \boxed{\begin{array}{c} \\ \mathrm{person}(md_B) \end{array}},\ \mathcal{K}_{md,B} \cup \left\{ \boxed{\begin{array}{c} s \\ \hline n \subseteq s \\ s:\ \mathrm{see}(i, md_B) \end{array}} \right\} \right\rangle \\[2em]
\left\langle BEL,\ \boxed{\begin{array}{c} s \\ \hline n \subseteq s \\ s:\ \mathrm{insane'}(md_B) \end{array}} \right\rangle \\[2em]
\left\langle EXPL,\ \boxed{\begin{array}{c} \\ \hline n \subseteq s \\ s:\ \mathrm{insane'}(md_B) \end{array}},\ \boxed{\begin{array}{c} s \\ \hline n \subseteq s \\ s:\ BizBeh(md_B) \end{array}} \right\rangle
\end{array}
\right\}^{22}
$$

Most of the notation used in (12) is by now familiar ground: The three ERs are (i) for the person *A* sitting next to *B* at the trial, who has just said (11) to him, (ii) for Smith and (iii) for the man in the dock. The BEL constituent describes the belief *B* has formed by accepting the assertion that *A* has just made, according to *B*'s interpretation of her words, which is given by the content DRS of the BEL constituent. But the final constituent of (12), beginning with 'EXPL', requires comment.

EXPL (for 'Explanation') is a Mode Indicator of a novel type, which wasn't mentioned in Section 3.2.1. EXPL links two propositions (once again represented as DRSs). The attitudinal mode EXPL in (12) is a generalization of the Explanation relation of SDRT (Asher & Lascarides 2003) and other theories of rhetorical structure.[23] It is a generalization of that relation in that it is not restricted to contents of clauses and other parts of a given discourse or text, but may be

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[22] 'A' is the name of A, which I assume B knows. 'BizBeh', short for 'Bizarre Behavior', is a '1-place state predicate' (one that relates states to individuals), which applies to an individual *d*, a state *s* and a time *t* iff *s* is a state of *d* being engaged in bizarre behavior and *s* holds at *t*.

[23] Since SDRT and MSDRT are both extensions of DRT, which use DRSs as representations of clause, sentence and discourse contexts, combining them is for the most part comparatively easy. Extending the Explanation relation of SDRT into the description formalism of MSDRT can be seen as one small step in that direction. Many of the insights and notational innovations of SDRT can be incorporated into MSDRT likewise.

applied also to propositions of other provenance. The application of EXPL in (12) is an example of this insofar as one of its relata is the content of a bit of discourse in this case – all of *A*'s utterance (11) – but the other relatum, the content of *B*'s observation of the behavior in the dock, is not.[24] But from a cognitive perspective EXPL is just the same as the corresponding discourse relation. The first relation is nothing but an extension of the second to a larger application domain.

What is it for a proposition *p* to provide an explanation for some other proposition *q*? One way in which *p* can do this is to logically entail *q*. If this is the relation that holds between the propositions expressed by the two DRSs of the EXPL constituent of (12), then we have the basis for an account of why *B* should interpret *A*'s utterance of (11) as a singular proposition about the man in the dock and interpret, as part of that, *Smith's murderer* referentially. By interpreting (11) in this way *B* assigns it a propositional content that doesn't say anything about Smith's murder. That makes the content one that can be explained by the behavior of the man in the dock which *B* has been observing. (That content may not strictly speaking entail *B* 's interpretation of (11) on its own, but it would in conjunction with the belief that his behavior could only be that of someone insane, a reasonable belief for *B* to hold in the given circumstances.) Furthermore, these circumstances may impel *B* to take the goings-on in the dock as an explanation of what *A* is saying to him (assuming that *A* speaks to him just after they have watched a particularly absurd piece of behavior by the accused). But if these goings-on are to provide explanatory support for what *A* says, then her words should be interpreted in such a way that these goings-on do explain it. And for that to be the case *B*'s interpretation shouldn't entail anything about the murder; for if it did, then it couldn't be entailed by a proposition about the man in the dock, which doesn't entail any such thing. (In the next section we will see reasons for thinking that just such a content would result if *B* would not interpret *Smith's murderer* referentially, but attributively.)[25]

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[24] We would have had a case of Explanation in the sense of SDRT if *A* had made the utterance in (13).

(13)   Smith's murderer is insane. Look at how he is behaving.

In (13) the second sentence serves as an explanation of the first, in the sense of the Explanation relation assumed in rhetorical structure theories.

[25] There is a further point here that I cannot pursue in depth, but that I like to mention as a topic for further exploration. (12) represents the explanation that *B* comes up with for the content of (his interpretation of) *A*'s words. When interpreters try to make sense of what they hear or read, part of that is typically that they try to make sense of why the producer says or writes the things she does. The explanation described in (12) is an explanation of why *A*'s words (on the right interpretation of them) should be true (and therefore to be accepted as such by *B*). The explanation why *A* should have made her utterance, with the interpretation that she wants to convey by it, is a different, if usually related matter. *B*'s explanation for *A*'s speech act (as distinct from its mere content of that act) could be represented in some such form as (14).

Below I will return to the argument of the last two paragraphs. But first let us go back to our point of departure: A's motive for the utterance of (11). If A's utterance is motivated by the behavior she observes in the dock, then the relation between that and the proposition she wants to express is like the relation between B's observation of it and his interpretation of her words. So, by analogous reasoning, the proposition she wants to express shouldn't entail anything about the murder. But such a proposition is expressed by the words she has chosen only when her use of *Smith's murder* is referential. (I will not provide an MSD here for the mental state of A in which the motivation relation is explicitly represented, as little would be gained from that for the point that is at issue – the reason why mentioning A's motive strengthens the case for the claim that she is using *Smith's murderer* referentially).[26]

Unfortunately, this account of why the goings-on in the dock motivate A to use *Smith's murderer* referentially, and why B's taking them as explanation for A's words induces him to interpret *Smith's murderer* as referentially used, is no more than a first stab. Logical entailment may be a sufficient condition for explanation and motive, but it surely isn't a necessary one. As regards explanation, it isn't just that p can provide an explanation for q without entailing q on its own; the entailment may rest on a number of additional premises: q isn't entailed by p but by p together with tacit premises $r_1, \ldots, r_n$. But even such a more relaxed notion of logical entailment is almost certainly too strong for what we want. In order that p can be seen as explanation for q, especially in the

(14)
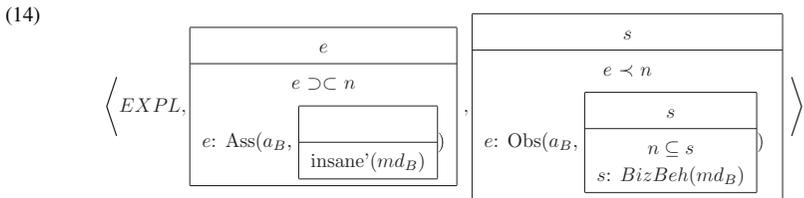
This involves additional notation, in the form of the predicates 'Ass' and 'Obs'. They point in yet another direction in which MSDRT can and should be extended: with machinery for describing speech act types, speaker intentions and speaker–hearer interactions like those creating common ground on the one hand and disagreements in adversarial discourse forms on the other.

[26] One way to provide such an MSD to add to MSDRT another relational attitudinal mode, with Mode Indicator MOT (for 'Motive'), with the same syntax as EXPL and based on the same logical relation between the propositions it connects. This is simple enough. But introducing MOT into the MSDRT formalism makes sense only when the formalism can deal adequately with the attitudes involved in utterance production. That raises a number of difficult questions, which do not arise in connection with utterance interpretation. These difficulties make extending the formalism to one fit for the description of the mental states of utterance producers a more demanding task than can be undertaken here.

sense in which Explanation functions as discourse relation, all that seems to matter is that p can be seen to render q more plausible than it would be without p, or raise q's probability, or something along such lines – I am speaking vaguely because I do not know what the right explication of Explanation as discourse relation is. Likewise for the relations expressed by EXPL and MOT (see note 26).

Whatever such a logically weaker definition of explanation and motive may be, it is far from obvious that it will enable us to account for why motive can guide intended utterance content, and explanation guide utterance interpretation, in the way they can when motive and explanation involve strict logical entailment. Perhaps a truly persuasive reconstruction of the relation between utterance motives and the kinds of use that utterers make of definite descriptions will prove illusory. But even if this should turn out to be so, there may be enough to the story I have sketched to explain why Donnellan found it useful to bring motive into play and why that seems to have worked well enough.

Section Summary The referential use of the description *Smith's murderer* that this section has been concerned with is much like the use of *the man with a martini*. Both are instances of the deictic use of descriptions, and deictic uses are one type of referential use. New to our discussion of *Smith's murderer* in this section was the role that the motive for an utterance can play in the way a description is used: If a speaker wants to make a statement about an entity to which she has independent access, then she may choose a definite description to refer to that entity, and her use of that description will then be a referential one.

To conclude the section, here is the 'official' version of the definition of the referential use of definite descriptions that has emerged in this and the previous section:

(15)   A singular definite description δ *is used referentially by* a speaker A *in* an utterance u of a sentence S containing δ iff A has an ER ER that represents an entity d and A uses δ to refer to d. This means that in A's own Logical Form for u the argument position occupied by δ in S is filled by the distinguished dref of ER.

3.3.3   Smith's Murderer II: The Attributive Use

A could also make an attributive use of *Smith's murderer*, Donnellan observes, and she would do so when her utterance of (11) is motivated by the horrific details of the way in which the generally beloved Smith has been killed. For instance, she could say (11) to B in reaction to some of these details that they had to listen to during the trial when the prosecution presented them as part of their case. The intuition here is that (11) is true in part by virtue of how its grammatical subject *Smith's murderer* describes its referent. One way in which this might be made more precise is to say that attributive uses of descriptions

lead to general rather than singular propositions. For instance, the proposition that is expressed by (11) when its description is used attributively might be represented by the Logical Form in (16) assigned to it by B.[27]

(16)
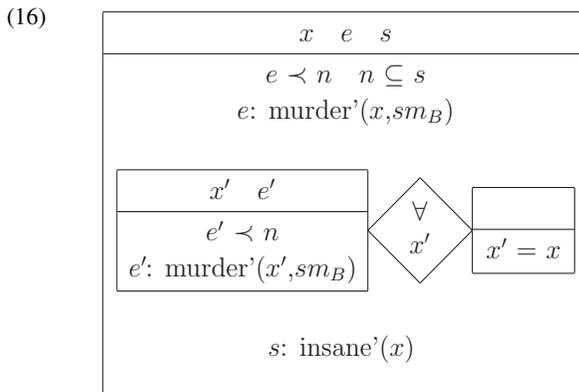
While the content determined by (16) is a singular proposition with respect to Smith, represented by the distinguished dref sm_B of B's ER for Smith, it is not singular with respect to Smith's murderer, which is what matters: (16) says that there is a unique individual who murdered Smith, and that that individual is insane. This DRS is thus a close approximation of a Russellian Logical Form for (11) (modulo its treatment of the name *Smith*), which I take to be the distinctive mark of the attributive use of *Smith's murderer*: by representing (11) as (16) B treats A's use of *Smith's murderer* as attributive. Likewise, if A's own representation of what it is she has chosen (11) to express has the form of (16), then her use of *Smith's murderer* <u>is</u> an instance of the attributive use of definite descriptions.

This then is one way in which the notion of *attributive* uses of definite descriptions can be defined within our MSDRT framework:

(17)   Agent *X uses* the definite description '*the* δ' attributively as part of her utterance of a sentence φ iff the Logical Form that *X* associates with her utterance is of the form 'There is a unique δ such that $P(δ)$ and this δ also satisfies Q', for certain predicates P and Q.

Is this the correct definition of the notion *attributive use*, or at least a defensible one? That is a delicate question, for one thing because it is to a large extent a matter of Donnellan exegesis. According to my own perception, (17) succeeds in capturing Donnellan's intentions insofar as it conforms to the received view of definite descriptions at the time when he introduced the distinction between referential and attributive uses. New to that distinction

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[27] The notation used in this DRS belongs to the standard equipment of DRS languages. This is so in particular for the expression of universal quantification in the third Condition in the Condition Set of (16). Details can be found in Kamp and Reyle (1993: chapter 2).

was that descriptions have referential as well as attributive uses – the attributive use was the one that everyone was familiar with, from the work of Frege, Russell, and many others. According to those authors descriptions always make their contributions via unique satisfaction of their descriptive content.[28]

That the use of *Smith's murderer* by *A* we are currently discussing is attributive in the sense of (17) is supported by *A*'s motive for uttering (11) in the scenario described at the beginning of this section. The motive, recall, was that whoever murdered Smith must be insane given what is known about the details of the crime. That thought, evoked or rekindled in *A*'s mind by the prosecution's exposition, has a Logical Form which speaks of the unique satisfier of the predicate 'murdered Smith'. And just as that thought is *A*'s motive for uttering (11) in the present scenario, it can serve *B*, who has also been listening to what the prosecution has had to say, as explanation of why *A* is saying what she is saying, and saying it at this particular time. And just as in the last section, *B*'s explanation will be valid only when the two propositions – the one expressed by his Logical Form for (11) and the one explaining it – are suitably related. For this to be the case, and since the explaining proposition is to the effect that the unique satisfier of 'murdered Smith' committed the atrocities described by the prosecution, the proposition it explains should also be about the unique satisfier of this predicate; that is, it should be the proposition that the unique satisfier of 'murdered Smith' is insane (and not the proposition that the man in the dock is insane). This will be a reason for *B* to interpret (11) by constructing the Logical Form shown in (16). And in this case too, what goes for the Explanation relation that *B* may be assumed to infer from what *A* says, and the conditions under which she says it, also goes for the relation between *A*'s motive and the proposition she wants to express by (11). That proposition too should not be a singular proposition about the man in the dock, but a nonsingular proposition about whoever murdered Smith.

The reconstructions I have offered of the referential use in Sections 3.3.1 and 3.3.2 and of the attributive use in the present section appear to entail that these uses are mutually exclusive: no description use can be referential and attributive at the same time. The reason for this assumption should be clear enough: In any sentence S containing a definite description δ, δ will fill an argument position of some predicate *P*. In a Logical Form for S the translation P' of *P* will have some discourse referent x in the corresponding argument position. When δ is used referentially, then x will be the distinguished dref of some ER. When δ is used attributively, x will be a dref internal to the Logical Form, of which the Logical Form says that it is the unique satisfier of δ's descriptive content.

---

[28] Whether that contribution involves a presupposition of unique satisfaction, as in Frege, or is directly part of the propositional content of the sentence in which the description occurs, as in Russell, is a further issue, but one that can and should be set aside in discussions of the referential–attributive distinction.

But should we conclude from this that description uses can't be both referential and attributive at the same time? Not necessarily. The conclusion would follow only if sentences with definite descriptions must always have either one of the two Logical Forms we have so far considered for such sentences and that is something we shouldn't take for granted.

3.3.4   *Are the Referential and the Attributive Uses Mutually Exclusive? And Are They Jointly Exhaustive?*

It is, I believe, a widespread if mostly tacit assumption that 'referential' and 'attributive' are mutually exclusive. Sections 3.3.1–3.3.3 may have come across as carrying such an implication too, although it was never explicitly stated that the referential uses of 3.3.1 and 3.3.2 weren't also attributive uses or that the attributive use of 3.3.3 wasn't also a referential one. But is the mutual exclusiveness of 'referential' and 'attributive' really supported by the criteria so far suggested? The answer to that question is 'no'.

True, there are referential uses that are not attributive and attributive uses that are not referential. For an example of the latter consider the situation of Section 3.3.3, where A utters (11) as a reaction to the horrors of Smith's murder detailed by the prosecution. But now, let us assume in addition that there is a common understanding between A and B that they got the wrong man: the accused is not the one who murdered Smith. So when A is prompted to say (11) by the prosecutor's presentation, she doesn't intend to speak of the man she can see in the dock. What she is saying is about whoever it was that murdered Smith and not about anyone for whom she has an ER with a current perceptual anchor. The Logical Form she associates with her utterance may therefore be assumed to be like (16) (with the distinguished dref sm_B of B's ER for Smith replaced by the distinguished dref sm_A of her ER for Smith). There is no further ER in her mental state that plays a part in this Logical Form. So, by our criteria (see (15)) A's use of *Smith's murderer* as part of her utterance is in this case not a referential one.

Similarly it will be clear that the referential use of *Smith's murderer* discussed in Section 3.3.2 won't be an attributive use according to the criteria in (17), if we make the following assumptions: Once again A doesn't believe that the man in the dock is the murderer, but now we also assume that she thinks B is convinced of the contrary. In this situation A may use the description *Smith's murderer* as an effective way to convey to B that she is referring to the man in the dock: it is about the man in the dock that she wants to say something and not about someone that satisfies the content of the description she uses. In this case the Logical Form she will associate with her utterance of (11) is like the content DRS of the belief in (12) (once again with sm_A in lieu of sm_B, and now also with md_A in lieu of md_B). The descriptive content of

Smith's murderer plays no part in this Logical Form, so by our criteria her use of the description is not an attributive one.[29]

But the scenarios of these last two paragraphs seem quite special. Indeed, they were chosen carefully to make sure that *A*'s use was not referential in the one case and not attributive in the other. For other scenarios these negative conclusions do not follow. Assume for instance that *A* and *B* both take it for granted that the man in the dock is the murderer.[30] In this situation it is possible for *A* to utter (11) for the two reasons considered in Sections 3.3.1 and 3.3.2: the present behavior of the man in the dock or the prosecution's details about the murder. But how should we classify *A*'s uses of *Smith's murderer* in this scenario? Consider the case where *A* reacts to the details about the murder, the one that Donnellan gives as his example of the attributive use. Since *A* wants to express in this case that it is the man who murdered Smith who is insane – as that is what she is reminded of by the prosecutor's presentation – the Logical Form she associates with her utterance will predicate insanity of the unique satisfier of *Smith's murderer*; so by criterion (17) her use of *Smith's murderer* is indeed attributive. But can we also assert that it is not a referential use?

There are two sides to this question, an intuitive side and a more formal one, which has direct connections with the MSDRT-based analysis of the referential–attributive distinction of this chapter. Intuitively, when *A* is convinced that the man in the dock is the murderer, then even if her utterance is prompted by facts about the murder, she could hardly fail to conceive of what she says as being about the man she can see in the dock. Therefore, it might be claimed, her utterance *is* about the man in the dock, whatever her reasons for asserting it, and therewith an instance of the referential use. But if this is to be a referential use in the sense of our criteria in (15), then *A*'s Logical Form for her utterance of (11) should contain an occurrence of her ER for the man in the dock. (16) (once more with *sm_B* replaced by the distinguished dref of *A*'s ER

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[29] One comment on this last case (Antje Roßdeutscher, p.c.) is that *A*'s use of *Smith's murderer* seems marginal: If you are convinced that what you want to refer to doesn't satisfy a description, then you shouldn't use it, even if you think that it is the most effective way to get your message across. (For me the case described above improves somewhat if *B* has been using *Smith's murderer* to refer to the man in the dock and *A* is playing along with that by using the description to refer to the man in the dock, even though she doesn't believe that he is the murderer. But there remains a flavor of disingenuousness even then.) This observation is consistent with the tenor of Kripke (1979), which argues that 'referential' uses of definite descriptions like *the man with a martini* can be expected in a language in which definite descriptions are stipulated to refer via unique satisfaction. Roßdeutscher's observation is further support for the view that English is like this.

[30] Perhaps this was the scenario that Donnellan himself had in mind in his discussion of the *Smith's murderer* example; but it is not very clear to me if that is right or, for that matter, whether distinctions between the different scenarios just described played a part in his thinking about this case.

for Smith) does not have such an occurrence and therefore doesn't capture the intuitive idea that *A* cannot fail to see her statement as one about the man in the dock. To do justice to this, *A*'s Logical Form for her utterance should rather be as in (18).

(18)

$$
\boxed{
\begin{array}{c}
x \quad e \quad s \quad s' \\
\hline
e \prec n \quad n \subseteq s \quad n \subseteq s' \\
e:\ \mathrm{murder'}(x, sm_A) \\
\boxed{
\begin{array}{c}
x' \quad e' \\
\hline
e' \prec n \\
e\prec':\ \mathrm{murder'}(x', sm_A)
\end{array}}
\ \
\begin{array}{c}
\forall \\
x'
\end{array}
\ \
\boxed{\ x' = x\ } \\
s:\ \mathrm{insane'}(x) \\
s':\ \mathrm{insane'}(md_A)
\end{array}}
$$
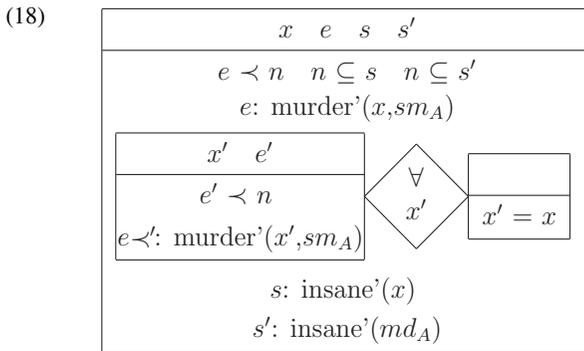
In (18) the description *Smith's murderer* has left two traces, (i) as the unique satisfaction specification that (18) shares with (16) and (ii) as the distinguished dref md_A in the final DRS Condition 's': insane'(md_A)'. By the criteria (15) and (17), if *A*'s Logical Form for her utterance of (11) is as in (18), then her use of *Smith's murderer* is referential as well as attributive.

What should we conclude in the light of (18)? Was it wrong after all to think of the referential and the attributive use as mutually exclusive? There are two points to consider. First, is it really possible for an utterance of (11) to give rise to a Logical Form like (18)? Second, does the possibility of representations like (18) as Logical Forms for utterances like (11) show that the distinction is not mutually exclusive?

An objection to the possibiliy that (18) could be the Logical Form for (11) might be that the referential–attributive distinction is about ambiguity: definite descriptions can be used (and interpreted) in the one way or in the other, but never in both ways at once.[31] This objection may sound a bit like begging the question: The issue raised by (18) *is* precisely, it may be countered, whether the referential–attributive distinction is a case of ambiguity thus understood.

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[31] As illustration of this aspect of ambiguity consider the two sentence discourse "Those two tennis players have a fraught relationship. She often beats him." The verb *beat* in the second sentence can be understood either in the sense of beating someone up or in that of winning some kind of competition (here most likely games of tennis). But you cannot take *beat* as covering both these possibilities, neither in the sense that some of the beating events the second sentence talks about are beating up events and others are events where she beats him at tennis, nor that each of those events involves *beat* in both senses: she first beats him at tennis and then rounds the event off by beating him up (as a way of consolidating the kind of relationship they have).

But on the other hand I have, as things stand, no better argument in favor of (18) as a possible Logical Form for utterances of (11) than the intuition I appealed to above. Whether utterances can have Logical Forms in which definite descriptions are interpreted 'twice over', in the way that *Smith's murderer* is interpreted twice over in (18), is a question that will require further work.[32]

But assume that (18) is the correct Logical Form for some utterances of (11). Are we then forced to admit that the referential and the attributive use are not mutually exclusive? No, not necessarily even then. There could be something wrong with the ways in which we have defined the referential or the attributive use (or both). It might be thought, for instance, that the term 'attributive' should be reserved for those description uses that are 'merely attributive', in the sense that they are attributive according to our criteria for the attributive use, but not referential according to our criteria for the referential use. Such a partly negative definition of 'attributive' might be justified insofar as it was the referential use that was novel in Donnellan's introduction of the referential–attributive distinction; the attributive use was supposed what had thus far been thought to be the only way that definite descriptions could be used.

In this light a natural and simple redefinition of the notion 'attributive use' might be one according to which attributive uses of descriptions are those that are not referential. Given the commitments we have made up to this point, this definition will identify the attributive uses as those that satisfy criterion (17) but do not satisfy criterion (15). Note well, however, that this definition will do only on the assumption that the referential–attributive distinction is *exhaustive* in the sense that each description use is either in accordance with criterion (15) or with criterion (17). If the distinction is exhaustive in this sense, then a description use that is not referential must be attributive in the sense of satisfying (17) and therefore qualify as (merely) attributive.

But is the referential–attributive distinction exhaustive in this sense? Discussions of the distinction often read as if this were assumed. But I am far from persuaded that this assumption can be sustained. One worry has to do with the anaphoric uses of definite descriptions, those which pick out an entity that has been previously introduced in the text or discourse to which the

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[32] This question is connected with a bigger issue about MSDRT, which I haven't addressed in this chapter. MSDRT's approach to the analysis of utterance meaning in terms of Logical Forms that are part of the mental states of their producers and recipients has, I have claimed, the advantage of making room for ties between those representations and other parts of the mental states to which they belong. But because of these ties it need not always be clear on intuitive grounds which parts of the mental states of producers and interpreters should be counted as parts of the Logical Forms for the utterances they produce or interpret. To address this 'demarcation problem' it is necessary to go into the details of DRS construction, something that has been out of the question in this contribution to the present volume from the start.

description itself belongs. There is a substantial literature on anaphoric descriptions,[33] but to my knowledge discussions of these uses have thus far been divorced from discussions of the referential–attributive distinction. Perhaps it is possible to apply the distinction also meaningfully to the anaphoric domain. But to decide this matter we need a unified theory of definite descriptions, which covers both their anaphoric and their nonanaphoric uses.[34]

Here is where I must end. It will have become increasingly clear in the course of this chapter that its explorations form a stage in an ongoing investigation. I hope that the distinctions to which these explorations have led us will prove robust enough to be of further use in a deeper and more comprehensive account of all the different ways in which descriptions and other definite noun phrases can refer.

3.4   Summary

In this chapter we have applied MSDRT – an approach towards natural language semantics in which linguistic meaning is analyzed in terms of the semantic representations that producers associate with their utterances and the representations that their interpreters construct for the utterances that reach them – to Donnellan's referential–attributive distinction. The modus operandi of MSDRT makes it possible – and thereby forces us – to differentiate more finely between different settings in which descriptions can be used than was possible, or would have been considered relevant, at the time when Donnellan first drew attention to the distinction. But the differentiation is important, as it brings to light aspects of the use of descriptions that would otherwise remain below our radar.

Much further work is needed. A united account of nonanaphoric and anaphoric descriptions will have to be one part of that. But as the existing work on anaphoric descriptions makes very clear, such a united account cannot bypass the competing roles that are played by other definite noun phrases – in

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[33] Recall the reference to Heim's work in Section 3.2.3. For some other references to this part of the literature which have had a considerable influence on my own understanding of this domain, see Chiriacescu and von Heusinger (2010), Brasoveanu and Farkas (2009), Coppock and Beaver (2015), Schwarz (2009), Peregrin and von Heusinger (2004), Coppock (2021).

[34] And furthermore, if anaphoric uses of descriptions are one reason for doubting that the referential–attributive distinction is exhaustive, there are other reasons as well. Among them: definite descriptions that occur as copula complements (Coppock & Beaver 2014, 2015), 'kind denoting' and generic descriptions (*the dodo*, *the post office*, *the road to success*; Carlson & Pelletier 1995; Schwarz 2009; Coppock 2021). For all these uses the question arises whether the referential–attributive distinction can be faithfully and meaningfully applied to them. In some cases the answer to that question may be easier than in others. But here I must leave all of them as mere questions.

English: pronouns, demonstrative phrases, and proper names. That is just as true for the nonanaphoric as for the anaphoric domain. And then of course, if it is permitted to close with an understatement, English isn't the only language to look at.

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4   On Definite Descriptions: Can Familiarity And Uniqueness Be Distinguished?

Elizabeth Coppock

4.0   Questions and Answers

(1)   Why do you think both linguists and philosophers find definite descriptions interesting?

Definite descriptions are an area where linguistics and philosophy have been intimately intertwined as long as they have been acquainted.[*] All the classic works on definite descriptions were written by philosophers; philosophers have continued to write about them in philosophy journals; and fundamental questions about truth, meaning, and existence have constantly surrounded their study. For instance, Strawson's critique of Russell's analysis of definite descriptions was not just that he got the facts wrong, but that he was wrong about the very nature of meaning and its relation to logic. That *The king of France is bald* implies, in some "strange" sense of "imply" distinct from entailment, that a king of France exists, was used by Strawson to support his argument that "ordinary language has no exact logic." Subsequent work has treated presupposition with an "exact logic," but the nature of presupposition, and hence the nature of meaning, continues to engage linguists and philosophers. Supposing the nature of presupposition is settled, there's still the small matter of what 'existence' is, actually. In *The golden mountain does not exist*, for example, does *the golden mountain* have a referent? Definite descriptions also figure in a debate in which two different (though compatible) ideas regarding the foundations of semantic theory compete with each other to explain the core phenomena: situation semantics vs. dynamic semantics. This last issue is what I focus on in my chapter.

(2)   What recent developments in linguistics and philosophy do you think are most exciting in thinking about definite descriptions?

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While earlier work on definite descriptions concerned the nature of the existence and uniqueness implications, some more recent work has focused on where these are absent. Familiar definites as in *A glass broke last night; the glass had been very expensive* seem to lack uniqueness (Heim 1982); there could be more than one glass. Similarly, there is more than one dog in the world, but *The dog is barking* is a usable sentence, so uniqueness must at the very least be relativized. An apparent lack of uniqueness can be explained by relativizing uniqueness to a salient discourse referent, situation, domain, or function; there are a variety of strategies here, as this chapter discusses. A more extreme lack of uniqueness is exhibted by weak definites like *take the elevator* and *the finger of the surgeon* (Barker 2005; Carlson & Sussman 2005); these seem to require a separate treatment.

Another case where uniqueness disappears is Haddock's (1987) *the rabbit in the hat*, which works even with multiple hats, so long as there is only one rabbit-containing hat. This phenomenon has been linked to so-called 'anti-uniqueness effects' as in *Victoria is not the only princess*, which Coppock & Beaver (2015) take to show that the definite article does not carry an *existence* presupposition (since there are multiple princesses, there is no 'only princess'). According to Bumford (2017), Haddock descriptions and anti-uniqueness effects are related to each other and to superlatives under relative interpretations as in *Who has the sweetest sister?*, in which the definite article's semantic contribution seems to disappear (Szabolcsi 1986; Heim 1999, among others).

In the modern era, work on definite descriptions has become less focused on English and more crosslinguistic, and the focus has shifted somewhat from foundational questions to more detailed empirical questions. Schwarz's (2009) strong/weak distinction has served as inspiration for much recent work on the crosslinguistic semantics of definiteness (e.g. Aguilar-Guevara et al. 2019). While this new development has led to a much richer and more well-rounded picture of definiteness as a phenomenon, the connection to the philosophical roots of the discussion has been lost a bit as the methods of discovery have been operationalized and applied to new languages. I suggest in this chapter that it is important to retain a connection to the philosophical roots and reflect carefully on what these methods can reveal, lest misunderstandings lead to spurious debates.

(3)   What do you consider to be the key ingredients in adequately analyzing definite descriptions?

The definite article contributes a uniqueness presupposition, even though it sometimes seems not to. There are two main ways to accommodate the bulk of the cases in which uniqueness seems to disappear. One strategy is to assume that definite articles can combine with indexed descriptions, where an index on

a description can correspond to a discourse referent that may be either novel or familiar (Beaver & Coppock 2015; Hanink 2017). Situation semantics presents another alternative (Elbourne 2013). It is quite difficult to disentangle the empirical predictions of these two approaches, as I discuss in the chapter, and it may be that both of these mechanisms are necessary, as Schwarz (2009) suggested.

Whether or not the English definite article contributes an existence presupposition is a matter for debate. Coppock and Beaver (2015) argue that it does not, and existential import for definite, indefinite, and even possessive descriptions is contributed by the type-shifting operations that provide existential import in Russian. Along with these type-shifting operations, it is important to have principles regulating their application as another ingredient of the analysis. According to Bumford (2017), the definite article does carry an existential component, but this existential component is separable from the uniqueness check. As far as I can see, this proposal is compatible with all of the data. So, the definite article may or may not come with an existential component, but if it does, then this component is separable from the uniqueness requirement.

(4)   What do you consider to be the outstanding questions pertaining to definite descriptions?

There are many outstanding questions. Many of them have to do with how the definite article interacts with certain interesting modifiers, including superlatives, comparatives, exclusives, exceptives, *same*, and *other*, both in English and in other languages. In the chapter, I focus on the debate over how to explain certain cases in which definite descriptions appear to lack uniqueness in some sense (setting aside cases of weak definites like *the elevator*, which also remain worthy of further investigation). The two major contenders – dynamic semantics and situation semantics – are based on very different (though compatible) foundational assumptions about semantic theory, and hence the question bears on philosophical matters concerning the nature of meaning. It's also important that the issue be clarified, so that fieldwork methods may be aligned properly with theoretical questions as field linguists explore the range of definiteness-marking systems in the languages of the world.

4.1   Introduction

What do definite descriptions have to do with philosophy? What *don't* they have to do with it? All the classic works on definite descriptions were written by philosophers; philosophers have continued to write about them in philosophy journals; and fundamental questions about truth, meaning, and existence

have constantly surrounded their study. But are we past all that now, in the modern era, as work on definite descriptions becomes less focused on English, and more crosslinguistic?

What I'd like to suggest here is that there is at least one great unresolved issue in the theory of definite descriptions, even in this modern era of crosslinguistic comparison, and it is a foundational (hence philosophical) one, pitting dynamic semantics against situation semantics. In dynamic semantics, meanings are recipes for updating a context, where a context consists of possible worlds and assignment functions that constrain the value of discourse referents. In situation semantics, meanings are propositions corresponding to sets of situations, as opposed to possible worlds. Although these ideas are not fundamentally incompatible with each other, they constitute competing accounts for some of the empirical phenomena that constitute core motivations for dynamic semantics. At the same time, it is not a trivial exercise to distinguish the empirical consequences of dynamic vs. situation-based analyses of these phenomena. What is at stake in the choice between them? This is a major open question. I concentrate here on the piece of this question that concerns definite descriptions, but the parallel debate in the realm of pronouns is instructive as a point of comparison.

As Heim (1982) and Kamp and Reyle (1993) show, dynamic semantics provides an insightful account of the behavior of pronouns like *he* and *it* in *If a farmer owns a donkey then he beats it*, where pronouns appear to be bound by indefinite antecedents that are in positions from which quantificational binding is ordinarily blocked. On a dynamic view, the indefinites are not quantifiers but rather serve to introduce novel discourse referents, and the pronouns pick up these established discourse referents. But do donkey sentences alone provide a knock-down argument for dynamic semantics? As Heim (1990) discusses, an alternative, nondynamic view on which these pronouns are disguised definite descriptions (Evans 1977, 1980; Cooper 1979), incorporating a situation variable into the description, fares not too badly in the same empirical realm. (Evans called pronouns under this analysis 'E-Type pronouns'). Elbourne (2005) argues at book length in favor of a situation-based, description-theoretic view of donkey pronouns, and the discussion continues (Barker & Shan 2008; Elbourne 2009; Charlow 2014). There are important motivations for dynamic semantics from other empirical domains, including tense and other temporal expressions, but establishing the viability of a nondynamic approach to the semantics of indefinites and pronouns would undermine the most celebrated of the motivations for dynamic semantics.

The same kind of tension exists in the realm of definite descriptions. Within dynamic semantics, it is natural to treat definite descriptions as picking up an established discourse referent, just like pronouns. After all, just like pronouns, definite descriptions can be donkey anaphors: *If a farmer owns a donkey, then*

the farmer beats the donkey. But in this realm too, a situation-theoretic alternative makes for a formidable competitor, one that Elbourne (2013) advocates at book length. The story has gone a bit differently in the realm of definite descriptions, though. It has been more peaceful here, thanks in no small part to the legendary diplomat Florian Schwarz, who advocated a "both, and" approach (Schwarz 2009). Schwarz argued that both approaches are needed for the analysis of definite descriptions, albeit for different definite articles. Focusing on the strong/weak distinction among definite articles in some dialects of German, he proposed that the tools of dynamic semantics are apt for strong articles, while those of situation semantics aid in the analysis of weak articles. So everybody's happy, and everybody's right. What's more, this perspective lays the groundwork for a grand typological research program to classify the definite articles of the world as 'familiarity' articles or 'uniqueness' articles, made feasible through Schwarz's diagnostics.[1] Too good to be true?

A bit, I believe. The predictions of the two analyses overlap too much, as far as I can see. While the strong/weak distinction is undeniably empirically real in these Germanic dialects, the two analyses do not account for the observed contrast in their distribution, and indeed it is unclear whether they predict *any* contrast whatsoever. This is why, when we go to apply the analysis to a new language (say, Akan), one researcher might draw one conclusion (Arkoh & Matthewson 2013) while another (Bombi 2018) draws another.[2] I therefore advocate for continued philosophical reflection as we operationalize our methods of discovery.

4.2   Background on the Uniqueness Requirement

4.2.1   *Frege/Russell/Strawson*

The modern debate on the semantics of definite descriptions[3] begins with Frege (1892), who introduced the distinction between *sense* and *reference* (*Sinn* and *Bedeutung* in German), in order to solve what came to be known as 'Frege's puzzle': Why aren't the following equivalent?

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[1] See for example Wespel 2008 and Déprez 2016 on Mauritian Creole; Ortmann 2014 on Upper Silesian and Upper Sorbian; Jenks 2015, 2018 on Mandarin and Thai (with Dayal & Jiang 2021 as a counterpoint regarding Mandarin); Arkoh and Matthewson 2013 and Bombi 2018 on Akan; Barlew 2014 on Bulu; Maldonado et al. 2018 on Yucatec Maya; and individual contributions to Aguilar-Guevara et al. 2019 on Cuevas Mixtec, Lithuanian, American Sign Language, and Yokot'an Maya.

[2] Another case in point: Dayal and Jiang (2021) oppose the application of the weak/strong distinction to Mandarin made by Jenks (2018).

[3] See Horn (2001: chapter 2) for an engaging presentation of related intellectual history prior to Frege.

(1)   a. The morning star is the evening star.
       b. The morning star is the morning star.

The morning star is identical to the evening star, but these expressions denoting them are not interchangeable, since (1a) is informative and (1b) is not. For Frege, the two expressions share a referent, but not a sense. He wondered if an expression could have a sense without a referent, and thought of several good examples, including *the least rapidly convergent series*, for which there is a proof that it has no referent, although it clearly has a sense. Such descriptions would later come to be known as 'empty definite descriptions', *The king of France* being the most famous representative. According to Frege, use of a definite description is generally "permitted" only when there is exactly one object that falls under the description, and he surmised that any use of what he called 'proper names' (a category that also includes definite descriptions, for him) always presupposes a referent.

Frege himself was not committed to the actual existence of a referent; he just said we speak *as if* there is a referent. He acknowledges that skeptics would object as follows (p. 214): "You talk, without further ado, of the moon as an object; but how do you know that the name 'the moon' has any referent? How do you know that anything whatsover has a referent?" His reply is that "we presuppose a referent," continuing:

> Now we can of course be mistaken in the presupposition, and such mistakes have indeed occurred. But the question whether the presupposition is perhaps always mistaken need not be answered here; in order to justify mention of the referent of a sign it is enough, at first, to point out our intention in speaking or thinking.

If the skeptics are right and the presupposition is always mistaken, then we go around speaking nonsense all the time, but Frege did not seem particularly bothered by that possibility.

The question whether the presupposition is perhaps always mistaken was one that Russell (1905) took very seriously, as he was someone who viewed direct acquaintance with an object as a precondition for knowledge of its existence. (See the chapter by Sharvit and Moss in this volume for further discussion of this point.) To do so, he set out to give a treatment of the definite article that does not presuppose the existence of entities with which the interlocutors have no direct acquantaince. He treated English *the* on a par with quantificational determiners like *some* and *no*, so that 'The F is G' makes an existential claim: 'There is an F such that: nothing else is an F, and F is G'. A sentence containing an empty description, then, such as the following:

(2)   a. The least rapidly convergent series consists of integers.
       b. The king of France is bald.

is perfectly 'permissible' for Russell; it's just false. (Frege would deem the usage impermissible.) One of Frege's arguments against a view like Russell's

comes from negation. If Russell were right, then the negation of *The king of France is bald* should be equivalent to: *Either there is no king of France, or there is and that individual is not bald*. But that disjunctive type of proposition is evidently not what the negated sentences express:

(3)   a. The least rapidly convergent series does *not* consist of integers.
        b. The king of France is *not* bald.

According to Frege, these sentences presuppose existence and uniqueness just as much as their positive forms do (and are hence just as impermissible). Russell admits that neither (2) nor (3) is generally felt to be true. But Russell can actually explain this fact, using the assumption that (3) is ambiguous between two readings: one true one, where the negation takes scope over the existential quantifier introduced by the definite article, and one false one, where the scoping is the other way around. He argues that a true reading for the negated sentences is in fact available, and that is a reading that Frege's theory does not immediately capture.

This is not the only argument Russell gives in favor of his own theory; he adheres to the dictum that "it is a wholesome plan, in thinking about logic, to stock the mind with as many puzzles as possible, since these serve much the same purpose as is served by experiments in physical science." In this spirit, he asks how Frege could account for sentences like *The king of France does not exist*, if definite descriptions presuppose existence. Neale (1990) discusses this problem among others, and advocates a Russellian approach from a modern perspective.[4]

Despite the cleverness of Russell's argumentation, Strawson (1950) disagrees mightily with him (and totally ignores his aim of avoiding existence presuppositions for objects that one does not have direct acquaintance with). Strawson advocates a more Fregean view, one on which existence is presupposed. For Strawson, this isn't just about definite descriptions; this is about whether the sorts of logical methods that Russell applies to natural language were appropriate. Russell's entire approach fails to situate language in contexts of use, where *acts* of *referring* take place. Dropping the proverbial microphone with this epic one-liner, Strawson concludes, "Neither Aristotelian nor Russellian rules give the exact logic of any expression in ordinary language; for ordinary language has no exact logic." But the only tangible piece of evidence Strawson gave was an intuitively compelling argument that the question of the truth of sentences like (2) did not arise. It is easy to construct a logic in which a sentence containing an empty definite description is neither true nor false. If that is the goal, then it can be achieved within the range of the

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[4] To out-Russell Russell, Szabó (2000, 2003) argues that the only contribution definite articles make to the meaning is an existential quantifier, without a uniqueness implication.

logician's methods, as it has been. The story of presupposition is told in greater detail in Márta Abrusán's contribution to this volume.

A great number of modern formal semanticists take a broadly Fregean view, incorporating Strawson's intuition that the question of truth for a sentence with a failed presupposition does not arise (Heim 1991; von Fintel 2004; Elbourne 2005, 2008; Glanzberg 2007). In their exposition of this view, Heim and Kratzer (1998) cite the following passage from Frege, on *the negative square root of four*:

> We have here a case in which out of a *concept-expression*, a *compound proper name* is formed, with the help of the definite article in the singular, *which is at any rate permissible when one and only one object falls under the concept*. [emphasis added]

To flesh out Frege's analysis of this example further, Heim and Kratzer (1998) suggest the following structure (presented here in the style of Coppock & Champollion in preparation), where natural language expressions are translated into corresponding logical expressions):

(4)

$$
\begin{array}{c}
\text{NP} \\
\iota x . [x < 0 \land x^2 = 4]
\end{array}
$$

Tree structure:

- NP: $\iota x . [x < 0 \land x^2 = 4]$
  - D: $\lambda P . \iota x . P(x)$ — *the*
  - N′: $\lambda x . [x < 0 \land x^2 = 4]$
    - A: $\lambda x . x < 0$ — *negative*
    - N′: $\lambda x . x^2 = 4$
      - N: $\lambda y \lambda x . x^2 = y$ — *square root*
      - PP: 4
        - P: $\lambda x . x$ — *of*
        - NP: 4 — *four*
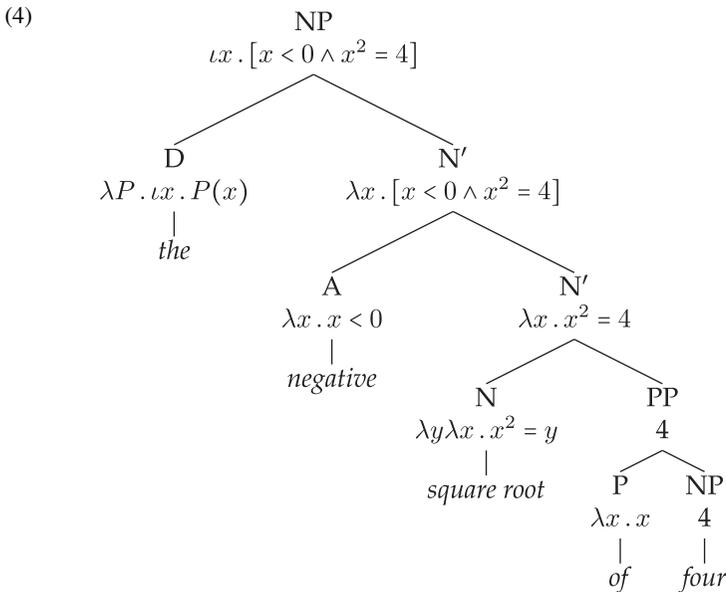
Here *the* is translated into a logical representation using the iota operator ι. The iota-expression denotes the unique individual satisfying the indicated condition, if there is one, and otherwise has no referent, at least no referent in the domain of entities that might be actualized in any possible world. Semantic definitions of iota-expressions sometimes appeal to a special 'undefined individual' for use in the case that there is no actual satisfier of the description.

Notations for this include Kaplan's (1977) †, standing for a 'completely alien entity' not in the set of individuals, Landman's (2004) **0**, and Oliver and Smiley's (2013) *O*, pronounced 'zilch'. Coppock and Champollion (in preparation) use the notation $\#_e$ in the metalanguage to denote it, and give the following characterization of its semantics:

$$(5) \qquad [\![\iota u.\phi]\!]^{M,g} = \begin{cases} d & \text{if } \{k : [\![\phi]\!]^{M,g[u \to k]} = 1\} = \{d\} \\ \#_e & \text{otherwise} \end{cases}$$

This says that $\iota u.\phi$ denotes the unique individual k that satisfies the condition on u given by ϕ, if there is one, and otherwise denotes the 'undefined individual', that 'completely alien entity'. The latter case is invoked for *the least rapidly convergent series*. An empty description like this generally[5] prevents the sentence as a whole from having a truth value, as most predicates fail to produce a classical truth value (true or false) when given the undefined individual as an argument. This result accords with Strawson's intuition that sentences like *The king of France is bald* are neither true nor false (against Russell's (1905) intuition that it is plainly false). The definite article can then be translated into a typed lambda calculus as according to the following lexical entry, where $\rightsquigarrow$ signals a translation relation from English to the formal representation language.

$$(6) \qquad the \rightsquigarrow \lambda F \cdot \iota x \cdot F(x)$$

Another option is to take iota-expressions to be entirely undefined, completely bereft of meaning, when the condition does not hold of one and only one object in the domain. In either case, the expression only has a proper referent when there exists a unique satsifier of the description, and in that sense is only 'permissible' in such a case. In other words, use of an iota-expression *presupposes* that existence and uniqueness obtain.[6]

4.2.2 Challenging Uniqueness

While Russell's theory of descriptions has largely been set aside in modern research on definiteness, another theory – the familiarity theory – has taken over as a competitor. In a paper advocating a kind of familiarity theory, Roberts (2003) discusses the following example, adapted from Heim (1982):

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[5] On some theories, such as Kaplan's (1977), there is at least one predicate that produces a classical truth value when predicated of the undefined individual, namely the existence predicate, which would yield 'false' when applied to *the king of France*.

[6] Some authors use the more verbose: $\lambda P : \exists! x[P(x)] \cdot \iota x[P(x)]$, where '$\exists! x[P(x)]$' is included as a domain condition, specifying that the function is only defined for input predicates that have exactly one instance, thereby yielding a presupposition to the effect that P is uniquely satisfied. I leave this part out, because the iota expression on its own contributes the same presupposition.

(7)   A wine glass broke last night. The glass had been very expensive.

This example could felicitously and truthfully be used to describe a scenario in which two wine glasses broke. It does not carry a presupposition that there was only one glass, or even that there was only one that broke (although it does carry such an implicature). Heim (1982) proposes that *a glass* introduces a new discourse referent constrained by the property 'glass'. On the familiarity theory of definiteness, *the glass* is licensed in virtue of this fact, picking up this now-familiar discourse referent. The meaning of a definite article, then, crucially involves the concept of familiarity (previously being introduced in the discourse). Dynamic semantics, in which meanings are instructions for updating a context, and discourse referents are introduced and picked up, provides a way of implementing that idea. In Heim's file change semantics, contexts are viewed essentially as sets of variable assignments, where the variables correspond to discourse referents, and the values they are assigned to are individuals in the model. The fact that the context consists of *sets* of variable assignments allows for the possibility that it is not fully narrowed down exactly which individual a given discourse referent picks out. As more information comes in through successive updates, the set of possible values for a given discourse referent may be whittled down. A definite description is a device for identifying an already-introduced discourse referent, a key step in being able to say more about it.

But this example alone does not prove the familiarity theory of definites. It is uncontroversial (so far as I know) that there is independent need for so-called 'domain restriction', where the overt descriptive content of a nominal is apparently enriched. A particularly telling case (due to Soames 1986, building on an example from Barwise & Perry 1983) is the following:

(8)   Everyone is asleep and is being monitored by a research assistant.

Clearly, *everyone* must be interpreted relative to a domain that excludes the research assistants, and yet the indefinite *a research assistant* requires that they be part of the domain. This type of example can be accounted for by using a contextually-provided variable over predicates C that is intersected with the descriptive content of the nominal that the determiner combines with (Westerståhl 1984; von Fintel 1994). Perhaps, then, what is going on in (7) is just domain restriction. For example, *glass* could be interpreted as 'glass in C', where C is the set of objects the speaker cares about, for instance.

A more challenging case comes from the use of definite descriptions in donkey sentences like the following:

(9)   If a farmer owns a donkey, then the farmer beats the donkey.

A dynamic semantic theory, in which indefinites introduces new discourse referents and definites pick them up, and conditionals 'execute' the meaning of

the consequent after 'executing' the meaning of the antecedent, provides an elegant account of this type of phenomenon. A dynamic analysis avoids overly strong uniqueness implications, captures the quantificational dependence of the definites on the indefinites, and accounts for the potentially universal force of these sentences. It does so by treating both indefinites and definites as variables that can potentially be bound by the same operator, effectively. The relevant analysis of definites can be approximated by the following lexical entry, in which v_i is a variable, the ith variable in the sequence of variables recognized in the formal representation language. The variable v_i is free in the expression below; its value is expected to come from context.

(10) $the_i \rightsquigarrow \lambda F \,.\, \iota x \,.\, [F(x) \wedge x = v_i]$

A pure Fregean analysis would make the false prediction that a sentence like (9) presupposes that there is exactly one farmer and exactly one donkey. A Fregean analysis augmented with a simple predicate-intersection theory of domain restriction also comes up short, as it fails to capture the systematic covariance in the way that the indefinite and definite descriptions are interpreted.

To capture the type of quantificational binding observed in donkey sentences using domain restriction, it has been proposed that the relevant set be determined by a contextually given function f, which maps a sequence of individual variables to an appropriate set (von Fintel 1994; Chierchia 1995). A mechanism for letting the domain of a quantifier (or a definite article) covary with the choice of witness for another quantifier seems to be independently needed:

(11)   Everyone answered every question. (Stanley & Szabó 2000)

(12)   Only one class was so bad that no student passed the exam. (Heim 1991)

Example (11) could be verified by a scenario in which the questions differed for each participant, and the interpretation of *the exam* in example (12) varies according to which class is under consideration. But observe that such an approach to domain restriction has a lot in common with the familiarity theory of definites: It involves a locally free variable ranging over individuals that can be interpreted as a bound anaphor. So the general inventory of interpretive mechanisms required in the grammar is the same, whether one adopts the familiarity view of definites or this relational approach to domain restriction, be it through dynamic semantics or some other way of binding the variable.

Substantially different mechanisms are required on the situation-based approach to definite descriptions, where they are interpreted relative to a given situation (Heim 1990; Cooper 1996; Schwarz 2009; Elbourne 2013). The lexical entry for the definite article on this type of view might look more like the following:

(13)   *the* $\rightsquigarrow \lambda s \lambda F . \iota x . F_s(x)$

For Elbourne (2013), a definite description always carries a locally free situation pronoun, which can either be bound by a special quantifier over situations or interpreted as anaphoric to a salient situation in the discourse. For the case in (7), the situation made salient in the first sentence could serve as the antecedent for the silent situation pronoun hiding in *the glass*. Relative to that situation, there is perhaps only one glass: the one that the speaker cares about. Elbourne (2013) shows that there is a viable, nondynamic alternative in the face of data like (7) and (9), one that is fundamentally Fregean, with the principal difference being that a situation pronoun is posited inside the definite description.

What, then, is at stake in the choice between these two theories? In the debate over donkey pronouns, one type of data that is presented as potentially problematic for a situation-based view is the following type of sentence, attributed to Hans Kamp by Heim (1990), though the original observation is apparntly due to Jan van Eijck (Hans Kamp, p.c.):[7]

(14)   If a bishop meets a bishop, then he blesses him.

If the pronoun *he* is interpreted as a disguised definite description (*the bishop*), and uniqueness for this description is calculated relative to the minimal situation characterized by the antecedent (a bishop meeting a bishop), then the pronoun should not be felicitous, because there are two bishops in this situation. Elbourne (2005) calls this 'the problem of indistinguishable participants'. It's easy to account for this type of example on a dynamic view, as long as the pronouns' discourse referents can be identified with those of their antecedents. As Heim (1990) discusses, Kadmon (1987) has a situation-based view that can account for some bishop-type sentences. But Heim argues that in general, it has uniqueness presuppositions that are too strong. This comes out in examples like the following:

(15)   If a man has the same name as another man, he usually avoids addressing him by name.

(16)   If a man shares an apartment with another man, he shares the housework with him.

---

[7] According to Hans Kamp (p.c.), Jan van Eijck presented the following example at a workshop on DRT that took place in Stuttgart in December of 1987 (where Irene Heim first presented the material that eventually appeared in her 1990 paper 'E-type pronouns and donkey anaphora'):

(i)   If a man lives with another man, he shares the housework with him.

A version of the sentence involving bishops was given a few years later by Hans Kamp in the discussion period of a talk given by Angelika Kratzer in Tübingen (and presumably conveyed thereafter to Irene Heim), but the original insight is apparently due to Jan van Eijck.

The first should presuppose that each man has at most one namesake, under Kadmon's proposal. Similarly, the second should presuppose that each man has at most one roommate. Elbourne (2005) offers another situation-theoretic approach, where in (14), there is an asymmetry between the two bishops such that one is part of a relevant situation that does not involve meeting another bishop and the other is not.

Elbourne argues furthermore that the situation-based view is capable of making a distinction that the dynamic view misses, one that can account for the contrast in acceptability between sentences like (14) and ones like (17).

(17)   #If a bishop and a bishop meet, he blesses him.

According to Elbourne, there is no relevant situation involving one bishop but excluding the other for this sentence, so the pronoun is correctly predicted to be ruled out.

It is crucial for Elbourne that only a restricted set of situations be considered relevant, or else the asymmetry would disappear (Elbourne 2005: 149–153). The exclusion of these situations does not strike me as particularly well motivated, so this is an unfortunate corner for the situation-based theory to be backed into. Furthermore, Barker and Shan (2008) argue that this contrast can in fact be accommodated under a dynamic theory, and they blame the infelicity on the difficulty of finding an antecedent for the pronouns. Elbourne (2009) expresses skepticism about this argument, arguing that (14) is likewise ambiguous. I leave it to the reader to adjudicate; suffice it to say that the issue is not clear-cut.

Bishop sentences can also be formed with definite descriptions (Schwarz 2009: 244):

(18)   If a bishop meets a bishop, then the bishop blesses the other bishop.

The same kind of question arises here. This kind of example can easily be accommodated under a dynamic view, because the two indefinites are associated with distinct discourse referents, yielding distinct antecedents for the two definites. *Prima facie*, it poses a problem for a situation-based view, because the uniqueness requirement is violated in the situation where the two bishops meet. But notice that intransitive cases with definite descriptions like the following are just as unacceptable as ones with pronouns:

(19)   #If a bishop and a bishop meet, the bishop blesses the other bishop.

To the extent that the contrast between (14) and (17) militates in favor of the situation-based view on pronouns, the contrast between (18) and (19) does the same for the situation-based view on definite descriptions. Perhaps a retort in the style of Barker and Shan (2008) can be upheld here as well.

What other evidence can be brought to bear on the issue, as it concerns definite descriptions? According to Schwarz (2009), the strong/weak

distinction among definite determiners in German dialects reflects the fact that strong determiners mark familiarity, while weak determiners mark situation-based uniqueness. Implicit in this reasoning of course is that the two analyses make different predictions about the range of uses that an article should have. Let us turn to this next.

4.2.3   A Both-And Solution

Schwarz (2009) takes a statesman-like approach, where the familiarity-based (dynamic) view and what he calls the 'uniqueness view' (a Fregean view enriched with situation variables à la Elbourne) are both needed, albeit for different purposes. He focuses on the distinction between two types of definites in German, *strong* and *weak*. For Schwarz, the weak definites are 'uniqueness' definites, but the strong ones are familiarity definites.

The weak article in German undergoes reduction after a preposition, yielding *vom* 'by the' rather than *von dem* 'by the'. The former is used in cases involving so-called 'situational uniqueness', such as the following:

(20)   Der Empfang wurde *vom / *von dem*   Bürgermeister eröffnet.
         the reception was   by-the$_{weak}$ / by the$_{strong}$ Mayor   opened
         'The reception was opened by the mayor.'

There may be more than one mayor in the world, but there is only one mayor in the situation being described here; in that sense, we have 'situational uniqueness' here. As Schwarz shows, the weak articles are used when uniqueness is presupposed with respect to what Hawkins (1978) calls an 'immediate situation' (e.g. *the dog*), a 'larger situation' (e.g. *the priest*), or a 'global situation' (e.g. *the moon*), and in certain types of bridging anaphora, namely 'part–whole' bridging (e.g. *the tower*, after a church has been introduced).[8] In all of these cases, the situation-relativized Fregean article would be expected to be possible, as the relevant property is unique, relative to the given situation. Weak articles also have what Schwarz calls 'covarying uses', as in:

(21)   At every train station that our train entered, a letter . . .
         a.   vom   Bürgermeister
                from.the$_{weak}$ mayor
         b.   *von   dem   Bürgermeister
                from   the$_{strong}$ mayor
                . . . was handed to me.

For these kinds of uses, he posits a type-shifting operation that allows the situation argument to be bound.

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[8] The 'global situation' uses are what Löbner (1985, 2000) calls 'semantically unique' – unique solely by virtue of the semantic content.

The strong form, on the other hand, is what is found in an anaphoric context:

(22)   Hans hat einen Schriftsteller und einen Politiker   interviewt.
        Hans has a   writer   and a   politician interviewed
        Er   hat *vom / von dem   Politiker   keine interessanten
        He   has from.the_weak / from the_strong politician no   interesting
        Antworten bekommen.
        answers   gotten
        'Hans interviewed a writer and a politician. He didn't get any interesting answers
        from the politician.'

Here, the referent of *the politician* is previously introduced into the discourse, so a familiarity article should be felicitous. The strong article in German occurs here as well as in 'product–producer' bridging (e.g. *the author*, after a book has been introduced). The latter type of usage is not immediately predicted by the familiarity account, and Schwarz introduces a relational version of the definite article in order to account for it (p. 271).

We certainly expect a uniqueness article (in Schwarz's sense) to be felicitous for 'the mayor' in (20) and we certainly expect a familiarity article to be felicitous for 'the politician' in (22). And it is certainly not *obvious* that we would expect them to be able to switch places. But what exactly is the distribution that we expect? Should a familiarity article be infelicitous with 'the mayor'? Should a situation-relative Fregean article be infelicitous with 'the politician'? Let us consider these questions in turn.

4.3   Predicted Limits on Familiarity Definites

As Schwarz (2009) himself recognizes, there are a number of environments where a familiarity definite would be expected, beyond those where strong definites in German appear.

Let us first establish that strict anaphoricity is not a requirement even for German strong articles; there are a number of environments where the strong article is licensed despite no discourse referent previously having been established. In the debate over donkey pronouns, one of the challenges that has been raised for the situation-based, description-theoretic account is what Heim (1990) calls 'the problem of the formal link'. Perhaps the most famous example in this category involves marbles (Heim 1982: 21, attributed to Barbara Partee, p.c.):

(23)   a. One of the ten marbles is not in the bag. It is probably under the sofa.
        b. Nine of the ten marbles are in the bag. ?? It is probably under the sofa.

The first sentences in (23a) and (23b) are propositionally equivalent, but they differ in their anaphoric potential; one establishes a discourse referent (a 'formal link') and the other does not, it seems. In the first case, a discourse referent is

established for the pronoun by the indefinite noun phase *one of the ten marbles*, and the pronoun is felicitous. In the second, there is no noun phrase that serves to introduce a discourse referent, and the pronoun is infelicitous.

Strong articles in German, surprisingly enough, can be used in the latter type of discourse context, where no discourse referent is (overtly) established. In the context (24a), the sentence (24b) is acceptable with the strong definite article (and not with the weak one).

(24) a. Wir   haben 10 Eier versteckt, aber die Kinder
          we   have   10 eggs hidden   but   the children
          haben erst 9   gefunden.
          have   only 9   found
          'We hid 10 eggs, but the kids have only found 9 of them.'
      b. Im   / In dem   fehlenden Ei ist   eine Überraschung.
          in-the$_{weak}$ / In the$_{strong}$ missing   egg is   a   surprise.
          'There is a surprise in the missing egg.'

Thus strong definite articles do not impose the same requirements on the context as pronouns.

Perhaps, then, the requirements imposed by strong definite articles could be framed in terms of Roberts's (2003) notion of 'weak familiarity'. Roughly speaking, if the existence of a given discourse referent can be inferred from context, then it counts as *weakly familiar*. A discourse referent can in that case be accommodated.

In their work on definite articles in Akan, Arkoh, and Matthewson (2013) propose essentially this way of viewing familiarity, although they prefer a different terminology. Arkoh and Matthewson (2013) adopt Prince's (1992) distinction between *hearer-old* and *discourse-old*, seeing the former as similar to Roberts's (2003) 'weak familiarity', and they argue that the definite article in Akan is a familiarity article that imposes a hearer-oldness constraint. Their reasons for this include the availability of the article in marble environments. Arkoh and Matthewson note that *nó* can be used in Partee marble scenarios, such as one that would be translated into English as:

(25)   There were four mangoes in the sack; Ama found three. *The missing one* is nicer.

This is evidence that the operative notion of familiarity for Akan *nó* is 'weak familiarity', or as Arkoh and Matthewson prefer, 'hearer-oldness'. By the same logic, the same applies to German, as they point out. But if it is only *weak* familiarity that is required by strong definite articles, then the predicted distributions of weak and strong definite articles begin to converge.

Schwarz (2009: 281ff.) has already noted that the predicted distribution of familiarity articles is wider than the distribution of strong articles in German.

In particular, familiarity articles would be expected to occur in both part–whole bridging environments and 'larger situation' environments. Schwarz discusses the following example in German, where *the mayor* receives a bound ('covarying') interpretation:

(26)   In every city in which our train stopped, a letter from *the mayor* was handed to me.

As Schwarz discusses (p. 282), a familiarity article would be expected for *the mayor*, and yet it appears to be disallowed. As he points out, the problem cannot be solved so easily as positing a general preference for the weak article whenever both are available, because there are cases where both the strong and the weak article can be used. He gives the following example in German, again involving a bound interpretation:

(27)   Every cook that happens to find a book about topinambur looks in *the book* for an answer to the question of whether one can grill topinambur.

Schwarz writes (p. 283), "Even though the weak article lacks the capacity that enables the strong article to be anaphoric to an antecedent, it would still be surprising if the mere presence of a potential antecedent ruled out the weak article as long as the relevant individual is situationally unique," and indeed, (27) is in line with those expectations; the weak article is roughly as acceptable as the strong article for *the book* here. If there are cases where both variants are possible, then it is tough to argue that one takes preference over the other whenever they are both applicable.

Schwarz floats another possible explanation for the surprisingly narrow distribution of strong articles (pp. 284–285), based on a difference between the weak and strong articles in the way that they combine with relational nouns. Weak articles do so via a type-shifter that specifies a part–whole relationship. The idea is that the extra specificity encoded there yields a preference for the weak article in cases where the distinction is 'relevant'. The idea would need to be fleshed out more in order to work, but I find it hard to imagine how the potential to combine with a type-shifter that contributes more specific information should drive a lexical preference for one lexical item over another. So I see this as an open issue.

The problem extends even beyond what Schwarz acknowledges, though. Recall from above that the usage conditions for the strong articles can be characterized in terms of weak familiarity: the possibility of accommodating a discourse referent. As far as I can see, whenever the usage conditions for a Fregean definite article are met, weak familiarity is satisfied. Hence, a strong article should be usable whenever a Fregean article is predicted to be possible. Take, for example, *the priest*, a 'larger situation' case, where only the weak article is possible in German. Whether or not the priest has already been talked

about in the discourse, it is possible to accommodate a discourse referent for him, because his existence should be entailed by any context, if world knowledge entails his existence. So the strong article should be usable in such cases, if the strong article encodes weak familiarity.

The controversy surrounding the correct analysis of Akan can be traced in part to the fact that weak familiarity is a highly inclusive category. Arkoh and Matthewson (2013) argue that Akan's definite article *nó* is a (weak) familiarity definite à la Schwarz. They show, for instance, that it has anaphoric uses, which the German weak article lacks. Furthermore, a bare noun is used instead of the article in certain scenarios in which the description applies uniquely but the referent is not previously introduced in discourse. For example, in a sentence that would be translated into English as *Armstrong was the first person to fly to the moon*, the moon is referred to using a bare noun (Arkoh & Matthewson 2013: ex. 2).

Bombi (2018) argues against Arkoh and Matthewson (2013) in favor of a uniqueness-based analysis. As for the moon example, Bombi writes that bare nouns rarely occur in subject position, and she suggests that pseudo-incorporation is what is going on here. She also shows that a strict familiarity analysis (one that requires anaphoricity) makes the wrong predictions. Among her evidence are the following examples cited by Arkoh and Matthewson (2013), from Amfo (2007: 146) and (Arkoh 2011: 71) respectively:

(28)   òkàsàmáfó nó   b'ɛ-bá   s'eèséí árá, . . .
        speaker   DEF FUT-come now   just
        'The speaker will arrive soon, . . .'

(29)   *The priest* will pray first [before anything else happens].

These are both 'larger situation uses' in Hawkins's (1978) terminology, cases where the German weak article is used and the strong article is not. These examples do show that Akan *nó* is different from the German strong article, and they do show that Akan *nó* does not impose a strict anaphoricity requirement. But the German strong article does not impose a strict anaphoricity requirement either, as we have seen above, and as Schwarz himself acknowledged. If weak familiarity is all that is required in order to license a familiarity article, then neither (28) nor (29) is actually problematic for a familiarity-based analysis. In these scenarios, weak familiarity is satisfied.[9] In fact, if weak familiarity is all that is required in order to license a familiarity article, then familiarity articles are expected to occur throughout the full range of Hawkins's uses, including cases like *the moon*. As Bombi (2018: 146) puts

[9] This point is also made by Augustina Owusu (2020), whose work I learned about after this chapter was written. Owusu offers a novel analysis of Akan *nó* involving weak familiarity coupled with an anti-uniqueness presupposition, and also treats uses of *nó* in the clausal domain.

it, "familiarity in the way Roberts (2003) . . . uses it is a defining characteristic of all definites. Put differently, the line Roberts's familiarity draws is not between different types of definiteness, but rather between definiteness and indefiniteness."

Is there any environment where a weak familiarity article should be ruled out, where a situational uniqueness article would be expected? One candidate might be cases where familiarity is explicitly denied (Horn & Abbott 2012):

(30)   The new curling facility here, which I assume you haven't heard of, is the first such facility of its kind in the nation.

It is not clear to me whether weak familiarity holds in this kind of case. Related are cases where the speaker explicitly states ignorance of existence (Coppock & Beaver 2015):

(31)   (Context: dissecting an iguana in science class)
        a. I don't know if iguanas have hearts, but is that the heart?
        b. #I don't know if iguanas have bones, but is that the bone?

The contrast seems to derive from the real-world knowledge (or assumption) that *if* an iguana has a heart, then it has only one, whereas the same does not hold for bones. So a uniqueness presupposition is satisfied in the 'heart' example, but not the 'bone' example, even if an existence presupposition is not. It is not clear to me whether weak familiarity can be argued to be satisfied in these cases.

Examples that put even more pressure on the view that definite articles presuppose any kind of familiarity involve what Coppock and Beaver (2015) call 'anti-uniqueness effects': For example, on a reading with focus on *only*, (32a) gives rise to the implication that there was more than one goal. Notice that this definite article does not license a subsequent anaphor, as in (32b):

(32)   a. Anna didn't score the *only* goal.
        b. It wasn't a bicycle-kick, either.

The pronoun *it* in (32b) cannot take *the only goal* as its antecedent. Coppock and Beaver (2015) take this to show that definite articles do not lexically carry a presupposition of existence. They call these 'indeterminate' uses of the definite article.

'Existence' is meant in a strong sense. Kripke (2011: 11) distinguishes between 'broad' and 'narrow' existence: Narrow existence is captured by the verb 'exists'; broad existence is captured by the existential quantifier. It is well known that definite descriptions can (apparently) refer to things that do not exist in the narrow sense; cf. Russell's famous (33a):

(33)   a. The golden mountain does not exist.
        b. It's not in Nebraska, either.

Here we have a case of an entity that is merely a figment of some interlocutor's imagination; a fictional entity. While I do not wish to take on the literature on fictional entities here, I do claim (following Coppock and Beaver) that they do not exist in the narrow sense, but do exist in the broad sense, as shown by their ability to license anaphora. The nonexistence that fictional entities exhibit is not as dramatic as what is going on with (32a). Notice that (33a) can be continued as in (33b), which shows that narrow existence is still implied here, even if broad existence is not. Example (36a) is a case where neither broad nor narrow existence is implied. If definite descriptions do not presuppose existence, then *a forteriori* they do not presuppose even weak familiarity.

Coppock and Beaver (2014) extend this analysis to superlative constructions which again seem to involve indeterminate uses of the definite article. As Szabolcsi (1986) noted, the definite article does not seem to receive its ordinary interpretation in cases like the following:

(34)   a. Wendy received the fewest flowers.
        b. Of all the students in her class, Lucy can count to the highest number.

These show *relative readings* of superlatives, where the relevant comparison is made among focus alternatives (flower-recipients or students, rather than flowers or numbers). Like indeterminate readings of *the only* phrases, definite descriptions containing superlatives on relative readings under entailment-cancelling operators fail to license anaphora (Coppock & Beaver 2014):

(35)   Perhaps Gloria climbed the highest mountain out of all of her friends.
        #The prize is a picture of it.

Furthermore, as Szabolcsi pointed out, superlatives on relative readings do not show definiteness effects. Heim (1999) simply assumed that the definite article was deleted at LF; Coppock and Beaver (2014) offered an analysis of these uses as definite but indeterminate.

Bumford (2018) argued for a different take on both the *only* data and superlative constructions. On his view, definite articles do carry both existence and uniqueness implications, but these two components of the meaning can be split apart. A discourse referent is established at one phase of the dynamic processing (hence existence), and a uniqueness check may be carried out after additional information from the surrounding sentential environment is integrated into the dynamic sequence. His analysis carries a number of advantages over previous accounts with respect to both exclusives and superlatives, and I refer the reader to his discussion.

But even if the definite article does carry an existence component as Bumford proposes, the fact remains that indeterminate uses of definite descriptions embedded in entailment-cancelling environments such as negation do not license anaphora outside the scope of the entailment-cancelling

operator (cf. 32b). Hence, either there is no weak familiarity requirement, or it is obligatorily locally accommodated inside the entailment-cancelling operator. Coppock and Beaver (2015) argue against the possibility that an existence presupposition is obligatorily locally accommodated in these cases; the same argumentation applies to putative familiarity presupposition. By this reasoning, then, these kinds of indeterminate uses provide evidence against a weak familiarity presupposition.

If anti-uniqueness effects with exclusives are indeed the kind of phenomenon that can adjudicate between familiarity and uniqueness theories, then this is the kind of data that should be used in fieldwork when investigating the semantics of definite articles in new languages. Indeed, Yifrach and Coppock (2020) use anti-uniqueness effects with exclusives in order to argue that the definite article in Ṭuroyo (an endangered Semitic language) encodes uniqueness, but not existence (or familiarity).

4.4   Are 'Uniqueness Definites' Anti-Anaphoric?

Now let us consider the other direction: How broad of a distribution would we expect from a situational uniqueness article? Arkoh and Matthewson (2013: 16) point to anaphoric uses of the definite article in Akan. Bombi (2018) acknowledges the availability of anaphoric uses, and presents original fieldwork data of her own showing that they exist:

(36)   I bought a dress yesterday. *The dress* is nice.

Although she advocates a uniqueness-based analysis of the definite article, Bombi is not fazed by this evidence. Nor should she be. Assuming that *the dress* means 'the dress in *s*', and *s* is construed as a situation involving just one dress, then the uniqueness presupposition is satisfied. So anaphoric uses are not expected to be impossible for situational uniqueness articles. Why are they impossible for German weak articles? Unclear; they are in the range of expected distribution under the situational uniqueness analysis.

A bishop sentence might pose more of a problem. Interestingly, bishop sentences in German require a strong article (Schwarz 2009: 245); the German equivalents of the following sentences are ungrammatical with a weak article:

(37)   a.   When a minister cuts the budget of other ministers in the cabinet, *the minister* receives a lot of complaints.
          b.   When a professor recommends a student to another professor, his application is read by *the professor* with great attention.

Schwarz writes (p. 245), "[w]hile there is at least one proposal that reconciles bishop sentences with a situation-based uniqueness analysis of donkey definites, namely that by Elbourne (2005), these German data suggest that

such a proposal is not needed, as the German uniqueness definites (expressed by the weak article) are not available in this configuration in the first place." He takes this to be clear evidence in favor of a familiarity-based analysis of the strong article. Perhaps fieldworkers should concentrate on bishop sentences.

On the other hand, perhaps not. Even for radicals like Coppock and Beaver (2015), who posit that definite articles do not even contribute an existence presupposition, let alone a familiarity presupposition, anaphoric uses can be accommodated, given the proper mechanism for interpreting indexes on noun phrases (Beaver and Coppock, 2015). They propose a system whereby indices are associated with descriptions, as in $bishop_i$. On their system, the definite article checks for uniqueness (not relative to any given situation, although this assumption is not crucial) with respect to the property denoted by $bishop_i$. The system is dynamic, so meanings are relations between input assignments and output assignments. There are two possible cases: i is defined on the input assignment, or it is not. (Assignments are partial functions from indices to individuals.) If i is defined on the input assignment, and maps to an object in the domain that is a bishop, then $bishop_i$ is guaranteed to be unique by virtue of the fact that there is only one object that can end up as the value for i in the output assignment. But if i is not defined on the input assignment – if i is novel – then $bishop_i$ is not unique, assuming that there are multiple bishops in the world (or situation), by virtue of the fact that there are many possible values that i could be mapped to in the output assignment. (If i is novel but the descriptive content guarantees uniqueness, then the definite article is licensed again.) Familiarity, then, becomes a special case of uniqueness. This view makes it possible to explain the duality of the English article: that it sometimes signals uniqueness without familiarity (as in the indeterminate uses), and yet other times signals familiarity without uniqueness (as in bishop cases).

I conjecture that it is more the rule than the exception that languages which allow indeterminate uses for the definite article also allow bishop uses, like in English. If that is so, then either there is a systematic ambiguity that is repeated in language after language, or there is a single lexical entry that is capable of being used in both ways, due to general mechanisms of the grammar such as coindexing. The latter type of explanation would strike me as more appealing. It remains to be seen whether there is any merit in these speculations.

4.5   Conclusion

There is massive overlap in the predicted distributions between situation-based uniqueness analyses and weak familiarity analyses. They both span the full range of Hawkins's uses. The only possible points of contrast that I have been able to identify are:

- indeterminate uses (with exclusives and superlatives on relative readings), where familiarity articles should not appear;

- bishop sentences, where at least under some assumptions, situational uniqueness articles should not appear.

I see it as an open question why German strong articles don't have a wider distribution, covering the full range of Hawkins's uses, and why German weak articles don't span the full range as well. By the same token, it is unclear why the definite article in Akan is not usable in semantically unique cases like *the moon*; both Arkoh and Matthewson's (2013) familiarity analysis and Bombi's (2018) uniqueness analysis would predict that the article should be usable in this case. If Bombi is on the right track that it has to do with pseudo-incorporation, it's still an open question whether the article encodes uniqueness or familiarity. Analogous questions hold throughout the post-Schwarzian crosslinguistic literature on definiteness.

In recent work, Kamp (2018) has developed the idea of 'Articulated Contexts', contexts for the interpretation of an utterance consisting of multiple sources of knowledge: knowledge from the discourse context (including familiar discourse referents), encyclopedic knowledge about particular entities, general knowledge, and perceptual knowledge. These distinctions make it possible, in principle, to cut up the pie in a different way. Strong articles in German, for instance, might require that their reference be determined at least in part through discourse context: Anaphoric uses would depend solely on the discourse context and marble cases would involve a combination of knowledge from the discourse context and general knowledge. Examples like 'the sun', where only the weak article is usable, would involve reference established independently of the discourse context. It may be a fruitful avenue for future research to explore the extent to which these distinctions can be marshaled in order to capture the usage of the various definite articles around the world. As shown in Hans Kamp's contribution to this volume, his Articulated Contexts also shed light on other linguistico-philosophical issues related to the analysis of definite descriptions, including the referential–attributive distinction, which I have not touched on here.

In any case, my hope is that further philosophical reflection will make it possible to construct instruments for fieldwork elicitation that are suitable for resolving these questions. The answers will bear not only on the analysis of definite descriptions, but also on foundational – philosophical – questions about how meanings are built up compositionally and understood in context.

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Part III

Narrating and Structuring

5   On the Role of Relations and Structure In Discourse Interpretation

Julie Hunter and Kate Thompson

5.0   Questions and Answers

(1)   Why do you think that discourse relations and structure have been interesting to both linguists and philosophers?

Discourse relations allow us to combine propositional contents in semantically significant ways in order to achieve a wide variety of discourse goals, from exposition and description to entertainment and even deception. In doing so, they add semantic content above and beyond the individual propositions expressed by the utterances in a discourse. Discourse relations and, importantly, the complex structures to which they give rise, can also influence the interpretations of individual utterances, having an effect on the very propositions the utterances are understood to express. In this way, they help us better understand content that is explicitly expressed through language, as well as the way in which language connects with the extralinguistic world.

(2)   What recent developments in linguistics and philosophy do you think are most exciting in thinking about discourse relations and structure?

Recent work applies the machinery of discourse structure and interpretation to model a diverse range of phenomena, from at-issue (AI) and not-at-issue (NAI) content, to discourse goals, to multimodal interactions. The first body of work casts the AI/NAI distinction as a byproduct of constraints that guide discourse attachment and the construction of complex discourse structures, and provides an independently motivated and flexible notion of AI/NAI content that captures the variable discourse status of a variety of constructions, including appositive relative clauses and speech reports. The second body of work considers how discourse relations and structures can be used to model discourse goals as well as certain kinds of subjectivity in discourse interpretation, and it looks at how the biases that lead to subjective interpretations can be self-reinforcing. The third body of work argues that discourse relations can take propositional contents contributed by nonlinguistic eventualities as arguments. In such cases, nonlinguistic contents are introduced into discourse structure via

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the same reasoning processes that lead an interpreter to infer a discourse relation between linguistically expressed propositions, rather than through any sort of lexically based anaphora. This leads to a two-way flow of information: integrating nonlinguistic events can impact discourse content and structure, and conversely, discourse structure and interpretation can help guide interpretation of the nonlinguistic environment in conversationally significant ways.

(3)   What do you consider to be the key ingredients in adequately analyzing discourse relations and structure?

Because discourse interpretation is influenced by how an interpreter understands a discourse context and what they infer about a speaker's discourse goals, work on discourse structure must control – to the extent that this is possible – for subjectivity in discourse interpretation, if judgments about discourse-sensitive phenomena are to be reliable and informative. Moreover, because constraints on discourse structure or the behavior of discourse-sensitive phenomena might only reveal themselves over discourses containing at least three, but sometimes many more, discourse units, it is important to be able to draw on data involving extended discourses. Inventing complex discourses, not to mention minimal pairs of such discourses, is no simple task. For this reason, much work on discourse structure has and will continue to depend on corpus study. However, corpus work comes with its own set of problems: corpora must be sufficiently large and be annotated by people with sufficient knowledge. To ease the annotation task, weak supervision approaches that draw on linguistic expertise to guide a process of automatic annotation may prove promising.

(4)   What do you consider to be the outstanding questions pertaining to discourse relations and structure?

Current work on discourse structure raises many exciting questions for future research. Some of these questions concern the relation between discourse relations and Questions Under Discussion (QUDs), an alternative approach to discourse analysis that posits that discourse is centered around often implicit questions that conversational participants work together to answer. While our chapter focuses on discourse relations, there are good reasons for thinking that some implicit aspects of what drives discourse development and structure are left unaccounted for by a discourse relations approach. How can we bring some of the elements posited by QUD together with this approach? And what, for example, will be the consequences for a discourse-based theory of goals?

Other questions concern ways to make more precise predictions about discourse attachment. At the moment, the Right Frontier of a discourse graph determines a set of nodes available for discourse attachment, but information

about, say, prosody, or different kinds of constructions (such as appositives), or lexical facts, might help improve predictions about where a discourse unit actually will attach. Finally, questions remain about the ways that nonlinguistic eventualities can influence the structure and interpretation of discourse, and the processes by which conversation can help us to ground more precise interpretations of the nonlinguistic context.

5.1   Introduction

We communicate for a variety of reasons, be it to exchange information, to persuade someone of a certain point of view, or simply to entertain each other. In each case, achieving our goals requires linking together the contents of multiple *discourse units*, which include the contents of individual speech acts and, for conversations situated in a shared visual environment, the contents contributed by physical gestures and other nonlinguistic events. A fundamental insight that guides work on discourse and dialogue interpretation is that *the way in which* discourse units are related to one another within the context of a conversation is essential to the conversation's meaning.

To develop an intuition of what we mean when we talk about relations between discourse units, we will start with a simple example. Suppose a friend says to you:

(1)   I need my hat back. I'm leaving for São Paulo in two days.

Your friend's utterance contains two sentences, each of which contributes a single *discourse unit*, understood here roughly as a single proposition.[1] Although there is no lexical or syntactic indication that the two discourse units are related, given that they are uttered together you will automatically try to find a connection between them that explains what your friend's needing their hat back has to do with their leaving in two days. Perhaps the most reasonable explanation is that they want to wear the hat in São Paulo, in which case your interpretation will be roughly the same as if they had used an explicit discourse marker as in (2):

(2)   I need my hat back **because** I'm leaving for São Paulo in two days.

Interpreting (1) along the lines of (2) places the discourse units in a semantic relation of explanation, but there are other types of relations you could infer

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[1] In this chapter, we treat discourse units as roughly clause level contents. However, we note that some clauses might contain more than one discourse unit, as illustrated by Hobbs (1985)'s example *A car hit a jogger in Palo Alto last night*, in which the deverbal noun supplies an event description and we infer a temporal sequence between the event of jogging and the event of being hit by a car.

between the same discourse units given different contextual factors. For instance, a change in intonation between the two moves might signal that (1) merely conveys a list of your friend's thoughts, linked by a conjunction relation, and would be roughly equivalent to:

(3)   I need my hat back. **Also**, I'm leaving for São Paulo in two days.

Semantic relations can also be inferred between the contents of discourse units made by different speakers. Questions and answers are primary examples of this.

(4)   a. What are you going to do downtown?
       b. I'm going to the bookstore.

It is a basic assumption of conversational exchange that if someone is asked a question they will answer it promptly, if not directly, in the next discourse move, as seen in (4). However, just as with the discourse units in (1), nothing about the content or surface form of (4b) when considered in isolation indicates that it is an answer to any question, let alone (4a). The question–answer relation between the two units is inferred from their content plus the assumption that people tend to promptly answer questions when asked.

The central role of inference in interpreting question–answer relations between discourse units becomes more apparent if we imagine more moves intervening between a question and its answer:

(5)   a. What are you going to do downtown?
       b. Ugh, I'm so mad! My brother lost my copy of *The Watchmen*, and I need to reread it for class. I'm going to the bookstore.

The answer to the question asked in (5a) is the same as the answer provided in (4b), but in (5), the speaker first provides unsolicited background information before giving the answer. Despite this detour, the speaker who asked (5a), or someone just listening in on the conversation, would be able to identify this answer by reasoning about the content of each intervening discourse unit expressed after the question.[2] In order to provide a systematic account of the inferences needed for the interpretation of discourse, such as those seen in the foregoing examples, formal approaches to discourse structure and interpretation such as Rhetorical Structure Theory (RST; Mann & Thompson 1987) and Segmented Discourse Representation Theory (SDRT; Asher 1993; Asher & Lascarides 2003), building on the work of Hobbs (1979, 1985), incorporate

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[2] The observation that we make sense of natural language discourse by making inferences about how discrete utterances might cohere is foundational to the study of discourse relations. Notably, Jerry Hobbs suggested that abduction, or inference to the best explanation, underlies the process of speaker interpretation (Hobbs 1979).

semantic relations, called *discourse relations*, into their models of discourse.[3] They focus on determining the variety of relations that can connect discourse units, e.g. Explanation or Question–Answer Pair, and the kinds of information – semantic, discursive, or otherwise – that speakers use to determine them. Discourse relations are considered to contribute truth-conditional content above and beyond that conveyed by the collection of discourse moves alone, which has an effect on the logical form of a discourse. Moreover, going beyond single relation instances, theories of discourse structure seek to identify the structural constraints on discourse development which limit how discourse structures built from multiple discourse units can evolve as a discourse proceeds, and to describe the nature and interpretation of full discourse structures.

In the discussion that follows, we start by taking a look in Section 5.2 at why discourse relations are important for philosophy and linguistics and by situating theories of discourse structure in the larger field of dynamic semantics. In Section 5.3, we show how recent work on discourse relations and structure has been used to model phenomena along the semantics–pragmatics interface, to analyze multimodal discourse, and to provide an account of discourse goals and the interaction of bias and discourse interpretation. We conclude in Section 5.4 with a set of open questions for theories of discourse structure and their role in semantics and pragmatics debates as well as a discussion of what kinds of tools will be most helpful for answering these questions.

5.2   The Semantic Effects of Discourse Structure

A simple sentence consisting of a single clause is the minimal tool for conveying a description of the world.[4] In modern philosophy and linguistics, specifically in truth-conditional semantics, the meaning of a clause is modeled as a proposition, which is often defined as the set of possible worlds in which the state of affairs, or eventuality, described by the sentence holds. Propositions have held the interest of philosophers and linguists because they are the minimal bearers of truth or falsity, allowing us to exchange information and learn new things about the world. From Plato and Aristotle up through modern day model-theoretic accounts of linguistic meaning stemming from the work of Frege and Russell, simple sentences, and the propositions they express, have been the primary units of study in semantics and philosophy of language; likewise they are the starting point for discourse-based language modeling.

It is clear that a discourse or conversation proffers a more complex representation of the world than does a simple sentence. Discourse units combine recursively to create more and more complex semantic structures, giving rise

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[3] Other terms for discourse relations include *coherence relations* or *rhetorical relations*.
[4] We leave the question of sentence fragments to the side in this chapter.

to both "bottom-up" and "top-down" effects. This section introduces some of these effects, starting with those that arise with individual discourse relations and finishing with effects related to complex discourse structures built from more than two discourse units.[5]

5.2.1   Discourse Relations

A discourse will generally support inferences which would not be entailed by the set of its constituent propositions alone,[6] allowing us to communicate, and infer, more complicated messages. Let's consider again our introductory examples (1)–(3), about the hat and leaving for São Paulo in two days. Inferring the relation Explanation between the two discourse units of (1), as made explicit in (2), will entail that the speaker needs the hat back in less than two days. This inference, however, cannot be attributed solely to the discourse units involved, for it is not supported if we infer a different relation between them: if (1) were interpreted along the lines of (3), the inference would not be supported and the speaker could reasonably continue (3) with "I can pick up the hat once I get back from Brazil."

   To some extent, we can say the same thing about complex propositions formed from Boolean operators: while $p \wedge q$ and $p \vee q$ are built up from the same constituent propositions, they do not support the same set of entailments because they do not involve the same relation. Only $p \wedge q$ entails the set $\{p, q\}$, for example. But it is important to note that, whereas the truth value of a complex formula formed by a Boolean operator is determined entirely by the truth values of its arguments, the truth value of an instance of a discourse relation cannot be so reduced: if two propositions, p and q, are both true, this automatically entails the truth of $p \wedge q$, but not that of Explanation (p, q). The Explanation relation adds additional semantic content that is itself truth-evaluable. Another crucial difference is that discourse relations can add substantial semantic content to discourse even in the absence of an explicit relation marker, as illustrated by (1). In this case, content is added to the discourse during composition as the result of a reasoning process, not by a logical operation determined by the semantics of a particular operator. In this

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[5] Other chapters in this volume highlight the importance of discourse relations and structure in contexts not covered in this article. See Abrusán (this volume) on presupposition, Anand and Toosarvandani (this volume) on narrative discourse, Pavese (this volume) on arguments, and Schlöder (this volume) on rejection.

[6] While we will often equate a discourse unit with a proposition for simplicity, it is more precise to say that a discourse unit is an *instance* of a proposition relativized to a particular discourse context (Asher 1993). If we took a discourse relation to hold between two propositions, then this discourse relation would hold between the set of possible worlds that each proposition represents, leading to overly strong claims. If a speaker says "John fell because he tripped on a rock," for example, we do not want the speaker to be committed to the claim that in every world in which John trips on a rock, he falls as a result of tripping on the rock. Rather, the speaker most likely just means that John fell at this particular place and time (in the discourse context) as a result of his having tripped on a rock at this particular place and time.

way, the bottom-up effects of discourse relations go beyond those observed in standard truth-conditional semantics.

When discourse is modeled using discourse relations, a variety of "top-down" effects are also observed. That is, information the interpreter has about how discourse units are related – which might come from explicit discourse markers or other lexical information from the discourse units, or even nonlexical contextual information – can be used to interpret the content of *an individual discourse unit*. In particular, discourse relations have significant effects on various anaphoric phenomena, including the resolution of anaphoric pronouns and the temporal interpretation of individual clauses. This is part of what makes discourse relations so important to philosophy, particularly the philosophy of language, and linguistics: not only do they provide a framework which allows a more complete representation of the complex semantic structures that mediate nearly all human information exchange and knowledge acquisition, but they do so by offering a new perspective on problems, such as anaphora resolution, that have been discussed in the literature for a long time.

As an illustration of top-down effects, consider the minimal pair in (6):

(6)   a. Andy's bike broke down this morning. He showed up late for work.
         b. Andy showed up late for work. His bike broke down this morning

The past tense employed in (6a) indicates that the events of Andy's bike breaking down and his showing up late for work happened in the past of the utterance time, but the example as a whole suggests more information about the timing of the individual events. In particular, we infer that the time at which Andy's bike broke down was in the past of the time at which he showed up late for work. Surely the order in which the events are described plays a role in this interpretation, but, as noted already by Ancient rhetoricians (e.g. Quintilian 1963), this cannot be the whole story. If we reverse the arguments, as in (6b), our tendency to understand Andy's bike troubles as the cause of his tardiness – an interpretation motivated by world knowledge – leads us to understand the event described second as actually having occurred first (Lascarides & Asher 1993). From the perspective of SDRT, these observations are explained by noting that we infer different discourse relations in (6a) and (6b), namely Result and Explanation, respectively. The semantics of these relations then entail the differing temporal interpretations: Result, when its two arguments denote events, requires that the event described by its second argument occur after that described by its first, whereas Explanation requires the opposite structure.[7]

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[7] That the temporal interpretation of a discourse depends on conversational purposes and world knowledge echoes claims in Grice (1981), as does the fact that discourse relations that are not explicitly marked are often cancellable and reinforceable. Theories of discourse structure like SDRT go beyond Grice in numerous ways, however. First, they attempt to explain how tense and aspect, lexical choice, and update order influence discourse interpretation – the point is not that such information is unimportant, but that its role in the interpretation of anaphora passes via the

Similarly, there are situations in which pronoun resolution is most effectively explained by appealing to discourse relations and world knowledge, as illustrated by (7), taken from Kehler et al. (2008) and adapted from Winograd (1972) (cf. also Hobbs 1979; Kehler 2002).

(7)   The city council denied the demonstrators a permit because ...
         a.   ... they feared violence.
         b.   ... they advocated violence.

The pronoun *they* is understood as referring to the city council in (7a), but to the demonstrators in (7b). Arguably, this is because world knowledge suggests that fearing violence is a good reason for an agent to reject a permit, while advocating violence is a good reason to have one's request rejected.

The role of world knowledge and reasoning comes out perhaps even more clearly if we consider an ambiguous discourse marker, such as *and*, which in (8) could support either a Parallel relation or a Result relation, leading to different interpretations of *they*:

(8)   The city council denied the demonstrators a permit and they advocated violence.

The context of (8) and the world view of the speaker will be what tips the balance in favor of one interpretation or the other. If it is understood that demonstrators would likely react violently to authoritarian obstacles, the Result relation would best support this reading of (8), where *they* are the demonstrators. But in a context in which one accepts that a body of government might advocate violence against a group of people who are wanting to protest a cause, (8) could equally express a Parallel relation which would make an interpretation of *they* as picking out the city council more accessible than one in which *they* picks out the demonstrators. The important point here is that the sentence in (8) supports two different interpretations of the pronoun *they*, and the choice of interpretation is accounted for by the type of semantic relation inferred.

The foregoing analysis of anaphora resolution and temporal interpretation generalizes insights from dynamic semantics. In dynamic semantics, models of pronominal anaphora take into account the order in which two clauses are added to the discourse context in order to capture the fact that, for instance, reversing the sentences in (6a) would lead to a less felicitous discourse (Kamp & Reyle 2013). Temporal interpretation can likewise be sensitive to update order and also to tense and aspect: were we to change the aspect in the second sentence of (6a) to the past perfect, this would change the inferred temporal relation between the clauses (Kamp 1988). Work on discourse

determination of discourse relations. Second, they do not treat unambiguous discourse markers, such as *therefore*, as implicatures of any sort. Finally, more recent versions of SDRT do not presuppose cooperativity in conversation (see Section 5.3.2).

relations, in particular Hobbs (1979), Kehler (2002), Asher (1993), and Asher and Lascarides (2003), incorporates the idea that a model of anaphoric phenomena must take into account the way in which the utterance content is linked to other contents in the incoming information state and the way in which discourse units are described.[8] In these accounts, however, update order and tense and aspect influence interpretation only *indirectly* by helping an interpreter determine what discourse relation is at work. Anaphora and temporal interpretation are thus understood as byproducts of reasoning about discourse relations (and, as we will see in the next subsection, discourse structure).[9]

5.2.2   Discourse Structures

So far we have discussed the role of discourse relations in the computation of temporal structure and the resolution of anaphora using examples that contain pairs of discourse units. However, there are some other important anaphoric facts, such as propositional anaphora, which cannot be explained by considering pairs alone. Consider this example from Asher (1993) (and see Snider 2017 for an in-depth discussion of propositional anaphora):

(9)   a. One plaintiff was passed over for promotion three times.
         b. Another didn't get a raise for five years.
         c. A third plaintiff was given a lower wage compared to males who were doing the same work.
         d. But the jury didn't believe this.

What is the antecedent for the pronoun *this*? For most speakers, the only possible antecedents are either the proposition expressed by the combination of (9a)–(9c), a *complex discourse unit* that we will denote as [(9a)–(9c)], or the proposition expressed by the discourse unit (9c) alone.

Note that how we resolve the pronoun *this* in (9) goes hand in hand with how we understand the scope of the discourse marker *but* in (9d): if *this* picks out the proposition expressed by (9c), then (9c) is also understood as the first argument of *but*. However, if *this* is understood as picking up on the complex proposition formed from (9a)–(9c), then it is the complex discourse unit [(9a)–(9c)] that provides the first argument to *but*. Observations about propositional anaphora take insights from Section 5.2.1 concerning the relation between discourse relations and anaphora to a new level. Now, it's not just a question of how anaphoric relations between two consecutive clauses are interpreted; in SDRT, RST, and the theory of Polanyi (1985), *discourse attachment itself becomes anaphoric*.

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[8] A dynamic semantic account explicitly underlies Segmented Discourse Representation Theory as developed in Asher and Lascarides (2003).

[9] For further discussion of why dynamic frameworks that do not assume discourse relations fail to capture temporal anaphora, see Altshuler (2016); Lascarides and Asher (1993); Webber (1988).

When a new discourse unit is introduced into an ongoing discourse, we must consider which discourse units already present in the discourse will be able to connect with it via a semantic relation. In a coherent discourse, each new unit of discourse content must attach and bear some semantic relation to some other constituent in the discourse structure; each discourse unit becomes, in effect, a "zero-anaphor" looking for an antecedent discourse unit or complex discourse unit. And as illustrated by (9), it might be that only a subset of the constituents in a discourse representation are salient and available as attachment points when updating the discourse context with new information.[10]

To define the set of salient constituents that are accessible for attachment, commonly called *The Right Frontier* (RF; Polanyi 1985; Asher 1993), we need to represent discourse structure as a graph whose nodes are discourse units and whose edges are instances of discourse relations between constituents.[11] We thus introduce a few fundamental features of the SDRT language here. The vocabulary contains a countable set of discourse unit labels $DU = \{\pi, \pi_1, \pi_2, \ldots\}$ for *elementary discourse units* (EDUs), which are discourse units that cannot be decomposed into further discourse units, and complex discourse units (CDUs), which group together multiple DUs (EDUs or CDUs). It further includes a finite set of discourse relation symbols $Rel = \{R, R_1, \ldots, R_n\}$, which we add to the vocabulary of a language L, such as the language of dynamic predicate logic, for describing the contents of EDUs. Formulas in the SDRT language are of the form $\pi : \phi$, where ϕ describes the content of π and ϕ can be: a formula of L; a formula of the form $R(\pi_1, \pi_2)$, which says that π_2 stands in coherence relation R to π_1; or a conjunction of SDRT formulas. Following Asher and Lascarides (2003), each discourse relation comes with constraints as to when it can be coherently used in context and when it cannot.[12]

A discourse structure for a text can be represented as a graph $(V, E_1, E_2, Last, \ell)$, where $V \subseteq DU$ is a set of vertices each representing a discourse unit; $E_1 \subseteq V^2$ a set of directed edges representing links between discourse units that are labeled by $\ell : E_1 \rightarrow Rel$ with discourse relations; $E_2 \subseteq V^2$ describes the membership relation between the set of DUs figuring in

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[10] Note that discourse attachment is a more general anaphoric process than pronominal or temporal anaphora, in part because the semantic relations involved in discourse attachment are semantically varied. Furthermore, discourse theories provide complex, recursive structures for the discourse context, so there are typically several possible antecedents for discourse attachment. In addition, as Asher (1993) and Lascarides and Asher (1993) show, different attachment sites will affect temporal structure of the discourse and the possible interpretation of anaphoric pronouns.

[11] In some theories, such as RST, discourse structures are represented more specifically as trees, but this constraint is not central to our points here.

[12] Discourse structure inferences are generally nonmonotonic or probabilistic; still, implemented SDRT models (Muller et al. 2012; Afantenos et al. 2015; Perret et al. 2016) have proven predictive over large corpora of discourse annotated, extended texts.
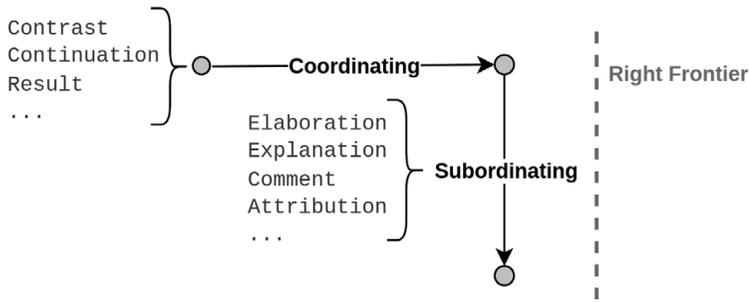
Figure 5.1 Subordinating and coordinating relations and their relation to the RF

CDUs and the CDUs in which they figure; and *Last* $\in V$ is the last EDU in the linear, textual ordering of EDUs in *d*. An SDRS is *spanning* in that all elements of *V* other than the root have at least (and possibly more than) one incoming edge: $\forall \pi_x \in V.(\pi_x \neq \text{ROOT} \rightarrow \exists \pi_v \in V.((\pi_v, \pi_x) \in E_1))$. Note that when discourse units are grouped together in a CDU, they will be related in such a way as to determine a subgraph respecting the foregoing conditions.

The *Right Frontier Constraint* (RFC) requires that given a discourse graph *G*, a new EDU to be attached to *G* must be attached to a node along the RF of *G*. (Nodes that are not on the RF can be accessed, but only through what Asher 1993 calls *discourse subordination*.) The RF evolves dynamically as a discourse proceeds and is sensitive to whether a new DU is attached via a *subordinating relation* or a *coordinating relation*, as indicated in Figure 5.1.

A subordinating relation, including Explanation, Elaboration, and Background, is one in which the second argument seems to provide further information about the first (Asher & Lascarides 2003). Crucially, the addition of the second argument does not render the first argument less salient or inaccessible for anaphora, which means that both discourse units will be on the RF. Let's return to our first example, repeated here as (10):

(10)   I need my hat back. I'm leaving for São Paulo in two days.

The speaker could easily continue with (11):

(11)   I'm sorry. I know you enjoy wearing it.

In apologizing, the speaker expresses the idea that she feels bad about asking for her hat back; the apology *I'm sorry* is thus related via the relation Comment to the discourse unit *I need my hat back*. The pronoun *it* in (11) likewise depends on the first discourse unit of (10), referring to the hat introduced in that unit. These attachments are possible despite the fact that the second sentence of (10) is uttered in the interim.

The left graph in Figure 5.2 represents the structure of (10). The vertical arrow connecting the discourse units indicates that Explanation is a
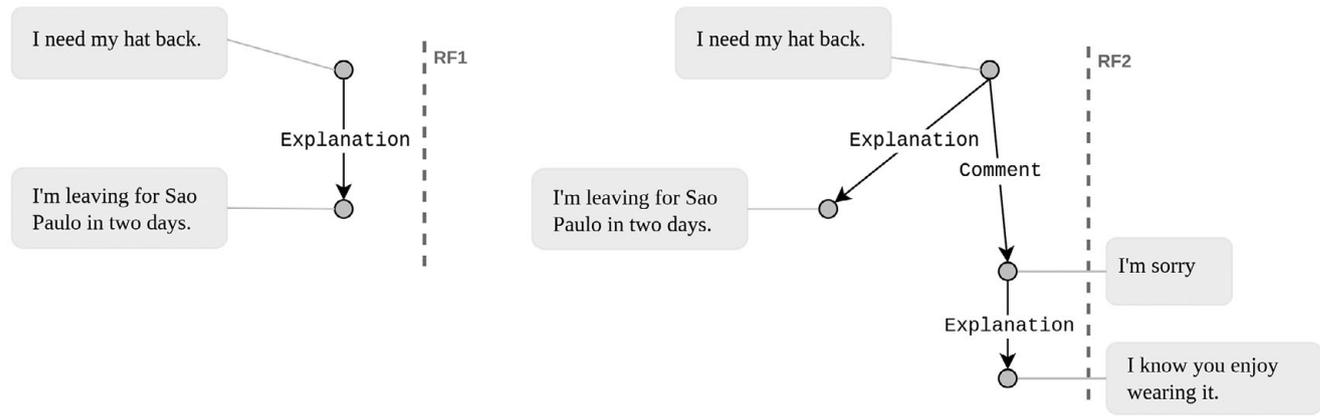
Figure 5.2 Discourse graphs for (10) and (11)

subordinating relation, and the dashed line (RF1) represents the RF just before the speaker utters (10). The right graph shows how the discourse structure changes when we update with (10). *I'm sorry* is attached to the top node via Comment, a subordinating relation, and *I know you enjoy wearing it*, which explains why the speaker is sorry, is attached via Explanation. This graph also shows how updating with (10) changes the RF: the unit *I'm leaving for São Paulo in two days* is pushed to the left and is no longer on the RF (RF2), though the remaining three units are.

Coordinating relations shut off the accessibility of their first arguments and advance the discourse to a new topic instead of providing further information on the current topic. The discourse units contributed by (9a)–(9b) and (9b)–(9c), for instance, are related by the coordinating relation Continuation in SDRT, whose semantics roughly correspond to Boolean conjunction. This means that (9b) is predicted to be inaccessible for attachment once (9c) is introduced, which is what we observed above. Coordinating relations, such as Continuation, Narration, and Result, are represented with horizontal arrows to show that they push the RF forward, or to the "right" as shown in case 1 of the figure. These assumptions imply that should we insert material in (9) such as:

(12)   These people were really badly treated.

before (9d), the available antecedents for the pronoun *they* should shift again. And indeed as SDRT predicts, our intuitions change in this new example: (9c) is no longer available as an antecedent.

Note that the RF, as it can contain numerous discourse units, does not determine where a new discourse unit *will* attach to the discourse graph to date, but only where it *can* attach. We can now formally define the RF in the style of SDRT. Let $e(\pi_x, \pi_y)$ mean that edge e has initial point π_x and endpoint π_y. A node π_x is on the RF of a graph G, i.e. $\text{RF}_G(\pi_x)$, just in case π_x is *Last*, π_x is related to a node in RF_G via a subordinating (*Sub*) edge, or π_x is a CDU that includes a node in RF_G:

Definition 1. Let $G = (V, E_1, E_2, Last, \ell)$ be a discourse graph. $\forall \pi_y, \pi_x \in V$, $\text{RF}_G(\pi_x)$ iff

  (i) $\pi_x = Last$,
  (ii) $\text{RF}_G(\pi_y)$ & $\exists e \in E_1, e(\pi_x, \pi_y)$ & $Sub(e)$, or
  (iii) $\text{RF}_G(\pi_y)$ & $\exists e \in E_2, e(\pi_x, \pi_y)$

Note that the RF is updated dynamically each time a new EDU is processed; the RF for (attachment of) an EDU π_n will be determined by the graph $G_{\pi_0 - \pi_{n-1}}$. The RF for a CDU $\pi_m \ldots \pi_n$, $m < n$, is the RF for π_m.[13] This predicts

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[13] This definition leaves open the possibility that a set of discourse units is first grouped into a CDU and that the graph determined by the CDU is only subsequently attached to the incoming graph.

a One plantiff was passed over for promotion three times.	
b Another didn't get a raise for five years.	
c A third plaintiff was given a lower wage compared to males who were doing the same work.	
d But the jury didn't believe this.	

The dialogue structure above is created as DUs are connected with *coordinating* relations. At each stage, the Right Frontier offers two options for attaching discourse continuations: either the most recently connected DU (Last), or a complex discourse unit (CDU), a weakly connected subgraph containing Last. In interpretation 1 above, d is attached to c; In 2, d is attached to a CDU containing a, b and c.

Figure 5.3 Two discourse graphs for (9)

that (9c) is available for attachment in (9) because it is *Last*, but (9a) and (9b) are both inaccessible because neither satisfies any of the conditions (i)–(iii). The complex unit [(9a)–(9c)] is correctly predicted to be available, however, because it includes *Last*, which is a member of the RF, thus satisfying condition (iii). The two possibilities for attachment in (9) are represented in Figure 5.3.

The picture that emerges from an account of discourse structure is one in which the attachment point of a new discourse unit to an existing discourse graph is itself an anaphoric process guided by a combination of reasoning about world knowledge and linguistic cues. When a speaker makes a new utterance, determining to what part of the conversation their new utterance is relevant is in fact a complex process. Given the hypothesis developed in Section 5.2.1, that pronominal anaphora resolution and temporal interpretation are byproducts of inferring discourse relations and structure, it follows that the former are guided by the same complex reasoning processes as the latter. While the RF cannot on its own determine where a discourse unit will attach – and thus in what unit a pronoun must find its antecedent or a temporal expression must be interpreted – it helps to greatly restrict the possibilities and facilitate discourse comprehension while offering a more comprehensive mechanism for interpretation.

This happens frequently with utterances of sentences with a complex syntactic structure: a sentence of the form *q, if p*, for example, will determine a CDU that contains the DUs π_p and π_q linked to each other via the relation Conditional, i.e. Conditional(π_p, π_q). Sentences containing appositive relative clauses, which we discuss in Section 5.3, likewise contribute CDUs containing, at least, the DUs contributed by the main clause and the appositive.

5.3   Complex Discourse Structures

If the nature of dynamically evolving, complex discourse structures can influence the interpretation of semantic phenomena such as pronominal anaphora resolution and temporal interpretation, the question arises as to what other semantic phenomena might be efficiently modeled by exploiting the full machinery of a theory of discourse structure. In this section, we examine three other types of phenomena that we feel are best analyzed through the lens of a discourse theory, namely (certain types of) at-issue and not-at-issue content, discourse goals, and multimodal interactions.

5.3.1   At-Issue and Not-at-Issue Content

Theories of discourse structure in the tradition of SDRT and RST have focused largely on defining the function of a discourse unit in terms of the kind of discourse relation to which it contributes: whether it serves to explain something, to answer a question, to continue a narrative, and so on. But this is not the only way to understand discourse function: fueled by the observations and theory presented in Potts (2005), there is an ongoing and lively debate in linguistics and philosophy of language about how to classify discourse content in terms of how central it is to discourse development and, often, to discourse goals or purposes. In current terminology, the challenge is to determine the conditions under which content is *at-issue* (AI), and thus central to discourse development and/or discourse goals, or *not at-issue* (NAI), and thus relevant to a discourse in some more indirect way.

   In this subsection, we take a look at recent work that brings theories of discourse structure and interpretation to bear on the AI/NAI discussion by focusing on two phenomena that have been said to involve NAI content: appositive relative clauses and discourse parenthetical reports. Before addressing these topics in turn, however, we need to clarify what is meant by AI and NAI content. Efforts to define these concepts more precisely have led to a variety of diagnostic tests, and because these tests do not always yield the same judgments, the result is that there is more than one way of carving up the AI/NAI distinction (Koev 2018). Here we will focus on two ways of categorizing AI and NAI content: as *backward-looking* AI/NAI or as *forward-looking* AI/NAI.[14]

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[14] The concepts of backwards looking at-issueness and forward-looking at-issueness correspond roughly to Koev (2018)'s notions of Q-at-issueness and C-at-issueness, respectively, which we find very helpful. We change the terminology for backwards-looking at-issueness to take a more agnostic stance as to the nature of the incoming discourse context; we opt for the notion of forward looking at-issueness to emphasize that Koev's notion of C-at-issueness pertains to those units in a discourse graph that can support anaphoric continuations, namely, the nodes along the RF.

To determine if content is backward-looking AI/NAI, we look at how it interacts with the *preceding* discourse. Consider (13):

(13)   Marie, the chemistry teacher at our old high school, is joining our volleyball team.

We say that the main clause of (13) is backward-looking AI while the appositive relative clause is backward-looking NAI because the former must be relevant to the preceding discourse in a way that the content of the latter need not be, as shown by the contrast between (14) and (15):

(14)   a. Who is joining your team this year?
         b. Marie, the chemistry teacher at our old high school, is joining.

(15)   a. Who is Marie?
         b. ?? Marie, the chemistry teacher at our old high school, is joining our volleyball team.

The infelicity of (15b) arguably shows that the main clause of a sentence containing an appositive relative clause must convey main point content, i.e. be backward-looking AI, while the acceptability of (14b) shows that the an appositive relative clause can be backward-looking NAI.

Forward-looking AI status is diagnosed by looking at possibilities for *subsequent* discourse continuations, like those in (16a) and (16b):

(16)   Marie, the chemistry teacher at our old highschool, is joining our volleyball team.
         a. That's not true! (=*It's not true that Marie is joining the team.*)
         b. Wait, I thought she was the physics teacher.

The main clause content of (16) is forward-looking AI because it is treated as more salient or discourse central by subsequent discourse moves, as shown by the fact that the pronoun *that* in (16a) seems to automatically target this content, while ignoring that of the appositive relative clause. Correcting the latter requires more effort, as shown by (16b); here, the speaker must employ explicit descriptive content to show that she is taking issue with the appositive, suggesting that the appositive content is forward-looking NAI (cf. Von Fintel 2004).

With these notions of forward and backward-looking AI/NAI content in place, we now turn to a discussion of how discourse structure has been exploited to model the behavior of two types of content that sometimes exhibit unexpected AI behavior: appositive relative clauses and the embedded clauses of speech reports. While the foregoing discussion might lead us to conclude that appositive relative clauses are by their very nature vehicles for backward-looking and forward-looking NAI content, the following subsection introduces data that show they can be both backward and forward-looking AI in certain cases. We then focus on data that show that the embedded content of a speech

report can be backward-looking AI even while syntactically embedded under content that appears to be backward-looking NAI. In both cases, we show how a theory of discourse structure can be brought to bear on these phenomena in a way that accounts for their nuanced behavior. While a discourse-based account of appositive relative clauses emerges naturally from the existing tools such as the RF, an account of speech reports requires some supplemental assumptions.

Appositive Relative Clauses As pointed out by numerous authors, appositive relative clauses pass diagnostic tests for forward-looking AI content when they appear in sentence-final position. This is illustrated by the fact that the direct rejection in (17b) targets the content of the appositive as easily as (17a) targets the content of the main clause (AnderBois et al. 2015; Syrett & Koev 2015):

(17)   This year, we'll be joined by Marie, (who was) the chemistry teacher at our old highschool.
        a. That's not true. She's moving to Germany now.
        b. That's not true. She was the physics teacher.

In fact, even appositive relative clauses in sentence-medial position can arguably convey forward-looking AI content in certain cases. Compare (18) and (19), from Hunter and Asher (2016).

(18)   a. Marie, the best volleyball player in the district, is joining our team.
        b. We're going to be invincible!

(19)   a. Marie, the worst volleyball player in the district, is joining our team.
        b. ? We're going to be invincible!

While an appositive relative clause cannot be targeted by a direct rejection such as *That's not true*, (18) and (19) show that such a clause can nevertheless play a central role in the acceptability of discourse continuations. And crucially, it can play this role even if a speaker makes no particular effort to raise this content to salience. In contrast to the appositive in (16), which must be explicitly targeted by a move like (16b) in order to be made salient, the appositive in (18) is automatically understood to be a part of the speaker's main point – that they're going to be invincible because the best player in the district is joining their team. Arguably, then, sentence-medial appositives can sometimes be forward-looking AI, even if direct rejection tests fail to diagnose them as such.

Examples similar to (18) suggest that sentence-medial appositive relative clauses can be backward-looking AI as well (Syrett & Koev 2015):

(20)   a. Our team is so much stronger this year.
        b. Marie, the best player in the district, joined our team in March.
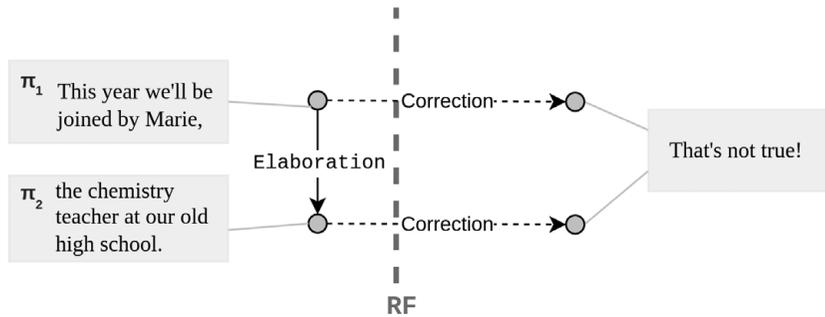
Figure 5.4 Discourse graph for (17) showing that both EDUs are on the RF

Without the appositive relative clause, it might have been possible to infer from (20) that the team is stronger *because* Marie joined, but for an audience who does not know Marie or how good of a player she is, this interpretation is greatly aided by making explicit why Marie's presence would strengthen the team. As with (18), the appositive content in (20b) plays a central role in conveying the speaker's main point, this time by directly contributing to the explanation of (20a).

In a discourse theory, the above observations fall out naturally by appealing to the nature of subordinating relations and the RF (Hunter & Asher 2016; Jasinskaja 2016; cf. Asher 2000). Let's begin with (17). Ignoring the frame adverbial *This year*, which would introduce complexities irrelevant to the current discussion, (17) can be decomposed into two discourse units, π_1: *we'll be joined by Marie* and π_2: *(Marie was) the chemistry teacher at our old high school*. In SDRT, these units will be related by the subordinating relation Elaboration, i.e. Elaboration (π_1, π_2), because the content of π_2 elaborates on the entity Marie, introduced in π_1. Recall that the RF includes: (i) *Last*, (ii) any unit x directly superordinate to a node y on the RF, and (iii) any CDU x that includes a node y on the RF. The unit π_2 satisfies condition (i), as it is the most recently uttered discourse unit, while π_1 satisfies condition (ii) because it is superordinate to π_2 (e.g. the source of a subordinating relation connecting π_2 to the graph). We thus predict that both π_1 and π_2 are on the RF and available for discourse continuations, as shown in Figure 5.4.[15]

The definition of the RF can also be used to predict that the medial appositive relative clause in (18) cannot be targeted by a direct rejection although it *can* be relevant for discourse continuations like that in (18b). As illustrated in Figure 5.5, (18) can be decomposed into two discourse units, π_1: *the best*

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[15] We relate the rejection "That's not true!" via the relation Correction. Corrections and rejections are in fact complicated discourse moves. For more, see Schlöder (this volume) on rejection.
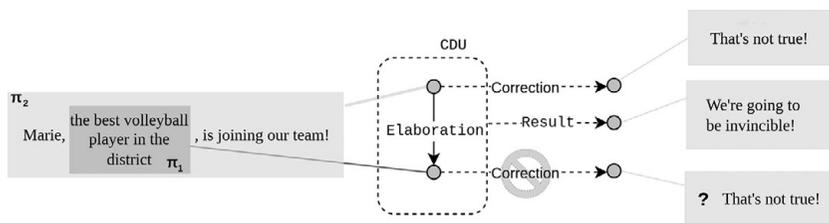
Figure 5.5 Discourse graph showing that the appositive relative clause in (18) is inaccessible as the sole target of direct rejection but can figure in a CDU that licenses discourse continuations

volleyball player in the district and π_2: *Marie is joining our team*. In this case, the main clause, whose content is π_2, is the last completed unit in (18a), and so it follows from condition (i) of the RF that it can support discourse continuations. The unit π_1, by contrast, fails to satisfy (ii), because is it actually *sub*ordinate to π_2, not *super*ordinate to it. Thus we predict, correctly, that π_1 *alone* cannot be targeted by a discourse continuation like *That's not true*. However, if π_1 contributes to a complex discourse unit that contains another unit on the RF, then by condition (iii), we predict that the entire CDU can support discourse continuations. And this is what we observe: the CDU $[\pi_2, \pi_1]$ in (18) supports the continuation in (18b). Parallel remarks can be made for the discourse centrality of the appositive relative clause in (20b): the complex discourse unit as a whole provides the explanans, making the appositive discourse central.

Recasting the AI/NAI distinction as a byproduct of constraints that guide discourse attachment and the construction of complex discourse structures provides an independently motivated and flexible notion of AI/NAI content that accounts for the variable AI status of appositive relative clauses. Within such a framework, there is no need to posit that appositive content is by its very nature NAI or that it gives rise to a special interpretation procedure (cf. AnderBois et al. 2015); nor do we need to posit new syntactic constraints as in Koev (2013). In the next section, we consider another phenomenon that raises questions about the AI/NAI distinction, namely discourse parenthetical interpretations of indirect speech reports. Like the behavior of appositive relative clauses, the behavior of the embedded clauses of speech reports appears to motivate a discourse-level explanation. Unlike the former, however, a discourse-based analysis of discourse parenthetical reports requires us to adopt some new assumptions.

Discourse Parenthetical Reports In certain cases, the embedded clause of an indirect speech report seems to convey backward-looking AI content despite being syntactically embedded under content that is less discourse central. Consider the contrast between (21) and (22).
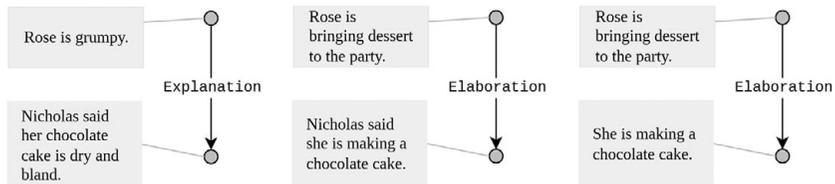
Figure 5.6 The main discursive contribution of a discourse parenthetical report (middle graph) is intuitively closer to an example without a report (right graph) than to a nonparenthetical report (left graph)

(21)   a. Rose is grumpy.
        b. Nicholas said her chocolate cake is dry and bland.

(22)   a. Rose is bringing dessert to the party.
        b. Nicholas said she is making a chocolate cake.

In (21), the report in (21b) as a whole explains why Rose is grumpy – regardless of whether or not Rose's cake actually *is* dry and bland, Rose is upset simply because Nicholas *said* it was. Intuitively, we could represent (21) using the first graph in Figure 5.6. A parallel analysis for (22), shown in the second graph, is unsatisfactory, however; the speaker is not suggesting that the event of Rose bringing a dessert to the party is going to furthermore be *an event of Nicholas saying* that she is making a chocolate cake. The speaker rather seems to be committed to something closer to the elaboration captured by the third graph in Figure 5.6, and the fact that Nicholas said what he did somehow provides evidential support for this elaboration. Following Hunter (2016), we will call speech reports like (22b) in which the embedded content appears to be backward-looking AI while the report clause plays a supportive, evidential role, *discourse parenthetical*.

In an attempt to provide more intuitive annotations for discourse parenthetical reports that more accurately represent the inferences that one can draw from them, numerous discourse theories have proposed that speech reports generate two discourse units, one for the main report clause and one for the embedded clause (Dinesh et al. 2005; Hunter et al. 2006; Buch-Kromann & Korzen 2010, see also Carlson & Marcu 2001). Such an approach has been further supported by experimental work in Simons (2019). As illustrated in (24), for example, the report in (22b) can be decomposed roughly as follows: [Nicholas said [she is making chocolate cake.]$_{\pi'_3}$]$_{\pi'_2}$, so that the report as a whole introduces a discourse unit π'_2, and the embedded clause introduces a separate discourse unit π'_3: *she is making a chocolate cake*. Because the different interpretations of (22b) and (21b) seem to result from how the reports are used in the discourse, rather than some kind of hidden syntactic difference
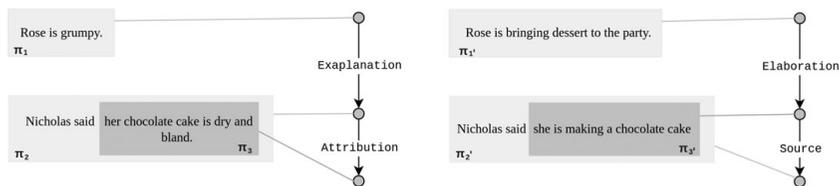
Figure 5.7 In the relation Attribution, the embedded clause of a report is subordinate to the main clause, mirroring the syntactic structure of the report; in Source, the main clause is subordinate to the embedded content, allowing the latter to enter directly into discourse relations with the incoming discourse context

(Simons 2007), we can further assume that all speech reports should be decomposed into two units, even when it is the main report clause that conveys discourse central information, as illustrated in (23).

(23)   a.   [Rose is grumpy]$_{\pi_1}$
           b.   [Nicholas said [her chocolate cake is dry and bland]$_{\pi_3}$]$_{\pi_2}$

(24)   a.   [Rose is bringing dessert to the party]$_{\pi_1'}$
           b.   [Nicholas said [she is making chocolate cake]$_{\pi_3'}$]$_{\pi_2'}$

To derive the distinction between nonparenthetical and parenthetical readings, then, one approach is to posit that they involve two different discourse relations, say Attribution in (21b) and Source in (22b) (Hunter et al. 2006), as shown in Figure 5.7. While Attribution mirrors the syntactic structure of a report, keeping the embedded clause subordinate to the main clause, Source reverses the order of its arguments so that the embedded clause can be directly related to the discourse preceding the report. This reflects the intuition that the embedded clause is backward-looking AI and is thus intuitively central for the incoming discourse context. Semantically, Attribution does not entail the truth of its second argument – i.e. the content of the embedded clause – and so is interpreted as expected for a report involving a nonfactive verb. When the embedded clause of a report contributes the first argument of Source, however, its truth *is* entailed. Relations such as Elaboration and Explanation are *veridical*, meaning that they entail the truth of both of their arguments; it thus follows that if the embedded content of a report attaches to the incoming discourse via one of these relations, its truth is entailed.

While the Source relation addresses the intuition that π_3' is backward-looking AI, it creates new problems. First, it fails to capture examples in which both the main clause and the embedded clause of a speech report are backward-looking AI, as illustrated by (25) (for extended examples, in which the clauses are related to very different parts of a discourse, see Hunter 2016).
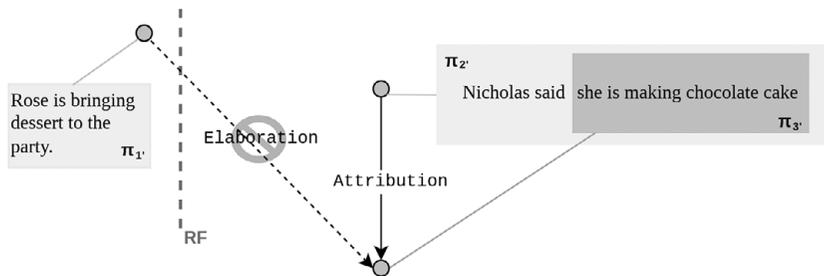
Figure 5.8 Connecting the second argument of Attribution directly to a discourse unit preceding the report leads to an RF violation

(25)   a. Have you talked to the guests? What are they bringing?
       b. Nicholas said Rose is bringing a chocolate cake, and he said that he would bring chips and guacamole. Kate is bringing veggie burgers, but I haven't heard from Isabel. Do you think I should call her?

In this example, the second speaker uses consecutive utterances to simultaneously provide suites of answers to both questions in (25a), telling the first speaker which guests they have talked to, as well as addressing the question of what each person is bringing. It is thus hard to say for any of the reports in (25b) which is *the* unit that attaches to the incoming discourse context or licenses discourse continuations, so adopting Source to represent the discourse centrality of π_3' is unmotivated at best (cf. also two-dimensional accounts such as Maier & Bary 2015). Moreover, adopting Source fails to account for the fact that a speaker who uses a discourse parenthetical report generally hedges their commitment to the embedded content of that report: in (22b), the speaker is not fully committed to the claim that Rose is making a chocolate cake for the party; they are committed at most to $\Diamond$ Elaboration $\left(\pi_1', \pi_3'\right)$, so Elaboration $\left(\pi_1', \pi_3'\right)$ is too strong. This observation would be naturally explained by appealing to the fact that π_3' is in the scope of a speech report – that is, by making π_3' subordinate to π_2' via Attribution.

Now we're back to the drawing board: if we posit Attribution $\left(\pi_2', \pi_3'\right)$, how can we represent the intuitive Elaboration relation between π_1' and π_3'? Directly relating them will lead to a violation of the RF, as can be seen from Figure 5.8. π_2' and π_3' form a complex unit that needs to be attached to the incoming discourse, i.e. π_1'. The only way to do this without violating the RF is to attach π_2' to π_1', but that would yield the reading of (22b) that we have rejected, namely a reading in which Nicholas saying what he did elaborates on the event of Rose bringing a dessert to the party. Attaching π_3' directly to π_1' is not permitted by the RF as introduced in Section 5.2.2: π_1' is not *Last* for π_3' (π_2' is), nor is π_1' superordinate to π_3' via a chain of subordinating relations, as π_2' is not attached to π_1' at all.

As argued in Hunter (2016), however, modifying the RFC to allow for such "violations" is independently motivated in the case of third-party speech

reports. As Hunter explains, the constraint that a discourse unit attach to another unit along the RF is best understood as a constraint on how a speaker presents her own commitments. When a speaker decides to use someone else's commitments to make a point, they must first set up this commitment space before using what that person has said to make a contribution to the larger discourse.[16] Of course, while speakers can use things that others have said to, say, elaborate on or explain other discourse units, we have seen that when they do so, they weaken their own commitments to the reported content. It follows that they hedge their commitments to the proposed relations as well: if the speaker of (22b) is not entirely committed to the claim that Rose is making a chocolate cake, they cannot be entirely committed to the claim that the event of Rose's bringing a dessert to the party is going to be an event of her bringing a chocolate cake to the party.

Accordingly, Hunter (2016) posits that anytime a speaker opts for a discourse parenthetical report, the report will contribute an instance of Attribution, just as a nonparenthetical report would, but when we link the embedded content to the discourse context preceding the report, the Attribution will have the effect of weakening the speaker's commitment to the relation. That is, rather than Elaboration (π'_1, π'_3) as in the graph above, linking π'_1 to content inside of an Attribution context weakens the relation to $\Diamond$ Elaboration (π'_1, π'_3).[17] This proposal allows us to systematically derive the difference between discourse parenthetical and nonparenthetical readings with minimal, well-motivated adjustments to a classic discourse theory: in discourse parenthetical readings, the embedded content is backward-looking AI and thus related directly to the incoming discourse context, although the speaker's commitment to this relation is hedged; in nonparenthetical readings, the main clause is backward-looking AI and no speaker commitment is entailed to the embedded content of the report (for third-person reports). Furthermore, this approach predicts that both the main and embedded clauses of a speech report can be backward-looking (and forward-looking) AI, as desired.

In the analysis of at-issue and not-at-issue content that emerges from this section, at-issue content is content that is central to discourse development. A discourse unit π is AI if it attaches directly to the incoming discourse context via a discourse relation or supports anaphoric continuations that need not explicitly evoke the content of π; a discourse unit π' is NAI if it is contributed by a syntactically complex discourse move that contributes more than one discourse unit, and π' does not (or cannot) attach to the incoming context or

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[16] The RF as defined in Section 5.2.2 must be adapted for multiparty dialogue as well, where building up a discourse structure becomes a collaborative task (Asher et al. 2016).

[17] In this account, the evidential effect of the report is derived as a byproduct of discourse attachment between multiple discourse units. For a discussion of evidentiality at the propositional and subpropositional level, see Bhadra (this volume).

cannot support anaphoric continuations on its own. The possibilities for attachment of a discourse unit are in turn governed by the RF and rules limiting discourse development. As mentioned at the outset of this section, however, AI content is sometimes presented as content that directly addresses a speaker's discourse goals. In the next section, we take on the topic of modeling discourse goals in a theory of discourse structure and interpretation and show how goals and at-issue content are decoupled in more recent work.

5.3.2   *Discourse Goals and Subjectivity*

Language is a tool for achieving one's ends, even if one's goal is merely to pass the time or to make someone laugh. Understanding how language can be used to bring about certain effects on one's audience has been of interest to the study of language going back to ancient work on rhetoric. The study of discourse goals has also recently become a main topic of interest in discussions of discourse analysis, from SDRT to theories of conversation centered around Questions Under Discussion, in which a discourse goal is understood as a question that a discourse move is expected to address (QUDs; Simons et al. 2010; Ginzburg 2012; Roberts 2012). Modeling goals is important for discourse interpretation for multiple reasons. First, because we can expect a speakers' discourse goals to guide the discourse moves they make and the way they put them together, we can expect discourse structure and goals to be very closely related. Moreover, an interpreter's expectations concerning what a speaker aims to achieve with her discourse will affect not only how she chooses to converse with the speaker, but also how she interprets the speaker's moves when there is ambiguity (as is often the case at the discourse level).

In this section, we take a look at how discourse relations and complex discourse structures can be used to model discourse goals. We also consider how the relation between discourse goals and AI content should be understood given the discourse structural perspective on AI content developed in the previous section. We conclude by showing how different perceptions of discourse goals can lead to different interpretations of what is said in discourse.

Goals Sometimes, speakers converse to get information from an interlocutor or to persuade someone of a position; in other exchanges, the desired outcome might be an action of some sort, as in (26).

(26)   a. Julie: It's time to go to bed.
        b. Rose: OK, good night.
        c. [nonlinguistic action: Rose goes to bed.]

Intuitively, one might simply say that Julie's discourse goal in (26) is to get Rose to go to bed, as she does in (26c). If (26) is a conversation that goes well

for Julie and meets her discourse goals, however, (27), which has the same outcome, is a much less satisfactory conversational exchange:

(27)   a. Julie: It's time to go to bed.
        b. Rose: OK, but I'm still watching my show.
        c. [30 mins later] Julie: OK, Rose it's really time now to go to bed.
        d. Rose: I'm still watching my show. You told me I could!
        e. Julie: It's no longer the same show! No story! [followed by half an hour of arguing . . .]
        f. [Rose goes to bed.]

A satisfactory model of the relation between discourse structure and goals cannot focus only on whether a conversation successfully achieves a desired outcome, but also on *how* the outcome is achieved. Speakers are usually trying to satisfy multiple constraints at once.

Because a full understanding of discourse goals usually requires modeling extended discourses and goals can be ranked not only by their final outcomes but by the different paths that the conversation can take to achieve these outcomes, recent work in this area models discourse goals as sets of full discourse structures – the structures in which the conversation "goes well" for a particular conversationalist. Asher et al. (2017) model a conversational goal as a subset of all possible conversations or discourse structures in the sequential game space of all possible discourse moves. The goal of making a conversation coherent, for example, is modeled as the set of all coherent discourse structures or, alternatively, as the set of all conversations or strings of discourse moves that generate such structures. Not angering one's interlocutor might be another goal, denoting a different set of structures. Exogenously given decision problems or conversations aimed at answering a particular question are also instances of such goals. Goals can be complex, formed from combinations of simpler goals. Where Win_i is the set of goals for a player i, the strategies that i adopts in conversation – the discourse moves that i chooses to make and how they are related – will be adopted to steer the conversation into Win_i.

Now if discourse goals are modeled as (sets of) full discourse structures, and AI content is defined in terms of attachment within larger discourse structures, what is the relation between AI content and goals? Consider the following exchange from the film *The Princess Bride*, in which the AI/NAI distinction is exploited to achieve a discourse goal:

(28)   a. Buttercup: He [Humperdink] . . . can find a falcon on a cloudy day, he can find you!
        b. Wesley: You think your dearest love will save you?
        c. Buttercup: I never said he was my dearest love, and yes, he will save me. That I know.
        d. Wesley: You admit to me that you do not love your fiancé?
        e. Buttercup: He knows I do not love him.

As background for those who haven't seen the cult classic, Buttercup and Wesley had previously been in love and had planned to marry, but then Wesley was taken hostage by pirates and Buttercup was told that he was dead. A few years later, Prince Humperdink chose Buttercup to be his bride, though she had no desire to marry him. In this scene, Buttercup has been taken hostage by Wesley whom she believes, given his disguise and behavior, to be the pirate who killed Wesley. In the conversation above, Wesley exploits the fact that Buttercup does not recognize him to try to get her to say, without exogenous influence, whether she still loves him.

Let's now look at how Wesley uses the conversation to achieve this goal. In (28a), Buttercup tries to intimidate Wesley so that he will release her, and Wesley follows up in (28b) with a confirmation question that seems to directly address her goal, but in fact, he is merely seizing the opportunity for his own ends. He aims to find out whether Buttercup loves Humperdink, but surmises that a direct question might make Buttercup suspicious or trigger feelings of guilt, leading to a less than fully reliable answer. Wesley thus opts to disguise his question in a presupposition (*your dearest love*), a paradigm NAI construction, in (28b).[18] Buttercup takes the bait in (28c) and directly responds to the noncentral content of Wesley's question, which allows Wesley to follow up directly on his real question about whether she loved Humperdink in (28d). Wesley continues to return to the topic in later scenes, and ultimately admits to Buttercup that he disguised himself in order to get an honest answer to his question.

In (28), the presuppositional content in (28b) is arguably more directly related to Wesley's discourse goal than is the AI content. It's not just that Wesley wants an answer to the question of whether Buttercup still loves him; he wants to get this answer in the most reliable way possible, and opting for a presuppositional expression figures in an optimal strategy for achieving this outcome. From the discourse-driven perspective developed in this chapter, then, AI content turns out to be a very local notion in the sense that is understood in terms of how a discourse unit attaches to the incoming discourse or licenses subsequent discourse moves. A discourse goal, on the other hand, will generally be a much larger structure (or set of larger structures) and we do not predict that AI content will reflect a discourse goal in any direct sense.

This understanding of the relation between goals and AI content stands in contrast to that developed in the QUD-based account of Roberts (2012). The latter assumes that conversation is a fundamentally cooperative activity aimed at getting more information about the world and posits that AI content is content that directly addresses a speaker's discourse goal, which is understood

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[18] Presuppositions provide another great example of a type of NAI construction whose behavior is arguably best modeled through the lens of a theory of discourse. For more discussion, see Abrusán (this volume).

as the question (QUD) that the discourse tries to answer. However, while someone who has a cooperative goal of sharing information with an interlocutor might find AI constructions to be the most straightforward means of sharing discourse central information with an interlocutor, people adopt a wide variety of goals that might make use of AI content in less direct ways, and in some cases, hiding one's central concerns behind NAI content might be preferable. It follows that in a discourse-based account of goals and AI content, an AI discourse unit may not have a direct relation to a discourse goal, but merely play an important part in how that goal is realized.

Bias and Subjective Interpretation In (28), while Wesley and Buttercup seem to agree on what has been said in the conversation, the fact that they come to the conversation with different sets of background beliefs, including their understanding of whom Buttercup is talking to, leads to importantly different perceptions of Wesley's discourse goal. In other situations, discrepancies in background beliefs and expectations can lead to different interpretations of discourse structure. To illustrate this we revisit (8), repeated here as (29):

(29)   The city council denied the demonstrators a permit and they advocated violence.

Example (29) is ambiguous: it can be interpreted as expressing either an instance of Parallel or of Result depending on the context, the interpreter's background beliefs, and expectations about the speaker's discourse goals. Such small-scale ambiguities both at the level of relation type and attachment point arise somewhat regularly in discourse interpretation, and are a familiar phenomenon to anyone who has tried to annotate texts for discourse structure and had to arbitrate inter-annotator disagreement. In conversation, such interpretive differences might not be exposed unless one interpretation comes into contradiction with some other part of the discourse. Thus, a speaker and interpreter might have conflicting interpretations of a discourse without even realizing it. This is not always problematic; it might be completely irrelevant to an interpreter's goals to settle on one interpretation or another.

In other cases, however, disagreements about discourse interpretation can become central to discourse content and development, and even have legal ramifications. Consider the following exchange, discussed in Asher and Paul (2018), in which a reporter is questioning Sheehan, the spokesperson for the former US senator Norm Coleman:

(30)   a. **Reporter:** On a different subject is there a reason that the Senator won't say whether or not someone else bought some suits for him?
         b. **Sheehan:** Rachel, the Senator has reported every gift he has ever received.
         c. **Reporter:** That wasn't my question, Cullen.

    d. **Sheehan:** (i) The Senator has reported every gift he has ever received. (ii) We are not going to respond to unnamed sources on a blog.

    e. **Reporter:** So Senator Coleman's friend has not bought these suits for him? Is that correct?

    f. **Sheehan:** The Senator has reported every gift he has ever received . . .

In (30b), Sheehan responds to the Reporter's question in (30a). Sheehan acts as though he is answering the question, and an audience biased towards Sheehan or the senator he represents might very well take his response as an answer (and likewise for Sheehan's other responses). The reporter, however, clearly does not interpret Sheehan's move as an answer, leading to a repetitive back and forth exchange, as each tries to push their particular discourse goal.

Asher and Paul (2018) provide a way of modeling competing interpretations of a conversation in an epistemic game-theoretic framework, and they show how discourse goals, and interpreters' views on these goals, influence discourse interpretation. They also show how interpreters of conversations such as (30) can become more and more convinced of their interpretation as the dialogue continues. Supporters of the reporter see Sheehan's repetition of *the Senator has reported every gift he has ever received* as confirming more and more that he is evading the reporter's questions, while supporters of Sheehan get more confirmed in their belief or bias that Sheehan has answered the question and that it's time to move on. This phenomenon of *bias-hardening* in interpretation gets replayed at the level of beliefs as well, and can be very hard to control, let alone eliminate. This is a familiar phenomenon from political discussions and even personal relationships, and given the impact that it can have on our ability to use language to exchange ideas or learn about our world, an important topic for philosophers and linguists to grapple with.

5.3.3   Multimodal Interactions

As hinted at in the discussion of (26) and (27), complex discourse structures can also be employed to model multimodal discourse. Let's return to example (26), repeated here as (31):

(31)   a. Julie: It's time to go to bed.
       b. Rose: OK, good night.
       c. [Rose goes to bed.]

The exchange in (31) culminates in a nonlinguistic event of Rose going to bed, but with a young child who still needs guidance, successfully getting her to go to bed would likely involve multiple multimodal exchanges along the way. (32) offers one such example:

(32)   a. Julie: It's time to get your pyjamas on.
         b. [Rose puts on her pyjamas]
         c. Julie: OK. Now let's go brush your teeth.

In (32), the event of Rose putting on her pyjamas contributes semantic content to discourse in much the same way as (33b) does in (33):

(33)   a. Julie: It's time for a snack.
         b. Rose: I'd like some applesauce and cookies.
         c. Julie: OK. Now go wash your hands.

Rose's response in (33b) contributes a discourse unit that plays a central role in discourse development; were we to take it out, the remaining discourse would be infelicitous in part because there would be no answer for Julie to acknowledge in (33c) and in part because there would be no concluded event to license the discursive use of *now*, which indicates that the speaker is moving from one eventuality to another in a sequence. In this case, *now* is licensed because the discussion about a snack has been concluded and it is time to move on to the next topic.[19] Similarly, in (32), we need to understand the nonlinguistic event in (32b) as contributing propositional content that can serve as an argument to a discourse relation. It is this event, and more specifically the event together with semantic content that is understood to describe it – that licenses the Acknowledgment marked by *OK* and makes it possible to close off the pyjama discussion and move on to teeth-brushing via an instance of the relation Sequence, whose second argument is *Now let's go brush your teeth*.

Given the claim laid out in Section 5.2 that pronoun resolution is guided by reasoning about discourse relations and structure, we should expect reasoning about the discursive role of nonlinguistic eventualities to influence demonstrative reference as well. Suppose that the exchange in (32) continues with (34):

(34)   a. [Rose starts toward the bathroom]
         b. Rose: Wait!
         c. [Rose goes back to her bed, grabs her teddy bear, and then heads back to
            the bathroom]
         d. Rose: [looking up at Julie] He needs to brush his teeth too.

In (34d), *he* will clearly refer to the teddy bear. At first glance, this might not sound so surprising – of course third-person pronouns can be used to refer to entities in the nonlinguistic context. But there is a lot more going on here than demonstrative reference. For one thing, Rose need not point to her bear or even look at him to get the demonstrative reference to work. In addition,

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[19] While we do not have space here to discuss the behavior of *now*, we note that another interesting area of research on the semantic effects of discourse structure focuses on the discourse-sensitivity of *now* (and its analogues in a variety of languages). See, for example, Stojnić and Altshuler (2021); Anand and Toosarvandani (2019); Hunter (2012).

understanding the relation between (34d) and the nonlinguistic events described in (34c), and how this interaction contributes to the interpretation of the larger interaction between Julie and Rose requires more than understanding to whom *he* refers. Rose is not merely saying that her teddy bear needs to brush his teeth; she is *explaining why she is taking him to the bathroom*. This Explanation relation is crucial in the context: we can easily imagine a different scenario in which Rose goes back to get her bear because she suddenly remembered that she forgot to give him dinner and now wants to go feed him. This scenario is likely to get a negative reaction from Julie. In explaining her actions as she does in (34d), she shows that she understands that it's time for teeth-brushing and that she is cooperating with Julie's discourse goal, making her more likely to get a positive reaction. The fact that she is explaining her previous action also explains why she doesn't need to go to any further trouble to make the bear salient. The entire sequence of events in which she went to get him and then started walking with him in her arms is salient, and he is a central figure in that sequence of events (cf. Stojnić et al. 2013).

The important point is that nonlinguistic eventualities do not only influence the *interpretation of a linguistically expressed discourse unit*, as entities picked out through deixis do; they can actually contribute *entire discourse units*, and they can do so without being picked out by any kind of referential expression (Hunter et al. 2018). This means that contents contributed by nonlinguistic events need to be taken into account in models of discourse structure – a difficult task given that nonlinguistic events are parts of the actual world and not just denotations of speech acts. This also means that they might impact discourse development. In fact, Hunter et al. (2018) argue that non-linguistic eventualities do not contribute to the RF in the way that linguistically expressed contents do and thus have different effects on salience (cf. the concluding discussion of Simons 2019, comparing implicated content and explicit content).

Moreover, the top-down effects of multimodal discourse go beyond the interpretation of deictic or temporal expressions in a clause: given that in multimodal conversation, a nonlinguistic eventuality can contribute an entire discourse unit in the absence of any linguistic description of that event, reasoning about discourse relations and structure can determine an entire event-level content. The event in (32b) might be conceptualized differently in a different context, for instance; we might rather think of it as an event in which *Rose changes out of her dirty clothes* or simply, *Rose changes clothes*. But in the context of (32), these other conceptualizations will not do: Julie must understand the event as one in which *Rose changes into her pyjamas* because only that kind of event will satisfy Julie's request in (32a). A related point is that there are multiple ways of grouping and describing the events that take place in (32b). While all of the actions involved in (32b) were grouped

together under the description *Rose puts on her pyjamas*, in another context, it might have been more pertinent to focus on some part of this larger event, e.g. *Rose put on her pyjama top*.

This discussion highlights an aspect of multimodal discourse that makes it very difficult to study systematically. The nonlinguistic context consists of a potentially evolving stream of information that must be decomposed into discourse-unit-level segments according to discourse purposes, but there is nothing like grammatical structure or intonation to suggest segment boundaries. And even if we determine such boundaries, individuated eventualities must be assigned semantic contents. The difficulty of assigning content to nonlinguistic eventualities makes studying either direction of information flow – bottom-up or top-down – a daunting task.

Work by Lascarides and Stone (2009a, 2009b) has made some important first steps to understanding how discourse structure and interpretation can guide the conceptualization or description of nonliguistic events by focusing on the interaction of discourse and coverbal gesture. Their research also reveals, however, that coverbal gesture illustrates yet a different kind of discursive interaction from either those observed between purely linguistically expressed discourse units or those observed above in (32) and (34). On the one hand, while coverbal gestures are nonlinguistic, they exhibit a kind of dependence on linguistic content that is not observed with contributions like that of (32b) in (32): similar to appositive relative clauses and the embedded clauses of discourse parenthetical reports, coverbal gestures are introduced into the discourse context in conjunction with another discourse unit through a complex update. On the other hand, coverbal gestures affect discourse development in ways that call for a radically different notion of the RF, and even of discourse graphs, than described in Section 5.2 for linguistic content.

5.4   Looking Ahead

The foregoing discussion raises a variety of questions that will be important to future research on discourse structure and interpretation. First, what is the relation between discourse relations and Questions Under Discussion (QUDs)? While our main focus has been on discourse relations, QUDs have become a popular tool among formal semanticists for diagnosing the presence of utterance-level phenomena that semantically depend on the incoming discourse context. Much of this work centers on very specific types of discourse dependencies, such as focus structure, which have not been at the center of attention in work on discourse relations, and so might be seen as complementary. Some linguistics have posited that QUDs actually play a more fundamental role in determining salience and driving discourse development, however, and that discourse relations are derivative of them (Roberts 2012),

while others have argued against such a position (Hunter & Abrusán 2015). Regardless of how this debate turns out, there are good reasons to think that there is something interesting to be said about the interaction between discourse relations and questions. Let's return to (5), repeated here as (35).

(35)   a. What are you going to do downtown?
        b. Ugh I'm so mad! My brother lost my copy of *The Watchmen*, and I need to reread it for class. I'm going to the bookstore.

In addition to the relations at work, the speaker of (35b) seems to be answering an implicit question of why a trip to the bookstore is necessary. How does either a discourse structure or QUD account handle this example? And what are the effects for the theory of discourse goals presented in this chapter if part of what drives discourse development is left implicit?

Another ongoing discussion that will continue to be important for future study concerns how to make more precise predictions about discourse attachment. The RF determines a set of nodes available for discourse attachment, but it cannot help predict for a given incoming discourse unit which node on the RF will be the best choice. By adding information about, say, prosody, or different kinds of constructions (such as appositives), or lexical facts, we might be able to say more. Following Hirschberg and Pierrehumbert (1986)'s attempt to link discourse structure and relations to the interpretation of prosody, researchers in SDRT have examined links between questions, prosody and discourse structure (Asher & Reese 2007; Reese 2007; Reese & Asher 2007), but there is much, much more to explore.

The discussion in Sections 5.2 and 5.3, however, highlights three significant features that will complicate efforts to answer these questions and to systematically study discourse structure in general. First, because background beliefs and discourse goals add a highly subjective element to discourse interpretation that can be hard to pin down and eliminate, any efforts to use experimental or survey data to study discourse-sensitive phenomena have to be very careful to control contextual elements that could influence interpretation. When it comes to judgments about discourse, the question is not only whether a certain discourse structure is acceptable, but what relations are at work in that structure. If two speakers disagree in their judgments, it could be that they disagree about the acceptability of the very same discourse structure, but it could also be, especially if a lot of context is left implicit, that they imagined different discourse contexts or inferred different discourse goals and thus interpreted the discourse differently.

A second hurdle is that providing an analysis of conversation that takes place in a shared perceptual environment will require modeling relations between linguistically expressed discourse units on the one hand and contents assigned to nonlinguistic actions, events and states, on the other. But as we

have seen, individuating nonlinguistic eventualities is not a straightforward task, nor is specifying their semantic contents. The way in which discourse structure and interpretation guides the conceptualization of nonlinguistic eventualities, and vice versa, is still very much an open question.

Finally, developing an analysis of discourse-sensitive phenomena often requires considering extended discourse structures, not just pairs of discourse units, as some phenomena only develop over multiple discourse moves. The relation between the NAI content in Wesley's move in (28b) (*You think your dearest love will save you?*) and his discourse goal, for example, would not have been apparent had we only considered that move together with (28a) (*He [Humperdink] . . . can find a falcon on a cloudy day, he can find you!*). Nor does the fact that both discourse units in a discourse parenthetical report can be backward-looking AI come out if we only consider the report and one preceding discourse unit. Even the effects of the RF are hard to test if we only consider two or three units.

When developing accounts of linguistic phenomena in formal semantics and philosophy, the standard tool of choice is the minimal pair. Approaches to modeling intersentential phenomena extend this to looking at minimal pairs of pairs. Tests for forward-looking at-issueness, for example, tend to apply the "that's not true!" test to a given example and then apply the "wait" (or "hey, wait a minute!" (Von Fintel 2004)) test to the same example. Similarly, backward-looking at-issueness is often diagnosed with question–answer pairs. Such diagnositic tests are very useful for showing the *existence* of discourse sensitivity and can shed light on some minimal aspects of discourse structure, as in the case of Simons (2019)'s experiments that support the view that indirect speech reports always contribute two discourse units. But the complexity of discourse structure and the subjectivity of discourse interpretation make these tools inapt for developing explanatory accounts of discursive phenomena. For this, we need discourse examples complicated enough to show the full behavior of the phenomenon in question and also to limit the influence of contextual factors. By embedding a target discourse structure inside of a larger discourse structure, we can better control the background context in which the target structure is interpreted and limit the direction in which an interpreter can expect the discourse to develop.

Extended, natural sounding discourses are difficult to invent, however, and much work on discourse structure and interpretation has heavily relied, and will continue to rely, on the annotation of corpora (see also Abrusán's discussion of the need for corpus data in this volume). Deep learning approaches, or other machine learning methods designed to entirely bypass annotation, have not been successful at learning discourse structure – the lack of good training data, the sparsity of positive attachments in any given data set, and the presence of long-distance attachments makes the task particularly difficult.

Of course, corpus annotation comes with its own set of well-known problems. It is incredibly time consuming, first of all, and requires annotators who are ready to think carefully about how to most reasonably represent the content of a given discourse, which usually requires a level of experience that makes finding reliable annotators difficult. To further complicate matters, discourse structure often contains long-distance dependencies, where a discourse unit π_n is attached to a discourse unit that was produced many steps back rather than to the discourse unit π_{n-1} that was expressed immediately prior to π_n. This means that you cannot simply divide a discourse into chunks of three or four units and pass them out to different annotators or appeal to crowdsourcing if you want to get good annotations.

For these reasons, future work on discourse structure is going to have to get creative, especially for studying multimodal discourse. Recent attempts to apply distant supervision methods to produce automatic discourse annotations on chat discussion are very promising (Badene et al. 2019a, 2019b). Hopefully, future work will prove the general applicability of these methods to other types of discourse so that we can make the systematic study of discourse structure as accessible as the study of more local semantic phenomena has been.

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6   Narrative and Point of View

Pranav Anand and Maziar Toosarvandani

> We have defined a story as a narrative of events arranged in their time-sequence. A plot is also a narrative of events, the emphasis falling on causality. "The king died and then the queen died" is a story. "The king died, and then the queen died of grief" is a plot. The time-sequence is preserved, but the sense of causality overshadows it . . . Consider the death of the queen. If it is in a story we say "and then?" If it is in a plot we ask "why?"
>
> (Forster 1927: 30)

6.0   Questions and Answers

(1)   Why do you think both linguists and philosophers find narrative and point of view interesting?

Questions about narrative structure, and discourse structure more generally, ultimately concern whether there are linguistic representations beyond the sentence level, an issue of import to linguists working at the semantics–pragmatics interface, as well as to philosophers of language. The question of modes of discourse goes back to at least Plato, with implications for philosophy of mind if narrative text is delimited in some way, to say nothing of how it is delimited (e.g. by relationship to time, event ontology, or causality). At the same time, issues of point of view in natural language interpretation have loomed large, in both linguistics and philosophy, across several empirical domains. In this chapter, we introduce a puzzle involving an interaction between how tenses and predicates of personal taste (PPTs) are used in narrative discourse. After pinning down which notions of point of view are sensible in these domains, we develop a solution that may help us understand larger architectural questions about narrative structure.

(2)   What recent developments in linguistics and philosophy do you think are most exciting in thinking about narrative and point of view?

Recent relativist treatments that split utterance and assessment times have provided new tools for understanding the core properties of PPTs (MacFarlane 2014). These have also provided useful for tackling certain

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puzzling tense uses (Schlenker 2004; Sharvit 2008; Anand & Toosarvandani 2017, 2018, 2020; Bary, this volume). We believe the additional degrees of freedom afforded by relativism offers a framework for attacking the puzzle in this chapter and enables an understanding of the interaction between tense and PPTs that is more nuanced than would have been possible before.

(3) What do you consider to be the key ingredients in adequately analyzing narrative and point of view?

Relativist semantics for tense and PPTs are necessary ingredients for solving the puzzle introduced in this chapter. But a theory of narrative structure is needed, in addition, that yokes together the point of view encoded in these two domains. We offer the beginnings of such a theory grounded in the pragmatic conventions underlying the narrative genre. Building on the results from the psychology of collaborative storytelling (Edwards & Middleton 1986) and from discourse analysis (Labov & Waletzky 1966), this theory provides a top-down structure for narratives, in which events are described from a unitary perspective.

(4) What do you consider to be the outstanding questions pertaining to narrative and point of view?

One set of questions involves the appropriate formalization of the theory of narrative structure offered. What is the appropriate formal framework for encoding perspective in narratives so that it interfaces appropriately with the intentions and expectations of the speaker (author) and hearers (readers)? How does this framework relate to other formal discourse models (based in, for instance, questions under discussion or discourse representation theory)? A more explanatory question is also relevant here: why is narrative structured in the way it is and not another way?

Another set of more specific questions has to do with the semantics for tense and PPTs. While we advance relativist semantics for both kinds of linguistic expressions, much remains to be understood. For tense: Is the temporal perspective encoded by present and past tense in English shared by their correlates in other languages? How is the point of view represented in so-called "narrative" tenses related to the notions introduced in the chapter? For PPTs: How is the judge for these expressions determined in narratives, and how might this underlie judge selection in other discourse genres? To what extent do related expressions (e.g. epistemic modals) track PPTs in narratives or require distinct perspectival-taking mechanisms?

6.1 Setting the Scene

As any reader of a novel or short story knows, the events in a narrative can be described in more than one way. The point of view, or perspective, can

shift many times in the course of even a single narrative, sometimes from one sentence to another. When theorists use terms like "point of view" or "perspective," though, they may have different ideas in mind. In many cases, point of view is meant *logically*, to represent an implicit argument or parameter necessary for the evaluation of a relational predicate, as is sometimes invoked for positionals like *left* and *behind* or the temporal landmark for tense. In other cases, the term is meant to invoke something more cognitive or experiential, such as the epistemic or evaluative state of some salient protagonist, or the embodied experience of a situation (as in the inside–outside distinction discussed in work on mimesis, e.g. Vendler 1982; Walton 1990; Recanati 2007).

While undoubtedly all these perspectival notions are constituents of the aesthetic effect of a narrative, from the point of view of philosophy of language and formal semantics the central questions are about how such categories intersect the structure of natural language: Are there forms or constructions that privilege particular kinds of perspective? Do these forms or perspectives interact? And how do they connect with what makes narrative genres so apparently replete with perspectival switching?

In this chapter, we explore these questions by examining a previously undiscussed interaction between temporal perspective, in the form of the *historical present*, and evaluative perspective, in the form of *predicates of personal taste*. By historical present, we mean the noncanonical use of a present tense to describe a past event (see also Bary, this volume) and exemplified below.

(1)　　If the funeral had been yesterday, I could not recollect it better [. . .]Mr. Chillip **is** in the room, and **comes** to speak to me. "And how is Master David?" he **says**, kindly. I **cannot** tell him very well. I **give** him my hand, which he **holds** in his.　　　　　(Dickens, *David Copperfield*)

While the historical present clearly changes the logical perspective for tense, it is often claimed to do more, giving the effect that the narrator, the reader, or both are witnessing events before their eyes. It is, thus, a fitting vehicle for exploring how logical perspective shifts may coincide with other notions of point of view.

Our puzzle starts from one of the central issues in the literature on predicates of personal taste (PPTs): disagreements involving individual-standard-dependent predicates like *delicious* or *fun* seem to be *faultless* (Kölbel 2003), that is, they have no clear fact of the matter. Consider the following toy dialogue:

(2)　　[A and B are tasting a bottle of cider at an apple orchard.]
　　　　A:　This cider is delicious!
　　　　B:　No, it's not delicious.

Intuitively, what is delicious to A here need not be delicious to B, and this is sufficient to allow neither A nor B to be making a mistake despite their seemingly contradictory beliefs.

There is little reason to think this kind of perspective-taking has much to do with what an author does by deploying the historical present. And yet, the two interact, as can be seen by embedding the disagreement above in a joint oral narrative like (3), where A and B together describe a shared experience.

(3)   C: [talking to A and B] How was your vacation?
       A: Well, after we arrive in Paris, we take a bus to the Normandy coast. We visit an apple orchard.
       B: They have their own cider. It's delicious!
       A1: No, it **is**n't delicious.
       A2: No, it **was**n't delicious.

In this context, the faultlessness canonically associated with PPTs varies with the tense of A's response. If A uses the simple past, as in the A2 response, the sense of faultlessness can persist. However, if A uses the present tense, as in the A1 response, the disagreement never seems faultless: either she or B has made a mistake about the taste of the cider at the orchard. In short, A can only disagree faultlessly by using the past tense.

The solution to this puzzle, we will advance, lies in the pragmatic conventions that shape the narrative genre. To motivate these conventions, we will draw on the literature on joint oral narratives within psychology. A key empirical generalization comes from Edwards and Middleton's (1986) seminal study of collaborative story telling. They show that the participants engaged in such enterprises are strongly motivated to collaboratively construct a story line. However, after a consensus version of what happened has been reached, participants are free to (faultlessly) share their own take on the significance of those events to themselves or others. We take this perspectival structure to characterize narratives in general, a generalization which we state as follows:

(4)   **Narrative Perspectival Generalization (NPG):**
       Assertions in the *complication* of a narrative are all evaluated relative to the same perspective. Assertions in the *evaluation* are evaluated relative to speakers' own perspectives.

In framing this generalization, we draw on Labov and Waletzky's (1966) theory of narrative structure. This foundational work within the linguistic discipline of discourse analysis includes a place, not just for a sequence of event descriptions, what Labov and Waletzky call a *complication*, but also for some component conveying the significance of those situations to conversational participants, what they call an *evaluation*. While a unitary perspective is enforced in the complication, speakers' perspectives are permitted to diverge when the broader significance of these events is being considered in the evaluation.

The puzzle in (3) forms the empirical foundation for the NPG, whose effects might be hard to discern in single-authored written narratives. We argue that those effects are revealed in such joint oral narratives, where there are multiple speakers whose points of view can, in principle, diverge. However, a linguistic theory of this contrast, involving tense and PPTs, needs more than just this empirical generalization. It requires a formal system that can represent the pragmatic principles underlying narrative structure in such a way that they meaningfully interact with the semantic theories of the relevant phenomena. The existing theories of discourse structure within formal semantics, reviewed by Bary, Hunter and Thompson, and Pavese (this volume), make nontrivial claims about the point of view invoked by grammatical and lexical aspect, but they do not enable an understanding of the interaction between tense and appraisal. We instead turn, in Section 6.2, to Roberts's (2012) notion of a *strategy of inquiry*, a sequence of questions representing the conversational goals of a discourse that directs the contributions that participants can make. We offer a way to encode the division between complication and evaluation, along with the perspectival limitations these come with, in a strategy of inquiry for narratives.

To connect this theory of narrative structure to the contrast in (3), we introduce a semantics for PPTs in Section 6.3. First, we survey *contextualist* and *relativist* approaches, aiming to uncover their respective understandings of faultless disagreement. We adopt a relativist approach, in which the notion of propositional content is revised to include a place for a perspective point (Kölbel 2003; Lasersohn 2005; MacFarlane 2014). While there are substantive differences amongst relativist accounts, they all attribute faultlessness to *heteroperspectival* appraisal – evaluation relative to distinct perspectives – while nonfaultless disagreement arises from *homoperspectival* appraisal – evaluation relative to a single perspective. Ultimately, we build our account on MacFarlane's bicontextual semantics for PPTs, where the relevant perspective point is a parameter, not in the context of utterance, but a context of assessment.

To derive the contrast in (3), a semantics for tense is also required. A recent line of work, which we discuss in Section 6.4, has sought to capture certain unexpected tense uses, including the historical present, by deploying a bicontext (Schlenker 2004; Sharvit 2004, 2008; Eckardt 2012; Anand & Toosarvandani 2017, 2018, 2020). In our extension of Sharvit's bicontextual semantics of tense, present and past tense describe reference time intervals relative to the time of the assessment context. With both PPTs and tense sensitive to the context of assessment, albeit to different parameters, a path to the solution for our puzzle opens up. The NPG can be cashed out as a requirement, encoded in a strategy of inquiry, that the complication of a narrative be evaluated from a unitary context of assessment. In a nutshell, the present tense leads to nonfaultless disagreement

when it describes past events, as in (3), because its semantics tightly binds the temporal location of an event to the contextual parameter relevant for appraisal. The past tense permits a distal temporal point of view on the events described, and so it is compatible, outside of complications, with appraisal involving past events from present perspectives.

It is important to point out that, while the past tense can be used in (3) to disagree faultlessly, it does not have to be. The simple past in English permits faultless disagreement, though a speaker can also use it, like the historical present, to disagree nonfaultlessly. In Section 6.5, we explore this flexibility, tying it to the broader distribution of past tense forms in narrative. While the historical present is restricted to complications, the simple past can be used throughout a narrative (Wolfson 1979: 171–172; Schiffrin 1981). We revise the existing semantics for past tense to enable this flexibility, engendering a new perspective on the crosslinguistic variation in tense usage.

6.2   The Structure of Narratives

We can start with what a narrative is. A narrative can be transmitted in a written form (e.g. *David Copperfield*) or orally (e.g. Aesop's fables or the Panchatantra before they were committed to paper). The events described can be part of an imagined world (a novel) or the actual one (a biography). And for oral narratives, these can be narrated by just a single speaker or jointly by more than one person, as (3) is.

Despite these differences, all narratives describe events, the individuals participating in them, and where these events and individuals are located in time and space. There is no necessary correspondence between how these elements are structured within the story world (what narratologists call the *fabula*) and how they are described in the narrative (the *syuzhet*). Mismatches between them could in principle involve any aspect of an event or individual that can be described. But, temporal correspondences between the story world and narrative are particularly salient, perhaps due to the important role that events play in scaffolding our understanding of a story.

Since the sequence of descriptions in a narrative is dictated entirely by the act of speaking or writing, the temporal ordering of events in a story world, whether imagined or real, must be inferred by hearers and readers. A narrative can describe a sequence of events iconically in a forward-moving fashion through *narrative progression*, as in (5a). Or, the temporal order can fail to correspond to the narrative order, with events temporally overlapping or even inverted through *backshifting*, as in (5b).

(5)   a. Max stood up. John greeted him.
         b. Max fell. John pushed him.

It is these temporal mappings which have primarily animated formal semanticists' investigations of narrative. The theories they have developed can be divided between two main approaches: *reference time theories* and *discourse coherence theories*. We review these briefly below, though reference time theories are discussed further by Bary (this volume) and discourse coherence theories by Hunter and Thompson (this volume) and Pavese (this volume).

To make progress on our puzzle, we will argue for a theory of narrative which, unlike reference time or discourse coherence theories, encodes the goals of narrative production. We will review certain empirical generalizations from discourse analysis and psychology that will allow us to begin to understand what the speakers in narratives, both monologic and dialogic, are aiming to do. And these generalizations, once constituted as pragmatic conventions of the genre and formalized in the question-under-discussion framework (Roberts 2012), will provide a path to understanding how the historical present can be deployed in a narratives, and how this leads to a lack of faultlessness with PPTs.

6.2.1   *Formal Semantic Treatments of Narrative*

While formal semanticists have investigated the temporal properties of narratives, developing theories to account for them, they have not necessarily aimed for a theory of narrative.

Reference time theories, for instance, have a relatively restricted scope, seeking primarily to derive the temporal inferences in a narrative from how tense finds a referent in the discourse (Partee 1984; Dowty 1986; Hinrichs 1986; Webber 1988; Caenepeel 1989), as in an anaphoric theory of tense (Partee 1973). Within many of these theories, the variability in temporal relations is traced to lexical and grammatical aspect. The first two sentences of (6), for instance, are understood as taking place one after another, because they are eventive. By contrast, the last two sentences in (6) are interpreted as temporally overlapping the preceding sentences, since they are stative.

(6)   He went to the window. He pulled aside the soft drapes. It was a casement window. Both panels were cranked out to let in the night air. (after Hinrichs 1986: 67)

Reference time theories might seem, at first, well furnished to solve the puzzle posed by (3), given the deep connection they posit between narrative structure and tense. However, their notion of perspective is not particularly well-suited to handle a contrast in faultlessness.

Reference time theories assume a single narrator's perspective, with the narrative representing their beliefs about the temporal order of events (even if this order is also reflected in the perceptions of a protagonist, as Dowty and Caenepeel contemplate). These theories thus posit a relatively slight formal

machinery that includes no explicit place for the speaker-author. But this simplification also prevents these theories from extending to joint oral narratives, like the one in (3), which have more than one speaker. If the possibility or impossibility of faultless disagreement with PPTs depends on the individualistic perspective inherent to appraisal, then these individuals and their perspectives must find their way, somehow, into the structure for a narrative.

The goals of discourse coherence theories are, by contrast, more general, aiming to uncover the principles that organize texts of all types (Halliday & Hasan 1976; Hobbs 1979, 1990; Mann & Thompson 1988; Lascarides & Asher 1993; Kehler 2002; Asher & Lascarides 2003). They posit an inventory of primitive *coherence relations* between sentences, containing temporal information as well as other kinds of information (e.g. causal, spatial), as described by Hunter and Thompson (this volume) and Pavese (this volume). The temporal inferences between sentences in a narrative come from which coherence relations are inferred, rather than being rigidly tied to the aspectual properties of the sentences. When no coherence relation can be inferred, a discourse is infelicitous, as in the defective narrative in (7): it is simply not clear why these events are described in the way they are.

(7)   ? My car broke down. The sun set.   (Lascarides & Asher 1993: 463)

Discourse coherence theories have more room, in principle, for developing an account of the faultlessness contrast in (3), since they aim for a general understanding of why texts cohere. In general terms, the historical present would only be coherent when deployed in a joint narrative if the perspective taken precludes the possibility of faultless disagreement. Since coherence, or the lack thereof, depends on the specific inventory of coherence relations adopted, as well as a calculus for combining them, saying something about faultlessness disagreement would require that discourse coherence theories make reference in some fashion to the primitives underlying faultlessness.

While it may be possible to enrich a discourse coherence theory like Segmented Discourse Representation Theory (Asher & Lascarides 2003) in this way, we pursue a different path here. A core property of narratives relevant for our puzzle, we believe, involves what speakers are trying to do when they describe a sequence of events. This intentional structure suggests a top-down organization for narratives, which we formalize within Roberts's (2012) *question-under-discussion* framework. This is, in principle, compatible with an analysis of narrative in terms of discourse coherence, with the intentional structure being layered onto the network of coherence relations connecting a narrative.[1]

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[1] To this point, various rapprochements between question-under-discussion and discourse coherence theories have been attempted (Roberts 2016; Hunter & Abrusán 2017; Kamp 2017).

6.2.2   *Toward a Theory of Narrative Structure*

In the question-under-discussion (QUD) framework, questions represent the goals of conversational participants (see Westera this volume). For a typical information-seeking exchange, the goal might, for instance, be to answer the question *What is the way things are?* These questions, which represent the shared goals of speakers and hearers, can be introduced explicitly, signaled covertly through prosody or other linguistic means, or just inferred. Both conversational participants' contributions and their expectations about these contributions are involved in inferences about the question under discussion.

As Roberts points out, no discourse comprises answers to some randomly selected set of questions. Conversational participants work together in a systematic fashion towards reaching their final goal. She proposes that a *strategy of inquiry* is the way they do this: it comprises the QUD that is the discourse's overall goal, along with a sequence of other QUDs that they plan to use to answer it. It is possible, we think, to characterize narrative in terms of a conventionalized strategy of inquiry. In other words, what goes wrong in a defective narrative like (7) is that we, as readers, cannot infer a suitable strategy of inquiry based on just the two sentences provided.

What might this strategy of inquiry be? Labov and Waletzky (1966), in their influential analysis of oral narratives, show that these are conventionally divided into several parts, illustrated by the narrative below. After an initial *orientation* (8a), the *complication* describes the main series of events (8b); this is always accompanied by an *evaluation*, which conveys the broader significance of these events (8c). (These can be followed by a *resolution*, and then a *coda*.)

(8)   a. [. . .] We were all going out for lunch // it was our birthdays // and we were C.I.T.'s // so we were allowed to.

b. We borrowed someone's car // and we got BLOWN OUT. [. . .] So we asked some guy // t' come over an' HELP us. // So he opens the car // and everyone gets out except me and my girlfriend. // We were in front // and we just didn't feel like getting out. // And all of a sudden all these sparks // start t' fly. // So the girl says, // 'Look, do you know what you're doing? Because y' know um . . . this is not my car // an' if you don't know what you're doing, // just don't DO anything.' // And he says, //'Yeh, I have t' do it from inside.' // And all of a sudden he gets in the car, // sits down, // and starts t' turn on the motor.

c. We thought he was taking off with us // We really thought- h- he was- // he was like real- with all tattoos and smelled- an' we thought that was it! hhh // But he got out hhh after awhile. I really thought I was gonna die // or be taken someplace far away. It was so crazy, // because we couldn't call anybody. // It was really funny.   (Schiffrin 1981: 47–48)

Formal semanticists have been primarily interested in the complication, which is comprised primarily of event descriptions with an iconic temporal ordering. Changing the order of the sentences in this *narrative spine* changes their temporal order, though the complication can also contain additional *satellite* material that is not temporally ordered relative to the narrative spine.

Labov and Waletzky argue that the evaluation is just as integral to the construction of a coherent narrative as the complication. It assigns an external significance to the events described in the story world. They identify two ways in which evaluations can be realized in narratives. In (8), the evaluation is *external*: it is a distinct textual segment following the complication, in which the speaker exits the story world, characterizing the events contained within it for the hearers. They suggest an evaluation can also be integrated into the complication itself. In such an *internal* evaluation, the event descriptions themselves give significance to the story, making its point clear. They can do this relatively indirectly, by inviting the addressee to infer the importance of those events on their own, rather than telling them directly.

Building on these empirical generalizations, we suggest that narratives are the product of a conventionalized strategy of inquiry, an initial version of which we state in (9): the questions it contains correspond to the different components of a narrative identified by Labov and Waletzky.

(9)   **Narrative Strategy of Inquiry (NSI; initial version):**
        A narrative is the product of a strategy of inquiry to answer a QUD, which contains at least the question *What is the way things are (in the story world)?*

The evaluation emerges from answering whatever QUD the entire strategy of inquiry is dedicated to resolving. This must involve some sequence of event descriptions, a requirement that is encoded by having one of the questions in the strategy be *What is the way things are (in the story world)?* There might be any number of substrategies for answering this question depending on the complexity of the complication. For the forward-moving sequence comprising the narrative spine, the substrategy might be: *What happened first? What happened second? . . .*; for satellite descriptions, the substrategy might include questions like *What was it like then?* or *Why did that happen?* (see also von Stutterheim & Klein 1989; van Kuppevelt 1995; Onea 2016; Velleman & Beaver 2016; Kamp 2017; Riester 2019). If the evaluation is internal, this might be all that the strategy of inquiry for a narrative contains. But if the evaluation is external, there will need to be additional questions, possibly organized in substrategies of their own, explicitly relating the events described to the highest-level QUD.

Under this view, the problem with the defective narrative in (7) is that the QUD at the root of the entire strategy of inquiry cannot be inferred based solely on the information that is provided. It is clearly possible to understand how the two sentences are related to one another in order to answer the question *What*

are the way things are? But without saying more, it is simply not possible to understand what higher-level QUD this is directed toward answering. For the NSI to be explanatory, actual narrative strategies of inquiry have to be more restrictive than this schematic one. It should be pointed out that there is, in general, no problem with two-sentence narratives,[2] as the invited six-word science fiction stories in (10)–(11) from *Wired* magazine demonstrate.[3]

(10)   Corpse parts missing. Doctor buys yacht.   (Margaret Atwood)
(11)   Easy. Just touch the match to   (Ursula K. LeGuin)

Based on our knowledge about who the authors are and the context in which these stories are presented, we can infer the QUDs these narratives are dedicated to answering. Klauk et al. (2016) suggest that, for (10), this is *Who did it?*, the conventional goal of a whodunit detective story. The inference involved here is clearly complex, and Klauk et al. observe that we probably cannot even arrive at this conclusion until after reading both sentences in the narrative.

   The short narrative by Ursula K. LeGuin illustrates a different point about what is, and is not, required in a narrative strategy of inquiry. The events described need not reach any sort of intuitive finality, what in literary studies is called *narrative closure*. In (11), events are, in fact, described only incompletely for humorous effect. Carroll (2007: 4) treats narrative closure informally as a sensation that arises "when all of the questions that have been saliently posed by the narrative get answered." Klauk et al. make clear that the questions that must be answered for narrative closure to arise are only those that "have the plot . . . as an object" (p. 45). If we take these, roughly, to resolve the question *What is the way things are (in the story world)?* in the NSI, it is clear then that this strategy does not require that a narrative provide a "complete" description of events in any sense. What the NSI does require, however, is what Klauk et al. refer to as *tellability closure*, the sense that the narrative has a point. They refer to Labov and Waletzky's observation that oral narratives always have an evaluation. This requirement is encoded in the NSI, since a strategy of inquiry's aim, in Roberts's sense, is to answer a given QUD. So, while narrative closure may not be required, depending on what questions are in the strategy of inquiry, the presence of an evaluation, which gives rise to tellability closure, is necessary for a narrative to be complete.

   The NSI is, by design, somewhat schematic. It is silent about the relationship between the question that is answered in the complication and the higher-level QUD the entire strategy is dedicated to. This freedom is needed to capture the wide variety of functions that narratives serve. A speaker may describe some

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[2] For the following discussion, we are indebted to an anonymous reviewer for referring us to Klauk et al. (2016), which insightfully discusses several of the topics we consider.

[3] "Very short stories," *Wired*, November 1, 2006. www.wired.com/2006/11/very-short-stories/ (accessed May 11, 2020).

sequence of events to convey something about who they are, as in a personal anecdote. Or, a narrative may be used to convey a prescription that the hearer-reader should follow, as in Aesop's fables. In origin myths, the narrative serves to explain why the world is the way it is within a given ideological or belief system. In the fictional written narratives in (10)–(11), their goal is circumscribed by the relatively narrow conventions of specific literary genres (a whodunit or thriller). Given the wide-ranging goals of narratives, it seems only appropriate that certain aspects of the NSI are filled in by more specific conventions.

At the same time, there are some necessary characteristics of narratives, which have not been included in the initial version of the NSI in (9). These come from looking at joint oral narratives, which exhibit a particularly interesting combination of properties: they are narrated by more than one speaker, whose individual contributions are easily distinguishable. While joint oral narratives are not, as a genre, attended to much by linguists, they are widely studied in research on human psychological processes, including language development, belief formation, episodic recall, collective memory, well-being, and social identity (see, e.g. Edwards & Middleton 1986; Hirst et al. 1997; Holmberg et al. 2004; Kellas 2005; Ekeocha & Brennan 2008; Pinto et al. 2018). One persistent finding in this literature is that the collaborative nature of these enterprises produces a strong motivation for consensus about the story line. For instance, in Edwards and Middleton's seminal work on the topic, eight acquaintances were asked to recall the plot and memorable episodes of the movie *E.T.* The resulting narrative was analyzed for a wide variety of linguistic markers of dialogue structure, metanarrative negotiation, and social function. Edwards and Middleton note that participants quickly established a routine: first, providing essentially chronological description, frequently in the historical present, and then after this plot outline, engaging in a more free-wheeling, temporally inconsistent sharing of what they found memorable or significant about the film. In other words, participants first collaboratively constructed the complication of the story, interspersed with some evaluative commentary, and then engaged in (external) evaluation. In the complication portion, the motivation for consensus was so strong that it even frequently carried over into negotiations over the evaluative commentary, which included PPTs, so that there was a consensus perspective on those issues as well. In contrast, during the final evaluation, there was far less of this. Participants could share their own private opinions without any negotiation, agreeing to disagree.

Joint oral narratives, it turns out then, hew rather closely to a particular set of pragmatic conventions, stated in (4). The event descriptions in the complication must all be evaluated relative to a single shared perspective. By contrast, contributions in the evaluation are relative to the individual perspectives of speakers, which may coincide or diverge, as the case may be.

(4)   **Narrative Perspectival Generalization (NPG):**
           Assertions in the complication of a narrative are all evaluated relative to the
           same perspective. Assertions in the evaluation are evaluated relative to
           speakers' own perspectives.

While this generalization is motivated by findings about joint oral
narratives, it plausibly characterizes all narratives. Joint oral narratives simply
provide a way of seeing the generalization in a way that is not possible with
other kinds of narratives. They have multiple speakers who can have, in
principle, divergent perspectives. In a monologic narrative, by contrast, where
there is a sole speaker-author, there is only ever a single perspective
to represent.

This means, then, that the NPG should be incorporated into the NSI. We do
this by relativizing different QUDs in the strategy of inquiry to different
perspectives. The highest-level QUD is evaluated relative to the utterance
event, while the subquestion for the complication is evaluated relative to a
salient perspective point that we represent, for now, as ρ.

(12)   **Narrative Strategy of Inquiry (NSI; revised version):**
           A narrative is the product of a strategy of inquiry to answer a QUD **relative to
           the utterance event**, which contains at least the question *What is the way
           things are (in the story world)* **relative to** ρ*?*

This enforces a shared perspective for the event descriptions in the compli-
cation. But contributions directed toward resolving the highest-level QUD will
allow diverging points of view, as these will be evaluated relative to distinct
utterance events, whose speakers and their perspectives may diverge.

6.2.3   Tense in Narratives

The contours of a solution to our puzzle should now be emerging.
Disagreement with the historical present is not faultless in (3) because the
events in the complication of a narrative are described from a unitary
perspective. This attributes the absence of faultlessness, in other words, to
the perspectival properties of narratives. Of course, we still need an under-
standing of how tense and PPTs are sensitive to this particular kind of
perspective-taking, and the remainder of this chapter will establish just this.
Building on recent developments in the formal semantic and philosophical
literatures, we will provide a semantics for tense and PPTs, which makes them
both sensitive to the perspective point invoked by the complication in a
narrative, represented simply as ρ above.

For PPTs, it is more clear what direction this line of inquiry will take, given
their more transparent perspectival sensitivity. For tense, this is perhaps some-
what less obvious. In contemporary theories of tense, which build on the work

of Reichenbach (1947) and Klein (1994), it is commonplace for this grammatical category also to encode a type of temporal perspective. Any tense must minimally locate the reference time relative to a time coordinate that can, at least sometimes, be identified with the "now" of an utterance. Fairly standard denotations are given in (13) for present and past tense (cf. Kratzer 1998: 101).

(13)   a. $[\![\text{PRES}_n]\!]^{c,g} = g(n)$; defined iff $g(n) \subseteq \text{TIME}(c)$
         b. $[\![\text{PAST}_n]\!]^{c,g} = g(n)$; defined iff $g(n) < \text{TIME}(c)$

The present tense locates an eventuality *at* the temporal perspective point, while the past tense locates an eventuality *before* it. Under attitude predicates, this time coordinate is the "now" of an attitude holder (Abusch 1997).

As Bary (this volume) discusses, the relatively simple semantics in (13) confronts a problem with the historical present, which in root clauses does not describe eventualities not located at the time of utterance. In one line of thinking, this variability can be traced to the temporal perspective that is part of the meaning of tense (Schlenker 2004; Eckardt 2012; Anand & Toosarvandani 2017, 2018). Rather than locating the the reference time relative to the "now" of the actual utterance, tense locates it with respect to a temporal coordinate that can be located at the utterance event or float free. Under this view, the historical present arises when it is dissociated from the utterance time, thereby allowing for the description of nonpresent eventualities. It is this temporal perspective point that we will propose is associated with ρ in the NSI in (12).

Some initial evidence in support of this possibility comes from the distribution of the historical present in oral narratives. As Schiffrin (1981) shows, following earlier observations by Wolfson (1979: 171–172), the historical present is essentially found only in complications. In a corpus of 73 oral narratives, she finds *no* occurrences of the historical present in external evaluations or codas, with only a few instances in orientations (3 percent of verbs). The historical present appears almost entirely in complications (on 30 percent of verbs, or 381 out of 1288). In the narrative in (8), too, it appears only in the complication. This distributional restriction has a plausible source in the perspectival properties of narratives. If the present tense can only describe past events when the temporal perspective point at which it locates events is divorced from the utterance event, and if this temporal coordinate is related, in some fashion, to the unitary perspective point present in the complication, then we might expect the historical present to only show up inside complications.

This is admittedly somewhat suggestive so far. We will be returning to the semantics for tense in Section 6.4, advancing a formal proposal based on our own earlier work, that incorporates an additional time parameter. This will serve, as we will see, to explicitly connect the temporal perspective invoked by

the historical present to the appraisal inherent to PPTs. But before we do this, we first need a better understanding of these latter expressions.

6.3   Point of View in Predicates of Personal Taste

The past decade and a half has seen a renewed attention, in both formal semantics and the philosophy of language, to subjective expressions in natural language. There has been a particular focus on predicates of personal taste (PPTs) (Kölbel 2003; Lasersohn 2005): expressions like *tasty* or *beautiful* which, intuitively, describe objects in terms of characteristics that vary from individual to individual. What is tasty or beautiful to one person need not be the same for others, and there are many cases on which there is likely no consensus.

There are three interconnected puzzles that PPTs pose for conventional truth-conditional semantics. First, if the standards for taste and beauty are perspectival, the foundational question is how that perspective is represented. Second, whatever that representation of perspective is, it must be flexible enough to allow people not simply to assert perspectivally-situated claims, as A does in (14), but to also disagree with such claims, as B does.

(14)   [A and B are tasting a bottle of cider at an apple orchard.]
         A: This cider is delicious!
         B: No, it's not delicious.

Intuitively, in the *heteroperspectival* dialogue in (14), A and B are making claims about the cider relative to their own perspectival standards. So it is not clear why this should be construed as a coherent disagreement. Compare this to a parallel dialogue using the expression *local*, which is also intuitively speaking perspectival, though not to a standard of taste, but a locative *origio*.

(15)   A: [in Los Angeles] This cider is from a local farm.
         B: [in New York] No, it's {not from a local farm, from the east coast}.

In contrast to (14), (15) is coherent only if A and B are referencing the same *origio*. If, for example, they reference their different coasts, the polarity particle *no* is not licensed. Given this contrast, PPTs must have some property beyond general perspectival-dependence, which interacts with the pragmatics of dialogue to allow for heteroperspectival disagreements.

This point brings us to the third puzzle, the one of central concern to this chapter. The dialogues in (14) and (15) vary, not only in whether they allow heteroperspectival disagreement, but also in the objectivity of the disagreement. In the case of (15), there does seem to be a fact of the matter that is in dispute: one of the two parties is mistaken. In the case of (14), by contrast, many people report that it allows for instances where there is no mistake: both

parties can be equally correct in their claims. It is this state of the discourse that Kölbel (2003) terms *faultless disagreement*, which he describes as follows:

(16)   A faultless disagreement is a situation where there is a thinker *A*, a thinker *B*, and a proposition (content of judgment) *p*, such that:
         a. *A* believes (judges) that *p* and *B* believes (judges) that not-*p*
         b. Neither *A* nor *B* has made a mistake (is at fault).

The problem, then, is how *A* and *B* can believe what seem to be contradictories without one being somehow in error.

These three questions – how perspective is represented for PPTs, how heteroperspectival disagreements are possible with PPTs, and how heteroperspectival disagreements can be understood as faultless – have led to a rich theoretical landscape (see MacFarlane 2014; Lasersohn 2017 for detailed discussions). For our purposes, it is useful to consider three approaches: *contextualist relativism*, *utterance-sensitive relativism*, and *bicontextualism*.[4] On all three accounts, PPTs are, at least at some conceptual level, dyadic predicates holding of an object and some perspectival component. Suggestive evidence for this position comes from the fact that, in addition to their "bare" uses, many PPTs allow *overt experiencer* phrases such as *to me* or *for her*, which make the perspective explicit (Lasersohn 2005; Stephenson 2007; Bylinina 2017).

6.3.1   Contextualist Approaches

In contextualist approaches, the perspectival component is typically treated as a variable in logical form, akin to a pronoun.[5] In typical usage, this pronominal is identified with the speaker, so that the PPT is interpreted as an assertion from the speaker's perspective, what Lasersohn (2005) calls an *autocentric* use.

Under this account, the logical form of a sentence on an autocentric use varies with the utterer, as does the content of the sentence. To illustrate, the logical forms for A and B's assertions in (14) can be schematized as follows:

(17)   a. PRES the cider be delicious x_2
         b. PRES the cider not be delicious x_9

Pronunciation not withstanding, these two propositions are logically independent. A's assertion is roughly equivalent to *The cider is delicious to A* (if x_2 refers to A), and B's assertion to *The cider is not delicious to B* (if x_9 refers to B).

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[4] There is a long-standing terminological debate in this literature regarding what counts as relativism; see MacFarlane 2014 for discussion. MacFarlane's terms for our approaches is indexical contextualism, nonindexical contextualism, and relativism.

[5] It could also involve an indexical like *I*, a distinction that is not central here.

This makes it possible for them to be simultaneously true, and hence for no fault or mistake to arise on the part of either interlocutor.

However, as Kölbel (2003) notes, contextualism achieves this result without explaining why the dialogue in (14) feels like a disagreement, or why ellipsis and polarity particles (i.e. expressions like *yes* and *no*) are possible in hetero-perspectival disagreements with PPTs but not with perspectival expressions like *local*. More pointedly, as Lasersohn (2005) notes, heteroperspectival disagreements seem markedly worse with overt experiencers.

(18)   A: The cider is delicious to me.
         B: #No, it's not delicious to me.

That overt experiences do not pattern with the implicit perspective of *delicious* is a deep problem for contextualist accounts, since they would naturally receive the same treatment as implicit perspectives.

Thus, while simple contextualism avoids fault in disagreements with a PPT, it leaves unclear how there is even a disagreement in the first place. One response is *group contextualism* (DeRose 1991; Anand 2009; Moltmann 2012; Pearson 2013). It posits that the implicit perspective in these cases belongs to a group containing both A and B (and perhaps others), as illustrated in (19).

(19)   A: The cider is delicious to {us, people like us}.
         B: No, it's not delicious to {us, people like us}.

This dialogue is coherent and is, moreover, construed as a disagreement. However, it accomplishes those goals at the cost of giving up the explanation for faultlessness, since now the contents of A and B's assertions are the same.

The fundamental challenge for contextualist accounts, then, is that the contents of utterances with PPTs contain the perspective point. In reaction to this, a large family of approaches has sought to remove the perspective point from propositional content. In this way, the content of two claims might be directly related (as logical opposites) without giving up faultlessness.

6.3.2   Relativist Approaches

For relativists like Kölbel (2003), Lasersohn (2005), and MacFarlane (2014), propositional content is revised to directly include a notion of perspective, to which some expressions are sensitive. Propositions under this view correspond not to world-time pairs, but to judge-world-time triples. Expressions like PPTs are sensitive to both the judge and world-time coordinates; nonsubjective expressions, like *Californian*, are sensitive only to the world-time coordinates.

(20)   a. $[\![\text{delicious}]\!]^{c, \langle j,w,t \rangle, g} = \lambda x. 1$ iff x is delicious to j in w at t
         b. $[\![\text{Californian}]\!]^{c, \langle j,w,t \rangle, g} = \lambda x. 1$ iff x is Californian in w at t

Thus, as desired, A's and B's assertions in (14) are contradictories (i.e. if one is true at index i the other must be false at i): one predicates that the cider is delicious to the judge of the evaluation index and the other that it is not.

In an intensional logic, the truth of an assertion in context is determined by evaluating the propositional content of the assertion relative to a contextually supplied world, typically the world in which the assertion was made. Lasersohn and MacFarlane both propose that assertions are likewise evaluated relative to a contextually supplied judge. But they differ in what sort of context supplies that judge, and what contextual flexibility exists. For Lasersohn, the context of utterance determines the judge, just as it determines the world of evaluation.

(21)   **Truth in a Context:**
         α is true in context c iff $[\![\alpha]\!]^{c,\langle \text{JUDGE}(c), \text{WORLD}(c), \text{TIME}(c)\rangle, g} = 1$.

Under his approach, the context of utterance crucially negotiates how the truth of judge-dependent material is calculated. In MacFarlane's subtly different view, that task is taken up not by the context of utterance, but the context of assessment, a distinct context whose role is to fix parameters of appraisal and evaluation. For him, then, truth is defined not at a context, but at a *bicontext*.

(22)   **Truth in a Bicontext:**
         α is true at utterance context c_1 and assessment context c_2 iff
         $[\![\alpha]\!]^{c_1,\langle \text{JUDGE}(c_2), \text{WORLD}(c_1), \text{TIME}(c_1)\rangle, g} = 1$.

MacFarlane's goal is to capture a range of behaviors linked to individuals standing in a state of disagreement. To understand his concern, consider how relativist treatments of PPTs handle the coherence of heteroperspectival dis-agreements. We have seen that because judges enter propositional content, it is possible to say that the contents of A's and B's assertions are contradictories. But the same could be said for a temporally-variant proposition. If A says *It is noon*, and then hours later B says *It isn't noon*, there is no sense of disagree-ment. What explains this contrast between judges and times? Without a satisfying answer to this question, it is not clear that relativist treatments improve much beyond contextualist ones in deriving a sense of disagreement. For MacFarlane, the answer comes from the bicontextual pragmatics of truth: since the context of assessment supplies the judge, judge-sensitive propos-itions will differ from those that are purely time-sensitive. Thus, only the former show an ability to consider the truth of an assertion relative to a judge different from the one supplied by the context of utterance.[6]

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[6] MacFarlane's main empirical target is the *retraction* of taste claims, in which one rejects a taste claim after one's tastes change over time. He argues that only bicontextualism correctly predicts that retraction is mandatory when one's tastes change.

We will ultimately build our account in terms of a bicontextual semantics, though MacFarlane's particular philosophical commitments lead to a view of the context of assessment that is not empirically borne out. As a result, we will end up arguing for a bicontextual semantics with a bit more expressive freedom, which we will exploit in building an account of faultless disagreement and our core contrast in (3). We can start by scrutinizing how these two flavors of relativism handle cases where the judge is, intuitively, not the speaker.

6.3.3   Relativism and Exocentric Readings

While the contextual world of evaluation is not typically very flexible, Lasersohn argues that the contextual judge has considerable freedom. Beyond autocentric uses, it also has *exocentric* uses, as in questions posed to the addressee (23) or in discussions of some relevant protagonist (24).

(23)   A: [asking B about a book B is reading] Is the book good?

(24)   Mary: How did Bill like the rides?
John: Well, the merry-go-round was fun, but the
water slide was a little too scary.   (Lasersohn 2005: 672)

In contrast, MacFarlane assumes that the assessment context is quite rigid, providing only the assessment standard of the assessor at the time of assessment. For exocentric uses, he follows Stephenson (2007), who proposes that, while autocentric uses are relative to the contextually supplied judge, exocentric uses are derived via variables in the logical form, as under contextualist accounts. As evidence for this hybrid system, Stephenson observes that exocentric readings do not readily lead to coherent heteroperspectival disagreements.

(25)   Sam: The tuna is tasty.
Sue: (#)No, it isn't! It's not tasty at all!   (Stephenson 2007: 521)

Stephenson notes that if Sam intends exocentrically to reference a salient cat's judgment of the tuna, and if Sue (knowing this) then brings in her perspective, Sue's statement is incoherent. Under the theory that exocentric readings require variables that lead to judge-invariant propositional content, such mismatches are predicted, while under the one where exocentric readings arise from the context of utterance, they are not.

But a dialogue like (25) can be felicitous depending on the individuals that are referenced by the interlocutors. Consider the scenario in (26), where two parents are discussing how a certain child enjoyed their birthday party. It seems much more acceptable here for another child to offer their own opinion.

(26)   Parent A: How was the cake at the party?
Parent B: It was delicious.
Child: No, it wasn't! It was disgusting.

This suggests that what is going on in exocentric–autocentric mismatches is not as clear-cut as Stephenson suggests, and that the infelicity of (25) is not a matter of mismatching logical forms, but rather of overall discourse coherence.[7]

In addition, based on tests furnished by MacFarlane, as well as Anand and Korotkova (2018), exocentric readings of bare PPTs can be shown to be distinct from those with overt experiencers. MacFarlane notes that PPTs with overt experiencers evaluate the predicate relative to a standard determined by the overt experiencer's standards of taste in the index of evaluation, while bare PPTs do not. One vivid illustration comes from a contrast he observes in counterfactual conditionals. In (27a), the counterfactual state of affairs involves some change in the structure of horse manure that would make it tasty relative to the assessor's real-world standards of taste. In contrast, (27b) admits a state of affairs where the speaker's standards of taste are different from their real-world standards.

(27)　　a. If horse manure were tasty, I would never go hungry.
　　　　b. If horse manure were tasty to me, I would never go hungry.

<div align="right">(after MacFarlane 2014)</div>

Similarly, Anand and Korotkova show that overt experiencers change the signature of the *acquaintance inference* that PPTs impose. Bare PPTs in typical autocentric assertive contexts give rise to the inference that the speaker has some direct evidence for their judgment (Stephenson 2007; Pearson 2013). This inference disappears under operators like epistemic *maybe* (Ninan 2014).

(28)　　a. #The cake was delicious, but I never tasted it.
　　　　b. The cake maybe was delicious, but I never tasted it.

<div align="right">(Anand & Korotkova 2018: 56)</div>

In sharp contrast, PPTs with overt experiencers do not lose the acquaintance inference, behaving exactly analogous to other predicates with experiencer arguments, including psych-predicates, such as *like*.

(29)　　a. #The cake maybe was delicious to me, but I never tasted it.
　　　　b. #I maybe liked the cake, but I never tasted it. (Anand & Korotkova 2018: 56)

These facts do not depend on autocentric judgment: exocentric judgments also require acquaintance and show the same signature of obviation.

(30)　　a. #Hobbes's new food was tasty, but he never ever tried it.
　　　　b. Hobbes's new food maybe was tasty, but he never tried it.
　　　　c. #Hobbes's new food maybe was tasty to him, but he never tried it.

<div align="right">(after Anand & Korotkova 2018: 63)</div>

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[7]　It is worth noting that the oddity of Sue's assertion in (25) fails to improve if Sue says instead *I didn't like it at all!*, which suggests that the problem is about the plausibility of the relevance of a QUD like *What do you and the cat think about the tuna?*

Returning now to the counterfactual examples in (27), we see the same pattern. Consider a situation where two parents are discussing their child's picky eating habits. An overt experiencer, as in (31b), allows the parents to consider a state of affairs where the child's eating habits are different from in the real world.

(31)   a. If our dinner had been tasty, he would have eaten it.
        b. If our dinner had been tasty to him, he would have eaten it.

Importantly, the bare PPT form in (31a) does not: it only allows consideration of a state of affairs where the subject of the PPT itself changes composition.

In sum, if exocentric readings involve variables, as Stephenson and MacFarlane suggest, bare PPTs in counterfactuals and acquaintance-obviation environments should pattern with their overt experiencer counterparts when the PPT is interpreted relative to an exocentric perspective. This prediction does not seem to hold: both exocentric and autocentric perspectives show the same contrast with their corresponding overt experiencer forms.

6.3.4   Relativism and Faultless Disagreement

We take the facts above, about exocentric readings, as evidence for Lasersohn's approach, where the context may set the judge to a perspective distinct from the speaker's. This is a position, we should note, that is compatible both with utterance-sensitive relativism and bicontextualism. Importantly, if we adopt this view, faultless disagreement can be blocked with exocentric readings, but only if the exocentric perspectives that speakers are employing are the same: in such a case, it is impossible for a proposition and its negation to be true relative to the contexts of utterance/assessment.

Taking stock now, in surveying the literature on PPTs, we have argued that judge contextualism is the most challenged approach and that bicontextual relativism is the least, while utterance-sensitive relativism needs to explain the contrast between PPT disagreements and temporally sensitive sentences like *It is noon.* At the same time, we have argued based on contrasts between overt and covert experiencer data that exocentric readings should both be treated relativistically, that is, that the context of assessment should be free to choose judges other than the speaker's.

But regardless of what one might conclude from disagreements and overt experiencers, when it comes to explaining the presence or absence of faultlessness, contextualist and relativist accounts are remarkably consonant in their explanation. Faultlessness comes from *heteroperspectival evaluation* (whatever its source), which allows intuitively contrary propositions to be simultaneously true because they are evaluated relative to distinct perspectives. And, in turn, the lack of faultlessness comes from *homoperspectival evaluation* (whatever its source), precisely because in such cases the contrary propositions cannot be simultaneously true (relative to the same perspective).

6.4   A Minimal Working Solution

We can now return to the puzzle in (3). It has two elements: on the one hand, the lack of faultlessness with the historical present and, on the other, the possibility of faultlessness with the simple past. We are ultimately committed to three theses to account for both of these:

(1) The complication in a narrative enforces a single perspective, while the evaluation admits diverse perspectives, i.e. the NPG in (4).
(2) Faultlessness with PPTs arises from heteroperspectival evaluation (independent of auto- vs. exo-centrism), while nonfaultlessness arises from homoperspectival evaluation.
(3) The historical present is only compatible with homoperspectival evaluation, while the simple past is more flexible.

The first two we have already addressed. Only the third remains. Why should the historical present have such a restriction? And why should it differ from the simple past in this regard? Ultimately, we believe the answers to both questions have their roots in the semantics of tense, as it interacts with the structure of a narrative. Thus, we aim to reduce the lack of faultlessness with the historical present to the fact that it is only employed in the complication of a narrative, and the possibility of faultlessness with the simple past to its availability in all parts of a narrative. We have already seen, in Section 6.2.3, that these tenses are indeed distributed in this way. But how should this be expressed formally? To answer this question, we turn to a more extensive formal analysis of tense.

6.4.1   A Bicontextual Semantics for Tense

We introduced a standard semantics for tense in (13) above and saw how it runs into problems with the historical present. If the present tense is sensitive to the time of the context and if this context encodes aspects of the utterance event, then it is hard to understand how this tense form could ever describe a past event. At the same time, there is no evidence for a distinct historical present morpheme. The historical present is just one *use* of a tense form that is also used for other purposes, including the canonical (utterance-time indexical) present and the so-called play-by-play (or broadcaster) present.

In Anand and Toosarvandani (2017), we argue these three uses can be unified, building on Sharvit's (2004, 2008) bicontextual semantics for free indirect discourse, as long as: (i) tense is sensitive to a time in the context of assessment, as in (32), and (ii) this time of assessment can be set relatively freely. Pronominal indexicals, e.g. *I*, are sensitive instead to the utterance context.

(32)   a. $[\![\,\text{PRES}_n\,]\!]^{u,a,i,g} = g(n);$ defined iff $g(n) \subseteq \text{TIME}(a)$
        b. $[\![\,\text{PAST}_n\,]\!]^{u,a,i,g} = g(n);$ defined iff $g(n) < \text{TIME}(a)$

Because tenses are sensitive to the assessment context, we cannot maintain MacFarlane's Truth in a Bicontext (22), which sets the time coordinate of the index based on the utterance context. We need a more general notion, one which explicitly evaluates an expression relative to the assessment context:

(33)   **Truth in a Bicontext (revised):**
        α is true at utterance context u and assessment context a iff
        $[\![\,\alpha\,]\!]^{u,a,\langle\text{JUDGE}(a),\text{WORLD}(a),\text{TIME}(a)\rangle,g} = 1.$

While Sharvit takes the two contexts to be identical at the root level, we propose, following Schlenker (2004), that the time of assessment is set pragmatically in root contexts (see Bary, this volume for discussion):

(34)   a. Canonical present: $\text{TIME}(a) = \text{TIME}(u)$
        b. Historical present: $\text{TIME}(a) < \text{TIME}(u)$
        c. Play-by-play present: $\text{TIME}(u)$ is a final subinterval of $\text{TIME}(a)$

When the time of assessment is the time of utterance, the canonical present results. When it is anterior to the actual speech time, the historical present results. And when it abuts the actual speech time, the play-by-play results.

With bicontextualism, in short, we can retain an indexical theory of the present tense in English, treating its various uses as arising from the mapping between the utterance time and the time that tense is indexical to. One component of this analysis is that the width of the time of assessment is also contextually determined. For the canonical present, the width is infinitesimal, small enough that only stative eventualities can occur. But for noncanonical uses, the interval is set freely, and it is for this reason that both the historical and play-by-play present allow episodic events while the canonical present does not. We suggest that for the historical present, in particular, the interval can be set wide enough to accommodate the entire story. What this means concretely is that sentences in historical present discourses require the same temporal perspective: they are evaluated relative to the same time of assessment.

This suggests, given what we observed about judges above, that the NSI in (12) can be rewritten more precisely. The QUDs in the complication of a narrative are all evaluated relative to a single context of assessment, while the QUD that gives rise to the evaluation is evaluated relative to the utterance context.

(35)   **Narrative Strategy of Inquiry (NSI; final version):**
        A narrative is the product of a strategy of inquiry to answer a QUD **relative to the context of utterance *u***, which contains at least the question: *What is the way things are (in the story world)* **relative to some context of assessment *a*?**

For a QUD evaluated relative to a given context, the only relevant answers will be ones that describe eventualities relative to that same context, assuming a

sufficiently fine-grained conception of relevance. Thus, all assertions in the complication will be evaluated relative to a single assessment context.

We can see how the semantics of tense interacts with the NSI by looking at a simplified version of the joint oral narrative in (3).

(36)   A: We arrive in Paris.   (i)
        A: We take a bus to the Normandy coast.   (ii)
        A: We visit an apple orchard.   (iii)
        B: They have cider.   (iv)
        B: It's delicious.   (v)
        A: It **is**n't delicious.   (vi-a)
            It **was**n't delicious.   (vi-b)

The sentences in (iii) and (iv) have the approximate logical forms in (37a) and (37b), respectively.

(37)   a. PRES$_3$ PFV we$_8$ visit an apple orchard
        b. PRES$_4$ PFV they$_9$ have cider

Each sentence is evaluated relative to an utterance context, which is updated throughout the narrative. But it is also evaluated relative to an assessment context, which we have posited does not change across the complication of a narrative. Thus, these two sentences have the following truth conditions:

(38)   a. $[\![$ PRES$_3$ PFV we$_8$ visit an apple orchard $]\!]^{u,a,i,g} =$
            $\exists e \exists x [orchard(x) \wedge visit(e) \wedge Agent(g(8), e) \wedge Theme(x, e)$
            $\wedge \tau(e) \subseteq g(3)]$;
            defined only if SPEAKER$(u) \leqslant g(8)$ and $g(3) \subseteq$ TIME(a)
        b. $[\![$ PRES$_4$ PFV they$_9$ have cider. $]\!]^{u,a,i,g} =$
            $\exists e [have(e) \wedge Agent(g(9), e) \wedge Theme(\textbf{cider}, e) \wedge \tau(e) \subseteq g(4)]$;
            defined only if $g(4) \subseteq$ TIME(a)

Each sentence commits the speaker to the existence of a particular kind of eventuality, with the presuppositions of the indexical elements constraining these eventualities. In both (38a) and (38b), the reference time interval the present tense denotes is inside the assessment time. Perfective aspect further requires, again in both, that the eventuality lie within the reference time interval. Since a is constant across the complication of a narrative, according to the NSI, TIME(a) is as well. So, by the narrative architecture of complications, the present tense locates both the visiting and possessing eventualities within the same assessment interval, which by the pragmatic conventions for historical present precedes the times at which these sentences were uttered.

6.4.2   Adding PPTs

We can now turn to the final sentence of the discourse in (36). We treat *delicious* as a predicate of events, as in (39), for compositional simplicity.

(39) $\llbracket delicious \rrbracket^{u,a,i,g} =$
         $\lambda x \lambda e.$ 1 iff $delicious(e) \wedge Judge(\text{JUDGE}(i), e) \wedge Theme(x, e)$

Sentence (v) accordingly has the logical form in (40a) and the resulting truth conditions in (40b).

(40)   a. PRES_5 PFV it_{10} be delicious
         b. $\llbracket \text{PRES}_5 \text{ PFV it}_{10} \text{ be delicious} \rrbracket^{u,a,i,g} =$
             $\exists e[delicious(e) \wedge Theme(g(10), e) \wedge Judge(\text{JUDGE}(i), e) \wedge \tau(e) \subseteq g(5)]$;
             defined only if $g(5) \subseteq \text{TIME}(a)$

The perspective for the PPT here is the judge of the index (i), which at the root level is determined by whichever assessment context is relevant for the complication of this narrative. Per Truth in a Bicontext (33), (40a) is evaluated against the sequence $\langle u, a, a, g \rangle$, so that its semantics reduces to the following:

(41) $\llbracket \text{PRES}_5 \text{ PFV it}_{10} \text{ be delicious} \rrbracket^{u,a,a,g} =$
         $\exists e[delicious(e) \wedge Theme(g(10), e) \wedge Judge(\text{JUDGE}(a), e) \wedge \tau(e) \subseteq g(5)]$;
         defined only if $g(5) \subseteq \text{TIME}(a)$

When A follows up with sentence (vi-a), disagreeing using the historical present by saying *It isn't delicious*, only a nonfaultless disagreement is possible. To see why, consider the logical form and truth conditions for A's assertion:

(42)   a. NEG PRES_6 PFV it_{10} be delicious
         b. $\llbracket \text{NEG PRES}_5 \text{ PFV it}_{10} \text{ be delicious} \rrbracket^{u,a,i,g} =$
             $\neg \exists e[delicious(e) \wedge Theme(g(10), e) \wedge Judge(\text{JUDGE}(i), e) \wedge \tau(e) \subseteq g(5)]$;
             defined only if $g(5) \subseteq \text{TIME}(a)$

which, again given Truth in a Bicontext, yields the following semantics:

(43) $\llbracket \text{NEG PRES}_5 \text{ PFV it}_{10} \text{ be delicious} \rrbracket^{u,a,a,g} =$
         $\neg \exists e[delicious(e) \wedge Theme(g(10), e) \wedge Judge(\text{JUDGE}(a), e) \wedge \tau(e) \subseteq g(5)]$;
         defined only if $g(5) \subseteq \text{TIME}(a)$

As with the other sentences in the historical present, A's disagreement here will be added to the complication of the narrative. But then, as the NSI requires, the perspective must be the same as for B's original assertion. There is, as a result, no way for faultlessness to arise.

6.4.3   Disagreements Using the Simple Past

This deals with half of the puzzle posed by the joint oral narrative in (36). But what happens when A disagrees using the simple past, as in sentence (vi-b)? It seems that, by saying *It wasn't delicious*, A can disagree faultlessly.

The truth conditions for this sentence differ from those of its historical present alternative only in the presupposition triggered by tense:

(44)   a. NEG PAST$_6$ PFV it$_{10}$ be delicious
         b. $[\![$NEG PAST$_5$ PFV it$_{10}$ be delicious$]\!]^{u,a,i,g} =$
             $\neg\exists e[delicious(e) \wedge Theme(g(10),e) \wedge Judge(\text{JUDGE}(i),e) \wedge$
             $(e) \subseteq g(5)]$;
             defined only if $g(5) < \text{TIME}(a)$

The past tense requires that the reference time precede the assessment time. Given Truth in a Bicontext, (44) produces the following semantics:

(45) $[\![$NEG PAST$_5$ PFV it$_{10}$ be delicious$]\!]^{u,a,a,g} =$
         $\neg\exists e[delicious(e) \wedge Theme(g(10),e) \wedge Judge(\text{JUDGE}(a),e) \wedge$
         $\tau(e) \subseteq g(5)]$;
         defined only if $g(5) < \text{TIME}(a)$

This allows for a more complex set of interpretative possibilities. One is that the past tense has its canonical use, equating the assessment and utterance times. Then, A's disagreement cannot be construed as an addition to the complication, since it is not interpreted relative to the relevant assessment context. It does, however, allow A to make an assertion from an autocentric perspective. In this case, since the judges for B's and A's assertions are distinct, a heteroperspectival disagreement should result, and thus also a faultless disagreement.[8]

Since A's assertion is not part of the complication, it does not contribute to the consensus description of the story world. This seems intuitively correct. By using the simple past, A reveals her own perspective on the events described. What this contribution means dialogically is less clear, since it can signal a range of intents. The disagreement may be a proposal about the evaluation of the joint narrative; it might register a dissent to the collective appraisal; or, finally, it may be a comment outside the narrative entirely, simply stating the speaker's opinion. At this point, it not clear how these differ empirically.

One important question is how the identity of the consensus judge in a complication impacts this reasoning. Based on Edwards and Middleton (1986), it might seem reasonable to assume that this judge is a group containing the appropriate discussants in a conversation. However, this complicates our explanation for the faultlessness made available by using the simple past. Under our proposal, switching to the simple past requires a change in assessment context, which opens up the possibility of a change in judges. But a change may not be enough. If a PPT evaluated relative to a group judge is

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[8] A switch in assessment contexts does not force an autocentric judge, and hence would allow a nonfaultless disagreement. Whether the nonfaultless interpretation is actually available is not clear, but we do, importantly, predict the presence of faultless disagreement.

entailed to be true of its subgroups, when B says the cider is delicious to the group, it will be delicious to B and to A. But then a switch from B's group judge to A's autocentric judge is not enough, since B's claim precludes the truth of A's claim.

We can see two responses to this objection, the first a more nuanced view of what nonfaultlessness means in these dialogues, and the second a proposal that the common judge need not be the group, but rather a more abstract narrator.

Varieties of Nonfaultlessness Let us first consider nuancing nonfaultless disagreements.[9] The assertions we are considering, and their judges in this context, are given below:

(46)	B:	The cider is delicious.	$\text{JUDGE}(a) = A \oplus B$
(47)	A:	The cider isn't delicious.	$\text{JUDGE}(a) = A \oplus B$
(48)	A:	The cider wasn't delicious.	$\text{JUDGE}(a) = A$

We have already seen that, relative to any particular bicontext, (46) is contrary to both (47) and (48), so the distinction we are making is not about truth-conditional relations in a bicontext. However, B's goal in making the assertion in (46) is to make a claim about A and B's common judgment, a fact represented by the plural judge. In typical information-seeking exchanges, where the aim is to contribute novel information, asserting that one's interlocutors have a particular judgment runs afoul of the first-personal privilege judgments of taste typically have, and hence comes across as deeply coercive. But in joint oral narrative, making assertions about another author's judgment may simply be reporting what is a common belief of both authors already. In this regard, the assertions in (48) and (47) both start from the common belief that they share a common judgment. The disagreement is about what the common judgment is, but not whether there is a common judgment.

In contrast, the autocentric use in (48) is limited to A's judgments alone. In doing this, A makes no commitments as to a common judgment. In addition, because it does not obey the NSI, A's assertion is made outside the goal of joint narrative. It thus stands apart in two ways from the assertion that prompted it, and may thus be seen as a metanarrative signal about issues with the joint narrative. Indeed, this is precisely our feeling of the import of the disagreement in (48). B has made a claim about the joint judgment of A and B, and A's goal here is simply to react to the assumption that there is a joint judgment, saying simply that, as for A themselves, the cider is not delicious. In contrast, (47) goes further, claiming that the joint judgment is that the cider is not delicious. Thus, while both (48) and (47) lead to nonfaultless disagreements, their impacts on the development of the narrative are different. (47) will lead to a

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[9] This section is inspired by MacFarlane's (2014) discussion of different types of disagreement.

discussion about what the consensus position was, while (48) is an attempt to deny that there was a consensus to begin with, thus serving as a metanarrative comment about what can be part of the complication of the joint narrative.

Narrator Judges Another potential option to be considered for the judge in joint oral narratives is an abstract narrator. In this way, we could perhaps preserve faultless disagreement in some sense, since the narrator and any particular speaker would not necessarily be connected in a way that could preclude the narrator and the speaker from having differing judgments.

Such an avenue is especially attractive when we consider storytelling where the goal is to construct a fictional narrative. In such cases, there is no compelling reason to claim that PPTs report the judgments of the group. Moreover, the difference between historical present and canonical past disagreements dissolves and the canonical past seems to trigger the same kind of nonfaultless disagreement. Consider a version of our narrative in (36), cast as a fictional account:

(49)   A: Our story begins as a couple arrives in Paris.   (i)
        A: They take a bus to the Normandy coast.   (ii)
        A: They wander around, eventually stopping in an apple orchard. (iii)
        B: They have cider.   (iv)
        B: It's delicious.   (v)
        A: No, it **is**n't delicious.   (vi-a)
            No, it **was**n't delicious.   (vi-b)

Both of A's possible responses, in (vi-a) or in (vi-b), now read as nonfaultless attempts to impose a different consensus view of the story. If this is the case, there must be a way for speakers to felicitously disagree about some storywide perspective, but where it is not possible to bring in one's own perspective. If the storywide perspective is the plural individual for the speaking group, it is hard to see why that would be. But if we recognize the possibility of an abstract narrator perspective, then the point would be that in fictional accounts one can disagree about the narrator's judgment, but talking about one's own perspective on something one is not acquainted with will be problematic.

The central problem with this account is that there is no clear notion of what the narrator requires, aside from being a perspectival respository (though see Eckardt 2015, 2021). Is this an individual who exists in some particular world or is it something more abstract, like a standard of taste? And do we require an abstract narrator for all narratives, including nonfictional ones? Though these are important narratological questions, we have not been able to operationalize them in a way that allows them to be tested. We thus simply note that, while this option is open to us, advancing it more seriously would require some motivation for the ontological sophistication it may lead to.

6.5   Narratives in the Past

In the preceding, we outlined a solution to our puzzle, one that could handle both why the historical present cannot be used to disagree faultlessly and why the simple past can. But we have yet to address another aspect of the joint oral narrative in (36). While A can make an assertion relative to her own auto-centric perspective by using to the simple past, A could also convey appraisal relative to the consensus judge with this tense form. That is, she can do with the simple past what she does with the historical present, disagreeing nonfaultlessly.

This perspectival flexibility could simply be a matter of what the judge of the assessment context is. The anteriority encoded in the standard semantics for the past tense in (32) absolutely prohibits a PPT from holding *at* the time of the context whose judge it is evaluated relative to. So, for sentence (vi-b) in (36), one option would be to allow the judge to remain the consensus judge, even while the assessment time is fixed to the utterance time. (The assessment context would thus not be completely identical to the utterance context.) Under this view, the flexibility in how the simple past is used simply boils down to variation in what the judge of the assessment context can be.

However, we think a more principled account is possible, linking this perspectival flexibility to more general facts about past tense usage in narratives. Consider an alternative version of (36), conducted entirely in the simple past:

(50)	A:	We arrived in Paris.	(i)
	A:	We took a bus to the Normandy coast.	(ii)
	A:	We visited an apple orchard.	(iii)
	B:	They had cider.	(iv)
	B:	It was delicious.	(v)
	A:	No, it wasn't delicious!	(vi)

Setting aside the disagreement in (v–vi), it is not clear, given our assumptions so far, how sentences (i) through (iv) comprise a coherent narrative. The restrictive formulation of the NSI requires a single context of assessment for all assertions in the complication. But we have assumed that, in its canonical use, the past tense identifies the assessment context with the utterance context. Since the latter advances in time with each speech act, so will the former. Thus, it should be impossible for a sequence of past tense sentences to comprise a complication, since the assessment context is different for each of them.

This is, of course, simply not the case: while (50) differs from its historical present counterpart, it does not differ in its coherence. This means that one or more of our assumptions must be relaxed. The tension here is between the semantics for the past tense in (32), which translates a fairly standard denotation into a bicontextual framework, and the NSI. In principle, either hypothesis

could be loosened or removed. We will try, however, to maintain the NSI in its present form in (35) and revise the semantics for past tense. This enables a common understanding of how the past tense can coherently be used in a narrative like (50) and why it is perspectively flexible, unlike the present tense.

6.5.1 Sources of Anteriority

In revising the semantics for past tense, we might look to the semantics proffered in the literature for other kinds of past meanings. One case of this is the past perfect, which intuitively conveys two levels of anteriority: it invokes a salient time anterior to the utterance time – what Reichenbach (1947) calls the "reference point" – which the event is itself anterior to. It is tempting to view this as a consequence of two morphemes, the past, responsible for anteriority with respect to the utterance time, and the perfect, responsible for the other case of anteriority. Kamp and Reyle (1993: 483–689) argue that both relations should be encoded in the semantics of tense, since this behavior is independent of the aspectual properties of a sentence. They observe that a sequence of sentences in the past perfect also exhibits narrative progression.

(51)   Fred arrived at 10. He **had gotten** up at 5; he **had taken** a long shower, **had got** dressed, and **had eaten** a leisurely breakfast. He **had left** the house at 6:30.   (Kamp & Reyle 1993: 594)

Kamp and Reyle introduce another perspectival point beyond the reference and utterance times, which is anchored to an event in the discourse: in (51), it is anchored to the arriving event described by the initial sentence.

Elsewhere (Anand & Toosarvandani 2017), we have argued that this perspective point can be assimilated to the assessment time, since an event described by the historical present can also serve as the anchor for the past perfect.

(52)   Rumors of Berlusconi's crimes swirl. His advisors confront him. He scoffs. He **had paid off** the prostitute for her silence already.
                                      (Anand & Toosarvandani 2017: 29)

All told, this would suggest the following semantics for the past perfect within a bicontextual framework:

(53) $[\![\text{P-PAST}_n]\!]^{u,a,i,g} = g(n)$; defined only if $g(n) < \text{TIME}(a) < \text{TIME}(u)$

Intuitively, it could be possible to see the simple past as an instance of this. All-past narratives would be coherent, then, because they are described as past relative to an assessment time that is itself anterior to the utterance time. However, there is a real contrast in temporal perspective taking between (50) and (51). In the past perfect example, there is a sense that there is a temporal vantage point (10 p.m.) relative to which the other events are being viewed.

In the simple past narrative, by contrast, that feeling is absent or at least not necessary.

An interesting constellation of properties has been described in this connection for past tense forms in German. Kratzer (1998: 105–106) observes that the German simple past (*Präteritum*) is, unlike its English counterpart, not felicitous out of the blue, while the German present perfect form (*Perfekt*) is. She proposes that the German simple past is strongly anaphoric to a temporal interval salient (thereby excluding it from out-of-the-blue uses), and requires that the event be contained *inside* this interval. She locates this sensitivity in the semantics of aspect (perfect vs. perfective aspect). However, as with the past perfect, this restriction may be better located in the semantics of tense. The simple past in German cannot be used to backshift relative to a salient past time (Dickey 2001: 88), a restriction it shares with the simple past in French and Dutch (Molendijk & de Swart 1999: 90–91).

(54)   a.   ?? Max **fiel**. John **schubste** ihn.
             'Max fell. John pushed him.'   (Dickey 2001: 88)
       b.   #Jean **mourut**. Max l'**assassina**.
             'Jean died. Max assassinated him.'   (Molendijk & de Swart 1999: 90)
       c.   ?? Jane **verliet** me. Ze **werd verliefd** op een ander.
             'Jane left me. She fell in love with someone else.'   (Dickey 2001: 87)

This is not an idiosyncratic property of "narrative" past tense forms. The historical present also prohibits backshifting (Anand & Toosarvandani 2018): e.g. *#John dies. Max assasinates him*. This parallelism between the historical present and the simple past in these languages plausibly has its source in a shared sensitivity to the same time parameter.

Let us suppose, then, that in a bicontextual framework the simple past in German (as well as in Dutch and French) locates the reference time in the assessment time, which is itself located anterior to the utterance time. It realizes, in other words, a past tense morpheme that we can call the R (EMOTE)-PAST. Its semantics would differ from that for P-PAST in (53) solely in the relation between reference time and assessment time.

(55) $\llbracket \text{R-PAST}_n \rrbracket^{u,a,i,g} = g(n)$; defined only if $g(n) \subseteq \text{TIME}(a) < \text{TIME}(u)$.

This past tense morpheme is a bicontextual cousin of the present, which also locates the reference time inside the assessment time. As the assessment time is not the utterance time, it must be a salient past time, which means the R-PAST must be temporally anchored. At the same time, since the reference and assessment times are related by inclusion, we do not have the requirement for a salient "intermediate" past that we had for the past perfect. In sum, R-PAST serves as an excellent candidate for the German simple past and similar "narrative" past tenses like the Dutch and French simple past. Next, we argue that it is also part of the meaning of the simple past in English.

6.5.2   A Revised Semantics for Past Tense

If we took the English simple past simply to encode R-PAST, like its German counterpart, then we would have a straightforward explanation for why an all-past narrative, like (50), is coherent according to the NSI. The assessment time can be set to a salient interval containing all the eventualities described in the complication, precisely as we have argued for narratives in the historical present. In addition, we can account for why the simple past allows for the option of homoperspectival evaluation, relative to the consensus judge. With the R-PAST, the simple past can describe a past eventuality without having to shift from the assessment context of the complication. A PPT could then be evaluated relative to the judge parameter of this context.

But the simple past in English cannot merely encode R-PAST. If it did, there would no contrast with the historical present in the availability of faultless disagreements with PPTs. Said another way, we would not derive the fact that the simple past allows heteroperspectival evaluation (though it does not require it). Additionally, we might expect it to be infelicitous out of the blue, like its German counterpart. It seems that we have to embrace some kind of polysemy for the simple past in English. It could be ambiguous (as Kratzer 1998; Kamp & Reyle 1993 have, in fact, proposed), between PAST and R-PAST morphemes. Or, it could have an underspecified meaning: one candidate for this U(NDERSPECIFIED)-PAST is given below.

(56) $[\![\text{U-PAST}_n]\!]^{u,a,i,g} = g(n)$; defined only if $g(n) < \text{TIME}(v)$,
        where $v = a \lor v = u$

With this semantics, the U-PAST simply says that the reference time is anterior to some bicontextual time, leaving underspecified which coordinate this is. For example, if $v = u$, a classical indexical past results that does not mention the assessment context at all. It could thus be used in an out-of-the-blue setting or in a narrative without violating the NSI, since the assessment time does not constrain the tense's denotation at all. If $v = a$, then a backshifted past becomes possible when the assessment time is contextually set to a time anterior to $\text{TIME}(u)$.[10] This polysemy, regardless of which version is adopted, corresponds to the perspectival flexibility exhibited by the simple past.

6.5.3   Considering an Alternative

It is important to consider whether this approach, which posits polysemy for the past tense in English, along with crosslinguistic variation in its semantics,

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[10] One question is whether this flexibility could run afoul of the restrictions on embedded tenses in free indirect discourse that motivate Sharvit's (2008) account.

is ultimately more explanatory than the alternative. The standard semantics for past tense in (32) could be maintained by restricting the scope of the NSI, making it a claim not about coherent narratives simpliciter, but merely about coherent narratives in the historical present.[11] This alternative would amount to a pragmatic principle that directly mandates a homoperspectival stance for one use of the simple present. It would be completely silent about other tense forms: it would have nothing to say about a disagreement in the simple past, whether following a sequence of historical present sentences, as in our original joint oral narrative in (36), or whether in an all-past narrative, as in (50).

Empirical coverage aside, there are a couple reasons to think that the alternative, which posits a direct mapping between a tense use and homoperspectival appraisal, is not on the right track. In the account we have advanced, the connection between the historical present and nonfaultless disagreement is indirect: the historical present is restricted to the complication because of the semantics of present tense. If this restriction means anything, there should be evidence for it outside of disagreements with PPTs. We would expect evaluative language, in general, to be treated as part of the "facts" of the story when it is expressed using the historical present. There is some intuitive evidence for this idea. Consider the following historical present story:

(57)   My neighbor and I start hanging out more after work. We go to see the new *Star Wars* movie later that month. But in the theater, they suddenly seem cold and distant. They stop returning my calls.
   a. They are falling in love with me, but I don't know that.
   b. They were falling in love with me, but I didn't know that.

We have the intuition that, in (57a), the fact that the neighbor is falling in love with the protagonist is part of the story; it is a crucial plot point that will propel some of the story events. For (57b), by contrast, we do not have that feeling: the prominent reading is one where the falling in love is a *post facto* explanation for why things happened. This contrast is rather subtle, but it does follow from the indirect account as we have advanced it. It is less clear how the same observations would be cached out in the alternative, which only posits a connection between the historical present and homoperspectival evaluation.

The indirect route, moreover, makes interesting prediction about PPTs in the "narrative" past tenses in German, French, and Dutch. For these languages, we suggested that there was a distinction, parallel to the historical vs. canonical present contrast, that was encoded as a semantic distinction between two past tense morphemes. We thus predict that the simple past in German, French, and Dutch should trigger nonfaultless disagreement, while the present perfect should allow faultless disagreement. Importantly, this is attributed, not to a

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[11] We thank an anonymous reviewer for urging us to consider this option more explicitly.

stipulation about tense–judge interactions, as the direct alternative would have, but to a general constraint on narrative genres. It may be that, ultimately, the account we have advanced is too ambitious. But it does make clear empirical predictions, showing at the same time what work needs to be done next.

6.6   Conclusion

We began this chapter with a novel puzzle about how tense and predicates of personal taste (PPTs) interact in the performance of joint oral narratives. We have used this puzzle to mount an argument for the linguistic importance of structures for oral narratives identified in the discourse analysis and psychology literatures. Namely, PPTs and other perspectival expressions are evaluated differently in the complication and evaluation portions of narrative, a claim we have called the Narrative Perspectival Generalization (4).

We have cached out the NPG theoretically by combining a bicontextual theory of perspective (MacFarlane 2003, 2014; Sharvit 2004, 2008) with Roberts's (2012) theory of discourse structure, leading us to a constraint on the strategies of inquiry for narratives, which makes mention of both bicontextual perspectives (35). In turn, we have shown how the linking of grammatical tense to the assessment context allows us to account for the contrast between (historical) present and (canonical) past disagreements in joint oral narratives.

In closing, we would like to reflect on the larger implications of the empirical puzzle we have focused on and the proposals we have advanced. Perhaps the most immediate question that arises is the status of the NSI within a theory of linguistic competence. Ultimately, we see the NSI as a claim about what speakers know about the pragmatics of the narrative genre. Genres ultimately are shaped by cultural practice, and hence are matters of convention. It may be that there are very few, if any, cognitive or properly linguistic constraints on possible genres. Nevertheless, we believe that the conventions of a genre can make direct reference to linguistic structures, and thus the study of the structures of genres can provide indirect evidence for underlying linguistic structures. In the present case, the interaction of tense and faultlessness provides, we believe, strong evidence that temporal perspective and evaluative perspective are grammatically linked, a claim we have cached out by making them both sensitive to the same object (the assessment context). Beyond that, we should understand that much of the surrounding structural dichotomizing – complication vs. evaluation, assessment vs. utterance context – is provisional, absent a theory of sufficient richness.

Hence, while our particular way of implementing that linguistic importance involved bicontextual parameters, our aim in this chapter was more general. We hope to have shown that a richer, more capacious notion of what constitutes narrative perspective is needed, one that engages with the intentional structure

of a narrative, and a sense of a narrative as a practice distinct from information exchange. While there is a substantial treatment of *Narration* as a coherence relation between discourse units within formal semantics and philosophy of language, very little has been done in these traditions to understand narrative as a larger intentional form of language use. We believe that there is real opportunity for progress in this arena. But this progress will only come by closely attending to the interaction with other perspectival notions by particular grammatical formatives (like the "narrative" tenses in German, French, and Dutch), as well as by undertaking more serious and sustained attempts to formalize the richer, more capacious notions of narrative structure found in discourse analytical, narratological, and psychological investigations of narrative discourse.

Such sustained, interdisciplinary examination will be necessary, we believe, to understand what narration is and why it has the character it does. While we have argued for a grammatical interaction between temporal and evaluation perspective in this chapter, our account, in essence, simply stipulates this interaction by making different sets of morphemes dependent on the same perspectival parameter. We have not touched the more important explanatory question of why things are organized this way and not another. In more naive discussions of perspective, the perspectival center is characterized, not as an abstract vantage point, but as some actual individual in the story world (see, e.g. Walton 1990). For such a view, it is not surprising that there is a unity of temporal and evaluative perspective. However, we have in Section 6.4 argued at some length that it is difficult to link the evaluative perspective with any particular set of individuals, even for autobiographical oral narratives, and more complex narratives clearly lack an obvious embodied perspectival center. It is thus surprising that tense and evaluation continue to track together formally, even when they are not linked to any clear individual. It may be that the narrator plays a crucial role here, and that even in cases where there is no actual person, there is some "counterfactual person" from whose vantage point the narration is simulated to take place. While we acknowledge the promise of this idea, moving from informal notions into something more substantive will require much more careful theorizing around narrators, and thus also the intentional structure of narration. We hope that this chapter has illustrated some potential payoffs of that task for linguists and philosophers of language alike.

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Part IV

Locating and Inferring

7   Present Tense

Corien Bary

7.0   Questions and Answers

(1)   Why do you think both linguists and philosophers find the present tense interesting?

Tenses are one of the main devices for encoding time in language. Linguistically they have a special position as they are part of the verb paradigm in many languages of the world and as such obligatory for finite verb forms. But tenses are not only interesting from a purely linguistic perspective. Philosophers' interest in tense goes back at least to Aristotle, who discusses in his *De Interpretatione* whether or not sentences about the future have a truth value. Aristotle seems worried that assigning them a truth value implies determinism. This debate, known under the name of *future contingents*, has continued up to our time. While philosophers were originally mainly interested in the future tense, work in semantics has shown in the last decades that the present tense poses many challenges as well, challenges that are interesting for linguists and philosophers alike.

(2)   What recent developments in linguistics and philosophy do you think are most exciting in thinking about the present tense?

Crucial for the present tense has been Hans Kamp's (1971) idea of double-indexing, which made it possible to capture the *deictic*, or in philosophers' words *indexical*, nature of the present tense: the present tense anchors us to our actual speaking across utterances. Although this seminal idea is still widely employed, it has turned out an enormous challenge to incorporate all the different uses of the present tense that we encounter. Two particularly interesting present tense phenomena are the present tense in complements of indirect speech and attitude reports, and the historical present.

Speech reports (as *John said that Mary is ill*) introduce a second context of speech, the context of the original utterance that is now being reported, in addition to the actual utterance context. The so-called *double access* interpretation of present tenses in complements of such reports in languages like English suggests that the interpretation of these occurrences of the present

tense requires appealing to both contexts. One of the greatest challenges in formal semantics has been to provide a clear formulation of the exact role of both time points and incorporate this within a larger semantic theory that also treats speech and attitude reports in a sensible way. Recently, psycholinguistic experiments have identified factors that influence the felicity of the present tense in these contexts. These factors are, however, hard to incorporate in the state-of-the-art accounts in terms of acquaintance relations.

The historical present is the use of a present tense to refer to events and states in the past. Recently, a better understanding of this phenomenon has been sought in the application of bicontextual semantic frameworks, in which indexical expressions are interpreted with respect to two contexts.

(3)   What do you consider to be the key ingredients in adequately analyzing the present tense?

We have to acknowledge that the idea that the present tense always and only picks up the actual moment of utterance is too simplistic. Things are much more complicated. Although I believe that semantics has brought us very far in unraveling the complex character of the present tense, recent engaging with the topic has raised the question for me whether a complete answer can be given within this field. Both the data about the present tense in speech and attitude reports and those about the historical present suggest that certain hard-to-formalize factors play a role in our tense choice. A holistic understanding of the present tense would require a discussion about how to connect a semantic component to these factors. Thus I believe that the most fruitful directions of research for this topic are to be found in collaboration between formal semantics and other fields of language study, such as psycholinguistics, cognitive linguistics, philosophy of language, fiction and mind, literature study, and narratology.

(4)   What do you consider to be the outstanding questions pertaining to the present tense?

The results from the experiments on tense in speech reports raise the question what kind of account would be able to deal with the observation that tense choice seems to be influenced by certain hard-to-formalize factors. Is compositional semantics still the field where we should try to deal with these observations (for example in terms of acquaintance relations (see Sharvit and Moss's contribution) to times or states as it is traditionally done) or should we rather move to looser pragmatic talk? And in addition we have seen that the use of linguistic experiments almost inevitably leads to gradual outcomes and differences between language users. At the moment our semantic theories are not adequately equipped to deal with these methodological consequences. Should this change?

What is more, in some accounts of the present tense in speech reports, and in many accounts of the historical present, we find the idea of 'nonliteral talk'. We *present things as if* two times that are actually different can be conflated (present tense in speech reports), or the other around: as if two times that are materially the same, are different (historical present). A major step forward could be set if we understood this *present as if* better.

7.1   Introduction

Philosophers' interest in tense goes back at least to Aristotle who discusses in his *De Interpretatione* whether or not sentences about the future have a truth value. Aristotle seems worried that assigning them a truth value implies determinism. This debate, known under the name of *future contingents*, continued through the Middle Ages (William of Ockham among many others) and early modern times (with Leibniz as an important contributor) up to our time (e.g. MacFarlane 2003). It is this debate which led the philosopher and logician Arthur Prior around 1960 to the invention of Tense Logic with the aim to analyze the wealth of arguments put forward in the debate (Prior 1955 as his earliest publication on this). Ever since, philosophers have used this modal-logic type of approach of tense and its many successors for clarifying philosophical issues about time. In addition, philosophers came to study the formal properties of such temporal logics as a topic on its own. With the birth of formal semantics from philosophy and linguistics in the late 1960s (see Partee 2011 and her preface to this volume for this historical development), temporal logic also became a framework within which to define the semantics of temporal expressions in natural language.

Tenses are one of the main devices for encoding time in language. Linguistically they have a special position as they are part of the verb paradigm in many languages of the world and thus often obligatory for finite verb forms. While the primary attention of philosophers originally went to the future tense and from a philosophical perspective the present tense seemed to be its easier, less interesting brother, work in (formal) semantics has shown in the last decades that the present tense poses many challenges as well. Crucial for the present tense – the topic of this contribution – has been Hans Kamp's (1971) idea of double-indexing, which made it possible to capture the *deictic*, or in philosophers' words *indexical*, nature of the present tense: the present tense tends to pick up the utterance time even when embedded under past tense matrix verbs. Or in other words, the present tense anchors us to our actual speaking context no matter what. Although this seminal idea is still considered a great insight, it has turned out an enormous challenge to incorporate all the different uses of the present tense that we encounter. In this chapter, I will discuss two particularly challenging present tense phenomena: (i) the present

tense in indirect speech report complements, and (ii) the historical present, which are both extremely interesting for semanticists and philosophers alike.

Before I zoom in on these two phenomena, I will first lay out what I'll call the 'simple picture' of the present tense (Section 7.2). This picture helps to chart the complications introduced by the two noted phenomena and the directions in which we have to extend our analysis to deal with them (Sections 7.3 and 7.4). A worked-out analysis of the present tense in which these directions are incorporated is not provided in this chapter. The reason lies in the outstanding questions, which I will bring together in Section 7.5, some of which are of a principled nature. Although I believe that formal semantics has brought us very far in unraveling the complex character of the present tense, recent research has raised the question for me whether the complete answer can be given within this field. This is not because we lack certain formal tools, but as we will see both the data involving the present tense in speech reports and those about the historical present suggest that certain hard-to-formalize factors play a role in our tense choice. To mention a few: the rather vague idea of current relevance, the idea of presenting something *as if* (while the actual situation is different), and the role of narration. A holistic understanding of the present tense would require a discussion about how to connect a formal-semantic component to these factors. Thus I believe that the most fruitful directions of research for this topic are to be found in collaboration between formal semantics and other fields of language study, such as psycholinguistics, cognitive linguistics, philosophy of language, mind and fiction, literature study, and narratology.

7.2   Our Point of Departure: A Very Simple Picture

What do we use the present tense for? Intuitively, the answer is simple: we use the present tense to indicate that something holds or takes place now, as we speak, or more precisely, to indicate that the eventuality (a cover term for events, states, processes, and what have you) *e* that we describe holds at the time at which we utter our sentence. I will refer to this as the SIMPLE PICTURE.

So, (1) uttered by me on November 12, 2019 expresses that a state of Corien's happiness holds at that time.

(1)   Corien is happy.

The simple picture entails that this also holds when the present tense is embedded under a past tense matrix clause, as in Ogihara's (1995) famous example:

(2)   Mary bought a fish that is alive.

Again, when I utter this sentence on November 12, 2019, the present tense of *is* indicates that the state of the fish being alive holds at that time.

In the Kaplanian framework (Kaplan 1989), the actual utterance time t_c is one parameter of the context of utterance c, next to the speaker a_c and the world $w_c : c = \langle a_c, t_c, w_c \rangle$. Kaplan uses these contexts of utterance to explain the interpretation of indexical or deictic expressions, by contrasting them with expressions whose interpretation can be shifted by linguistic operators (by changing the index, a world-time pair). Applying this framework to the present tense, the SIMPLE PICTURE would entail that the present tense picks up t_c in all circumstances, which seems correct when we look at (1) and (2).

A closer look reveals, however, that reality is more complicated than the SIMPLE PICTURE suggests. In Section 7.3 we'll see that sometimes not one but two utterance times seem relevant in licensing a present tense. This is the case for the complements of speech reports in languages like English, as in *John said that Mary is ill*. They interestingly introduce a second context of speech, the context of the original utterance that is now being reported, in addition to the actual utterance context. The name *double access* for the interpretation of the present tense in such reports refers to the fact that it is tempting to think about the interpretation of these occurrences of the present tense as appealing to both contexts. One of the greatest challenges in formal semantics has been to provide a clear formulation of the exact role of both time points and incorporate this within a larger semantic theory that also treats speech reports in a sensible way. This incorporation involves answering questions as what kind of object the meaning of a complement clause should be.

Furthermore, we'll see in Section 7.4 that the present tense is not only used for eventualities that hold at the actual utterance time t_c. Sometimes it is used for eventualities that are strictly speaking in the past of t_c, the so-called historical present. An example is Schlenker's (2004) *Fifty eight years ago to this day, on January 22, 1944, just as the Americans are about to invade Europe, the Germans attack Vercors*. It is tempting to think about such examples in terms of *pretense*. The idea then would be that the present tense keeps its normal value of picking up the utterance time, but the speaker pretends that this time is different from the actual time he is speaking. Obviously, we would need to explain what exactly this means. As we will see, the phenomenon of the historical present has led to the introduction of bicontextual semantic frameworks, where indexicals are interpreted with respect to two different kinds of contexts.[1]

It thus seems that we need to adjust the SIMPLE PICTURE along multiple parameters. I will discuss the issues that come up in passing and then bring them together in the discussion at the end of this chapter.

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[1] Interestingly, bicontextual frameworks have also been used to analyse the problem of *future contingents* that I started this chapter with (MacFarlane 2003). See also Anand and Toosarvandani (this volume).

7.3   **Present Tense in Speech Reports**

7.3.1   *Double Access and Acquaintance Relations to States*

Let's take a look at the present tense in the complement clause in (3) with the SIMPLE PICTURE in mind (and assume that I am the one who utters the sentence):

(3)   John said that Mary is in the room.

Two complications arise. First, what would be the eventuality located at the time when I utter this sentence? As shown by Ogihara (1995) and Abusch (1994, 1997), it's not necessarily an actual state of Mary in the room (according to me, the actual speaker). I can utter (3) in situations where I am not committed to Mary being in the room, so there need not be such a state according to me. This becomes clear in the felicity of continuations such as in (4):

(4)   John said that Mary is in the room. But that's not true. The one that is in the
        room is Sue.   (Ogihara 1995)

We may try to fix this by saying that it is not required that an actual state of the kind described in the complement clause holds (according to the actual speaker), but only a state of that kind as assumed by the reported attitude holder, in this case John. This would actually be very much in line with the meaning of a report complement clause and need not imply a true adjustment of the SIMPLE PICTURE. But even then, more seems required than this state (that John believes in but that need not actually exist) simply to hold at the utterance time of (3). We can see this if we look at (5):

(5)   Mary will be in the room.

If this is the sentence that John uttered, I cannot use (3) to report this, even if he made his utterance about a time that would later happen to become (or include) the time when I made my report. In that case the assumed state of Mary being in the room would hold at the actual utterance time, so according to the SIMPLE PICTURE the present tense should be felicitous, but it is not: I cannot use (3) to report (5).[2]

In fact, (3) can only be used if John said (6):[3]

(6)   Mary is in the room.

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[2] This was one of the reasons for Abusch (1994, 1997) to introduce the Upper Limit Constraint. Here, I give Kamp's (2012) version, who calls it the *Principle of Obligatory Marking of Prospective Aspect*, or the *Future Orientation Constraint*, since it is formulated in less technical terms: 'if the content of a speech act is future-oriented, then this future orientation must be marked explicitly in the complement clause to a matrix verb that is used to report that speech act.' In English past tense matrix speech reports *would* is used for this: *John said that Mary would be in the room.*

[3] Or an equivalent, which is (if we gloss over many complications) a sentence that in that context expresses the same proposition (or maybe something stronger, e.g. 'is sitting on a chair in the room' for (6)).

This observation, supplemented with considerations about *de re* vs. *de se* belief in the temporal domain (von Stechow 1995), has led to the conclusion that present tense in speech reports such as (3) can only be used if – formulated in terms of the content of this example – according to John, Mary was in the room at his subjective, psychological now. I will refer to this time, the subjective now of John at the time of his utterance, as the *reported now*.[4] We can now say that for the present tense in (3) to be felicitous John has to locate the (assumed) eventuality at the reported now.

This, however, does not mean that the only moment of time that counts for felicitous present tense use is John's reported now. We can see that when we compare the present tense in (3) and the past tense in (7).

(7)   John said that Mary was in the room.

Both can be a report of (6), but the embedded present tense in (3) seems to import additional information, an idea that goes back to the 1970s (e.g. Smith 1978). Both present and past tense lead to an inference that according to John, Mary was in the room at the reported now (i.e. the subjective now of John at the time of his utterance). But only the present tense imposes a requirement about the actual utterance time n in addition, which is what we started this section with. This additional requirement has led to the name *double access* (Enç 1987), describing an interpretation of the present tense in (3) that involves reference to two times: the reported now and the actual now t_c.

As a side note, in other languages, so-called non-SOT (non-Sequence-of-Tense) languages, such as Hebrew, Japanese (Ogihara & Sharvit 2012), and Ancient Greek (Bary 2012), the only time that is relevant in licensing the present tense is the reported now. The tense system for speech reports in these languages is quite simple compared to English, but note that it still involves a complication relative to the SIMPLE PICTURE: it is not the actual now that the present tense indicates a temporal relation to, but the reported now.

Returning to English, there seems consensus that these two points, the actual now t_c and the reported now, are relevant in licensing a present tense, but defining what exactly has to hold at the actual utterance time turns out to be quite complicated and subtle. In more informal literature, the role of the actual utterance time has been formulated as 'current relevance' (Costa 1972; McGilvray 1974): the choice for the present tense indicates that the reported eventuality still has current relevance. In the nineties, Ogihara and Abusch independently of each other tried to make clearer what exactly it is that has to

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[4] It is important to keep in mind that this is not the same as the actual time of the original utterance. We see this clearly in cases where John is mistaken about the time, analogous to the mistaken identity cases as described by Perry (1977) and analyzed as self-descriptions of properties in Lewis (1979a).

hold at the actual utterance time for the present tense to be felicitous (and how to incorporate this in a formal-semantic theory of tense and speech reports).

Ogihara (1995) considers various contexts for (3) (with the target sentence in bold face and the crucial differences between the three scenarios underlined):

(8)   John and Bill are looking into a room. Sue is in the room.
        John (near-sighted): 'Look! Mary is in the room.'
        Bill: 'What are you talking about? That's Sue, not Mary.'
        a. John: 'I'm sure that's Mary.'
           One minute later, Kent joins them. Sue is still in the room.
           Bill (to Kent): '**John said that Mary is in the room**.
           But that's not true. The one that is in the room is Sue.'
        b. John: 'Yeah. You're right. That's Sue.'
           One minute later, Kent joins them. Sue is still in the room.
           Bill (to Kent): '**John said that Mary is in the room**.'
        c. John: 'I'm sure that's Mary.'
           Sue leaves the room. One minute later, Kent joins them.
           Bill (to Kent): # '**John said that Mary is in the room**.'

Discourse (8a) is the full form of what we had already seen in (4). To repeat the finding: on the basis of (8a), Ogihara concludes that speaker's commitment to the truth of the complement at the actual utterance time is not a prerequisite for the use of a present tense: Mary is not in the room, but still a present tense in the complement is acceptable. Moreover, based on (8b), Ogihara argues that it also doesn't matter whether the reported speaker (John) has found out the falsity of the complement at some point after his utterance. By the time of the report, John no longer believes that Mary is in the room, but again the present is still acceptable. Comparing (8a) and (8b) (where Sue is still in the room) with (8c) (where Sue has left), Ogihara concludes that if the state that made John think that Mary is in the room still holds at the actual utterance time t_c, then we can use the present tense. Otherwise, we cannot.

Ogihara implements this observation in the following formal-semantic truth conditions for (3): (3) is true iff there exists a state s at the actual utterance time t_c such that John talks at the reported time in the past as if he ascribes to s the property of being a state of Mary's being in the room (Ogihara 1995: 205). Note that this state s has to hold at t_c. In (8a) and (8b), but not in (8c), there is such a state still holding, namely Sue's being in the room. This predicts correctly that (8a) and (8b) are acceptable, in contrast to (8c).

Ogihara thus proposes that (8) is an example of *de re* reports about states: John makes an utterance about a state which happens to hold at the actual utterance time, without this moment (which is in the future for him) playing a role in his mind. Building on Cresswell and von Stechow's (1982) analysis of *de re* reports about individuals, Ogihara then formalizes such *de re* reports about states in terms of acquaintance relations: (3) is true iff there exists a state

s at the utterance time t_c and a suitable acquaintance relation R such that: (i) s is the state to which John bears R in the actual world and time of his utterance; and (ii) John talks at this time as if in all his belief alternatives, s has the property of Mary's being in the room. In (8a) and (8b) there is such a state that satisfies these requirements, namely the state of Sue's being in the room, to which John is acquainted via the relation 'the situation that I am observing'.[5]

Focusing on the temporal part: this analysis elegantly captures the idea that although the report in (3) is in some way about the actual utterance time, that time need not have played a role in John's mind. The connection is indirect, namely via the state that John is acquainted with and that happens to include the utterance time. Note that the first complication that we started this section with has also been addressed elegantly: the state (of Mary being in the room or of Sue being in the room) that John takes for a Mary-in-the-room state is what we described earlier as the assumed Mary-in-the-room state.

Note that while we formulated the double access interpretation in terms of two time points, the intuitive picture of Ogihara's analysis is in terms of a state (or interval in Abusch's case) that includes both time points, rather than the two time points on their own. Indeed, the present tense on this picture can still be considered indexical since it picks up the actual utterance time, albeit with more requirements.

Although Ogihara provides a very elegant specification of the current relevance intuition, the key observation that has driven Ogihara's analysis has recently been questioned. This key observation was the following: as long as the cause of the reported speaker's belief (in our case a state which he takes to be a Mary-in-the-room state) is still present at the actual utterance time n, the present tense is felicitous; otherwise it isn't. Klecha (2015) questions this key observation with the example in (9):

(9)   Mary puts a balloon under her shirt. John then observes her in this state, and then says to everyone: 'Mary is pregnant!' Later that day, Mary takes the balloon out from under her shirt and pops it. Bill, aware of everything that happened, says to Mary: '(Earlier today,) John told everyone that you're pregnant.'

In this scenario, the cause of John's belief that Mary is pregnant, i.e. the state of the balloon under her shirt, is absent by the time of Bill's report. Nevertheless, the present tense is acceptable, suggesting that the key observation is empirically inadequate.

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[5] We find very similar insights in Abusch 1994, 1997, and Heim 1994 (a reformulation of Abusch 1994), with the difference that Abusch uses acquaintance relations to intervals rather than states. Heim reformulates these in terms of time concepts: the meaning of descriptions by which a speaker might represent a time to herself, technically a function from world-time pairs to times.

7.3.2   *A More Complex Picture from Experiments*

Inspired by Klecha's example, I have carried out two experiments together with Daniel Altshuler, Kristen Syrett, and Peter de Swart to arrive at a better understanding of the factors licensing a felicitous usage of the embedded present tense, aiming to make clear what the data are that a theoretical analysis should account for. These experiments targeted precisely those types of cases of interest to Ogihara and later Klecha, where the target sentence reports a false utterance. In the first experiment the participants were asked to indicate the acceptability of (past or present tense) speech report complements on a five point scale. The second experiment was a forced choice task, where participants had to choose between a past and present tense complements.[6]

Surprisingly, we didn't find that Ogihara's key factor, namely whether the cause of the false belief still holds, made a statistical difference. We zoomed in on those cases in which the cause of the belief no longer holds at the utterance time, and, inspired by the contrast between Ogihara's (8c) and Klecha's (9), we compared (i) short-term reported properties (e.g. *be in the room*) versus long-term reported properties (e.g. *be pregnant*), and (ii) three possible belief situations:

(A) cases where at the time of the report only the reporter (i.e. the agent of the speech report, the speaker of the target sentence) knows of the falsity of the reported belief (so both the reported speaker and his original audience still entertain this false belief);
(B) cases where both the reporter and the reported speaker know that the reported belief is false but the original audience still believes it;
(C) cases where everyone has come to realize that the reported belief is false.

We found an influence of both factors: (i) For both tasks (i.e. rating and forced choice) short-term reported properties disfavor present tense. For the rating task, sentences with short-term properties were rated significantly lower with embedded present tense than with past tense. In the case of the forced choice task, we found a higher percentage of present tense for long-term properties ($M = 62\%$) in comparison for short-term properties ($M = 22\%$). (ii) We found that belief states of others indeed seem to effect present tense use. In the rating experiment we found that only within condition C (where no one still believes the content of the reported belief) the present tense was rated significantly lower than the past tense. In the forced choice task we found a stronger preference for present tense in condition A (when only the reporter is

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[6]   See Bary et al. 2018 for the details of the experiment and the results including the statistics.

aware of the falsity; present tense $M = 50\%$) compared to condition C (when everyone is aware of the falsity; present tense $M = 41\%$).

The results from this experiment thus strongly question the key observation that drove Ogihara's analysis: even if the cause of the reported speaker's belief is no longer present, the present tense can still be felicitous. Although the formal mechanism of acquaintance relations may introduce some wiggle room, it is very hard to see how to account for the results from the experiment. An account in terms of acquaintance relations would have to come up with an alternative state, but what other options are there that would satisfy the truth conditions, i.e. states that John is acquainted with at the reported time, that continue up to and including the utterance time and that John talks about as if this state has the properties as described in the report? The situation may be slightly better for Abusch' analysis that uses acquaintance relations to times rather than states. As for (9), she (p.c.) suggests that the acquaintance relation in (9) could pick out the day in which the time of the reported speech act (rather than the time of the balloon being under Mary's shirt) is included, and since this day still holds at the actual utterance time the present tense is acceptable. While this would allow us to account for (9), the question, then, is why we don't have this flexibility for the infelicitous (8c).

As the experiment suggests, the difference in felicity between (8c) and (9) is influenced by two factors: in (8c) we have a short-term property, in (9) a long-term one (factor (i) above); and in (8c) the original audience no longer believes what they were told, whereas in (9), they still do (at least, that's the most natural interpretation) (factor (ii) above). This result raises the more general issue whether these findings could be dealt with within a purely formal-semantic theory in the first place. Although more research is needed to corroborate the effects of this factor, (ii) is particularly interesting since it means that tracking other people's beliefs affects our choice of grammatical morphemes, even in the case of people who are not participating in the actual conversation. How can we let what the original audience thinks (at the time of the report) play a role in the semantics of speech ascriptions? Wiggling with acquaintance relations doesn't seem the right track for that.

This comes on top of conceptual reasons to doubt whether acquaintance relations are the right track to explain the interpretation of tenses. Sharvit and Moss (this volume) discuss the general question what may count as an acquaintance relation and observe that if we want to include the way acquaintance relations are used in the temporal domain, no single notion of acquaintance fits all kinds of *de re* ascriptions. Cognitive contact seems too much to ask from relations to times, especially to times in the future of the attitude holder. This means we would need to do away with the causal-informational notion of acquaintance which was at the core of the original application (e.g. Lewis 1979b; Cresswell & von Stechow 1982). What's more, as Sharvit and Moss

show, we don't find temporal analogues of the Ortcutt example (Quine 1956) where we clearly see the effect of different acquaintance relations at work. While Sharvit and Moss are determined to account for the temporal domain in terms of acquaintance relations, and accept that therefore they have to stretch what counts as a suitable relation, an alternative and maybe easier move in light of the findings described above seems to be to give up a treatment of the present tense in terms of acquaintance relations.

An alternative, suggested by Bary et al. (2018), is that we go back to the informal idea of *current relevance* from the seventies. The different factors are then various ways in which the proposition expressed by the complement can still be relevant to the conversation the reporter is engaged in. Indeed, if we want to generalize over the various factors, it is hard to come up with a more concrete common core. But admittedly, we would like to see more rigor, if only to distinguish current relevance in this context from that of the present perfect, where this notion is also often alluded to (see e.g. Schaden 2013).

A second suggestion that also does not depend on acquaintance relations and that has a large pragmatic component has been brought forward by Klecha (2018). He proposes that semantically speaking, the use of the embedded present tense leads to ill-formedness when it is embedded under past, requiring pragmatic intervention to be rescued. According to Klecha, a double access interpretation is *nonliteral*, a special kind of loose talk. Klecha's key idea is that present-under-past sentences can be felicitously used when

the temporal resolution in the discourse is sufficiently coarse so as to conflate the event time of the attitude verb with speech time; in other words, in discourses where the interlocutors don't care to make the distinction between event and speech time for the purposes of discussing what they're discussing.

When the discourse is not sufficiently coarse, pragmatic enrichment via conflation of the actual utterance time and the reported speech act time will not be triggered and infelicity will arise. This conflation between the two times could be a way to make sense of the factors at play and perhaps even of the idea of current relevance in this domain more in general.[7]

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[7] This proposal is in some aspects similar to that of Kamp (2012), who takes what he calls 'documenting' cases of embedded present as the paradigms and conceptual origins of the double access phenomenon. In these cases the reported speech act took place in the same conversation as the report and the complement describes the topic of this conversation, as in (i) (from Kamp 2012):

(i)   But you said a moment ago that Mary is in Paris right now.

On Kamp's assumption that the present tense is used for eventualities that are presented as holding *throughout the conversation* (and not only at the utterance time of the sentence at hand), we already derive the double access effect, since both the reported speech act and the report take place within this conversation. Of course, occurrences of present tense under past tense matrix

Let's return to the experiments since a few comments are in order on the outcomes in relation to both the methodology used and the theoretical consequences. First, starting with the rating task, note that, when looking at the raw scores and overall, both types of sentences seem to be rated as acceptable: present tense: $M = 3.82$, $SD = 1.43$; past tense: $M = 4.02$, $SD = 1.34$. When we zoom in on the individual conditions, we find that the mean is 3.49 or higher and the medium is 4 or higher for each condition.[8] So even though we have been able to identify factors that influence tense acceptability, they do not have an all-or-nothing effect:[9] The acceptability of the present tense seems gradual rather than black or white. This may well be a task effect, at least in part: by presenting acceptability in the task as something that can be 'more or less', participants are encouraged to behave accordingly and also select the nonextreme options.[10] Still, in combination with the preference for the upper part of the scale, this suggests that present tense acceptability may indeed not be a black or white matter for language users. This point, I believe, should also be recognized in a semantic account of the present tense: it is ok, and maybe even preferable, if such account does not specify a rigorous rule that leads to a strict division between acceptable and nonacceptable cases.

Second, in light of this last point, it would be relevant to know if there are clearly distinguishable subgroups within the total group of participants, of participants who pattern together in terms of their judgments. For now, a simple examination, not aided by any statistics, revealed that in forced choice task one participant never chose the present tense, and three participants chose the present tense only once (all three for the combination of long-term property with either condition A or B). By contrast, no participant selected the present tense for all experimental items, or chose the past tense only once. Although the data need to

clauses are not restricted to conversation-internal uses. Kamp contends that in other cases "we extend the current 'conversation' – that of which we present our report as a part of – so far into the past that it includes the speech act to which our report refers." This forms a striking similarity with Klecha's account where present-under-past is felicitous when we feel justified to present things as if we can conflate the time of the original speech act and that of the report. In both cases present-under-past is analysed as some kind of loose or nonliteral talk.

[8] The lowest mean is for the condition ⟨ short-term reported property + C 'everyone has come to realize that the reported belief is false' + present tense ⟩ and the lowest medium for five conditions, the other seven thus having 5 as their medium.

[9] To be sure participants do use the lower part of the scale (scores 1 and 2) for the experimental items, and also regularly for the fillers that are ok as sentences in the given scenario except for a clear tense misfit, e.g. past time adverbial combined with a present tense. This makes the scenario less plausible that for the test items they do have black-or-white intuitions about the tense acceptability and that their choice for the 3 and 4 scores is the result of them reasoning like 'It's good as a report in terms of the content, it's only the tense that doesn't fit, so I score the sentence as a whole a 4.'

[10] The advantage of having a forced choice task in addition to a rating task is that in the former we don't introduce possibly artificial gradualness and we can be quite sure that the present tense is acceptable in the cases where it is used since this is the form the participants chose themselves.

be investigated further on this point, this tentatively suggests that some people have a higher standard of when the present tense is felicitous than others.

Combining these results with the theoretical discussion of the experiment presented earlier, a plausible semantic/pragmatic picture presents itself. Most theories on the present tense in speech reports agree that whenever the present tense is an option, the past tense is in principle an option too. So on these accounts, sentence (3) provides all the information that (7) provides and in addition something extra. If this is true then a preference for a present tense in certain cases can be understood naturally along Gricean lines: if there is an alternative form that provides more information (that is relevant for the current state of the discourse etc.) the speaker should use that form (maxim of quantity), unless she believes it's false or she does not have sufficient evidence for it (maxim of quality). With a relatively vague notion as 'current relevance' (either as such, or in terms of a pretended conflation of reported speech act time and actual utterance time [Klecha] or a pretended extended conversation [Kamp, see note 7]), this would then explain why some people have a preference for the past and other for the present in individual cases: people simply differ in what for them counts as currently relevant. If they strongly believe that the reported proposition is still currently relevant, they have a preference for the present tense since that gives more information. But if they are hesitant or believe it's not relevant anymore, they use the past tense, since otherwise there is a risk of violating the maxim of quality. Since there is no fact of the matter as to what counts as currently relevant each person makes their own trade-off and we see both choices.

This ends my discussion of the present tense in speech reports.[11] What we may take from the discussion in this section (in addition to the well-known fact that what the SIMPLE PICTURE is way too simple to account for embedded contexts) is a warning that we shouldn't lean too heavily on acquaintance relations and that we should keep our eyes open for the option of felicity as a graded notion and of differences between speakers.

7.4   Historical Present

Let's consider a second phenemonen of present tense use where the SIMPLE PICTURE does not in itself suffice and more needs to be said. The SIMPLE PICTURE entailed that we use the present tense to indicate that the eventuality e that we describe holds at the time t_c at which we utter our sentence. In the case of the so-called historical present, however, the present tense is used to

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[11] It is not a comprehensive overview of the topic. Very relevant for a more comprehensive account are the observations in e.g. Altshuler et al. (2015), a corpus study and pragmatic account of the differences in present tense use between speech and attitude reports, and Ogihara and Sharvit (2012), a study of the crosslinguistic variation between Hebrew, Japanese and English in tenses (including present-under-future, which I didn't discuss) in attitude complements and relative clauses.

describe eventualities that are strictly speaking in the past from the utterance time. Consider (10) where we see a switch from past to present tense:

(10)   In the days before the funeral, I saw but little of Peggotty ...
         If the funeral had been yesterday, I could not recollect it better. The very air
         of the best parlour, when I went in at the door, the bright condition of the fire,
         the shining of the wine in the decanters, the patterns of the glasses and plates,
         the faint sweet smell of cake, the odour of Miss Murdstone's dress, and our
         black clothes. Mr. Chillip is in the room, and comes to speak to me.
         "And how is Master David?" he says, kindly.
         I cannot tell him very well. I give him my hand, which he holds in his.
         . . .
         All this, I say, is yesterday's event.
                                        (Charles Dickens, *David Copperfield*, Chapter 9)

In cases like (10) it may seem natural to interpret the present tense in terms of pretense: the narrator pretends to be located at a different time (and maybe also place) than the one he is actually located at at the time of his utterance and he seems to relive his experience. This view on the historical present gives rise to a cluster of questions around the notion of pretense: what exactly does it mean to pretend to be at a different time? What place should pretense have in a theory of natural language interpretation (maybe in addition to a formal-semantic component)? Are there any constraints on the use of the historical present that can help us understand this phenomenon and the potentially needed concept of pretense?

Unfortunately, I will not be able to answer these questions. Nevertheless, I'll try to provide some conceptual clarification. I'll discuss Schlenker's (2004) and Anand and Toosarvandani's (2016) analyses, two of the few accounts of the historical present in the formal-semantic tradition. Both accounts courage-ously try to say more than just the above-given informal description and in order to do so both look at the co-occurrences of the historical present with other indexical elements (in a broad sense, as elements that are usually interpreted with respect to the actual context of utterance).[12] In Schlenker's account it's the co-occurrence with indexical adverbial temporal expressions, in Anand and Toosarvandani's account it's predicates of personal taste.

7.4.1   Schlenker's Context of Thought and Context of Utterance

Schlenker's key example is (11):

(11)   Fifty eight years ago to this day, on January 22, 1944, just as the Americans
         are about to invade Europe, the Germans attack Vercors.

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[12] We'll see below that this notion needs to be further differentiated on a bicontextualist account, as used in both papers.

Note the past time temporal adverbials in this example, which clearly indicate that the eventualities described are actually in the past. For Schlenker these adverbs are an indication of how to understand the historical present: The temporal adverbials and the present tense, both at least *prima facie* indexical expressions, are not to be evaluated with respect to one and the same Kaplanian context since the combination would result in a clash.

Schlenker notes that this is somewhat similar to what we see in Free Indirect Discourse, a narratological technique in which we read the thoughts or utterances of a character in the story, but where these thoughts/utterances are not embedded under an attitude or speech verb that explicitly attributes them to this character. This technique has attracted considerable attention, first mainly from narratologists and more recently also from linguists. Schlenker gives the example in (12):

(12)   Tomorrow was Monday, Monday, the beginning of another school week!
(Lawrence, *Women in Love*)

As in the case of the historical present, here too the indexical temporal adverb *tomorrow* and the past tense would result in a clash were both to be evaluated with respect to the same context. Together, Schlenker takes these data to show that we have to distinguish two contexts, a context of thought and a context of utterance. He describes the context of thought as 'the point at which a thought originates'. The context of utterance is 'the point at which the thought is expressed.' He continues:

The difference rarely matters in everyday life: a person's mouth is located near a person's brain, and as a result the point at which a thought is formed is not significantly different from that at which it is expressed. If we were very different creatures, we might be able to have our brain in one location and to express its thoughts in another. (Schlenker 2004: 279)

Although the difference doesn't come out in everyday life, Schlenker argues that the two literary styles mentioned above, the historical present and Free Indirect Discourse, do tease the two contexts apart. Here the narrator presents things as if the context of thought is significantly different from the context of utterance. In these constructions, only one of the two contexts is the actual context of the narrator, the other is a nonactual context in the story.

As for Free Indirect Discourse, Schlenker's account closely follows ideas already found in Banfield (1982) and Doron (1991). In Free Indirect Discourse, he contends, the context of utterance is the actual context, that is, the context of the narrator at the moment of the narration, but the context of thought is the context of a character in the story. This gives the impression that 'another person's thoughts are articulated through the speaker's mouth'. The felicity of (11) is then explained as follows: tenses and pronouns are variables

and as such always anchored to the context of utterance. All other indexicals, by contrast, are anchored to the context of thought. For (11) this means that the time denoted by *tomorrow* is in the future for the character (the context of thought) but in the past for the narrator (the context of utterance, which is the actual context here), resolving any impending contradiction.

While the Free Indirect Discourse part of Schlenker's account has received considerable attention, the historical present component has gone somewhat unnoticed (one notable exception is Eckardt 2015). Schlenker proposes to analyze the historical present as the mirror image of Free Indirect Discourse. He argues that we find the opposite pattern: here it's the context of utterance that is a nonactual context (in the story), while the context of thought is the actual (narrator's) context. Indexical expressions still having the same anchoring, this means that the present tense in (12) is anchored by the (nonactual) context of utterance, while the temporal adverbial *fifty eight years ago to this day* is anchored by the context of thought, which here is the actual narrator's context. As in the case of Free Indirect Discourse, this then explains the felicity of (11).

Despite its elegance, I believe there are some problems with this account of the historical present. In the following I will discuss the three problems from Bary (2016).

The Historical Present and the Two Contexts

The first problem is that there is no intuitive reason to say that for sentences in the historical present, the context of utterance is shifted to a nonactual context in the story, while the context of thought remains the actual, narrator's context. Surely, historical presents seem to be interpreted with respect to a nonactual context, but there is no intuitive reason to say that this is a context *of utterance* (rather than of thought). Schlenker writes:

from the present perspective, the explanation [for the felicity of (15)] is simply that the time of the Context of Utterance v is set exactly fifty eight years before the time of the Context of Thought θ, which yields the impression that the speaker is directly witnessing the relevant scene. (Schlenker 2004: 281)

Note that Schlenker speaks about *a witnesser*. A witnesser (the effect to be explained), however, is intuitively a thinker at least as much as a speaker, and hence the effect is not explained by shifting the context of utterance while leaving the context of thought unchanged. Take, for instance, our example (11), where the first-person narrator seems to be lost in thought. It is important to keep in mind here that for Schlenker the distinction between the two contexts is not just a technical distinction. He wants to *explain why* tenses and pronouns are evaluated with respect the one, and all other indexicals with respect to the other context. In his explanation he uses the conceptual distinction between the two contexts, one being the context of a thinker and the other

a context of a speaker. For demonstratives, for example, he maintains that their reference depends on the 'referential intentions of a thinking agent' which explains why they are evaluated with respect to the context of thought and hence shifted to the character's perspective in Free Indirect Discourse. This means that we would lose much of the explanatory value if we gave up the conceptual characterization of the two contexts.

The Historical Present and Other Indexicals

Schlenker's account of the historical present makes predictions about the interpretation of other indexicals in the sentence, such as demonstratives and temporal adverbs. These predictions are not borne out. As we have seen, Schlenker argues that in the case of the historical present it's the context of utterance that is shifted, while the context of thought remains the actual, narrator's context. This means that the tenses are evaluated with respect to a nonactual context in the story, explaining the fact that the present tense refers to the past. But it also implies that the other class of indexicals (containing adverbs, demonstratives, etc.) is evaluated with respect to the actual context. (It might be confusing to call this the 'narrator's context' since the narrator pretends to speak at a different time, but it is the context where (s)he is actually speaking). This seems to be correct for (11), but just as natural are examples such as (13) (made-up) where adverbial indexicals are interpreted with respect to the shifted context (as are the tenses).[13]

(13)   Paul walked to his mother's house. Suddenly he notices Susan, his French teacher. He hides behind the bushes since today he is not up to talking to her. When she is gone, Paul continues his walk.

(14)   ? Paul walked to his mother's house. Suddenly he notices Susan, his French teacher. He hides behind the bushes since that day he is not up to talking to her. When she is gone, Paul continues his walk.

If we follow Schlenker's analysis, *today* in (13) should be evaluated from the actual context, that is the context with respect to which the past tense of *walked* (so before the shift to historical presents) is evaluated as being in the past. The natural interpretation, however, is that it is the day surrounding the time in the story, the time when he sees Susan. In fact, to refer to that day the expression *today* seems a more natural choice than *that day*, as used in (14), the choice predicted by Schlenker's analysis.

A possible objection may be that *since today he is not up to talking to her* in (13) is Free Indirect Discourse, and that that's why *today* is evaluated with

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[13] Schlenker gives example (i) in a footnote, leaving it for future research:

(i) Forty years ago today John Lennon is about to take to the stage at the Cavern. Tonight his life will change forever.

respect to a shifted context of thought, which is in this case the same as the shifted context of utterance, with respect to which the present tense is evaluated. In other words, we have Free Indirect Discourse in the historical present, a phenomenon also discussed in Eckardt (2015). This combination is problematic on Schlenker's account, however. As we have seen, Schlenker argues that the constellation that characterizes Free Indirect Discourse is the combination of an actual narrator's context for the context of utterance with a context of thought that is shifted to a context in the story. By contrast, for the historical present, it's the context of utterance that is shifted, while the context of thought is the actual, narrator's context. This predicts that Free Indirect Discourse can never occur in the historical present, since the two make contradictory requirements on the two contexts.

Having seen in (12) that the conceptual distinction between the two contexts (as one being the context of a speaker and the other of a thinker) is untenable, the current observation shows that even without the conceptual component of the analysis, the account is problematic. We have seen that the historical present does not exclude the possibility of other indexicals being evaluated with respect to a nonactual context as well. Again, we could try to rescue some of Schlenker's account, this time by giving up the idea that the context of thought is always actual in the case of the historical present, and the same for the context of utterance in the case of Free Indirect Discourse. This then would allow for constellations where two context shifts are stacked on top of each other (and a mechanism would need to guarantee that we do not end up with two different nonactual contexts!). Below we will see that there would still be a problem left.

The Lack of a Nonactual I

A final argument against treating the historical present as the mirror image of Free Indirect Discourse is the following. While Schlenker treats tenses and pronouns on a par (being variables they are always interpreted with respect to the context of utterance), a striking difference between the two is that we do not find the equivalent of the historical present in the person domain, that is a nonactual *I*.

Schlenker makes up an example that, according to him, tentatively suggests that it does occur:

(15)   Situation: Mary, a psychic, is sitting at a café in Clamart with a journalist in 2002. They are trying to reconstitute what happened during the attempted assassination of de Gaulle in 1961 at the Petit Clamart. Mary utters the following:
         It's April 2, 1961. I am de Gaulle. I am on my way here in the presidential car. Two snipers appear . . .   (Schlenker 2004: 298)

Schlenker claims that while *here* refers to the actual context, not only the present tenses but also *I* are evaluated with respect to the shifted context of

utterance. This example is problematic for two reasons. First, I am not sure that *I* refers to De Gaulle here. The sentence as a whole should rather be interpreted as if the speaker self-ascribes the property of being De Gaulle. Second, if the possibility of a nonactual *I* were part of our language (as is the historical present), we wouldn't expect to need a psychic to let it come about. Note in this respect that for the historical present too, the narrator only presents things *as if* the context of utterance is nonactual.

Although the idea of distinguishing between two contexts of evaluation for indexicals seems promising, the division that Schlenker makes does not seem tenable. In the next section I'll discuss an account that is likewise informed by the co-occurrence with other classes of indexical expressions in the broad sense, and that likewise distinguishes between two contexts of evaluation.

7.4.2   Anand and Toosarvandani's Context of Assessment and Context of Utterance

Anand and Toosarvandani (this volume) try to understand the historical present better by studying the interaction between this use of the present tense and predicates of personal taste. They observe that while disagreement about the applicability of such predicates is usually 'faultless' (i.e. disagreements without a clear matter of the fact), it's not in the case of the historical present. To see this compare the present and past tense in the last sentence of (16):

(16)   C: [talking to A and B] How was your vacation?
        A: Well, while we're in Massachusetts, we visit this apple orchard. They have their own cider. It's delicious!
        B: No, it {'s, was } disgusting.   (Anand and Toosarvandani, this volume)

The intuition here is that in the case of the past tense speakers A and B can simply agree to disagree and continue, but in the case of the present tense there is a problem that needs to be solved (i.e. A and B they have to settle this issue) before they can continue. At a general, intuitive level, a natural explanation provides itself: the historical present can only be used in narratives and we do have *joint* oral narratives, with multiple people telling a story together (see references in their chapter), but such narratives, as are narratives that are the product of one single speaker, (by default, I would add, i.e. unless we have linguistic clues to the contrary) are evaluated with respect to a single 'point of view', which is impossible in the case of a faultless disagreement. This then explains why the historical present tense is infelicitous on a faultless disagreement interpretation.

Anand and Toosarvandani make this explanation more precise in the following way. Like Schlenker, they use a bicontextual semantic framework. In their version, the second context that is relevant for the interpretation of

indexicals, next to the context of utterance, is the *context of assessment*. Anand and Toosarvandani's distinction does not line up with Schlenker's between a context of thought and a context of utterance, as they divide up context-sensitive expressions differently. The interpretation of the historical present (and actually all present tense uses) and that of predicates of personal taste are connected as they are both relative to this *context of assessment*.

Building on their earlier work (Anand & Toosarvandani 2018a, 2018b), they propose a unified semantics for the present tense that includes the canonical use of the present tense, the broadcaster present tense ('he shoots … and he scores!!!') and the historical present. They argue that all three uses of the present tense can be understood as picking up the time of the context of assessment and in that sense it's a unified proposal. Crucially, however, this time of the context of assessment is not always the time of the context of utterance, our t_c. In the case of the historical present, the time of the context of assessment precedes the time of the context of utterance.

From here they explain the impossibility of faultless disagreement in sentences with the historical present as follows: The use of the historical present is restricted to narratives, which require a stable context of assessment. For faultless disagreements, by contrast, we need multiple contexts of assessment. So the historical present is not compatible with a faultless disagreement interpretation of predicates of personal taste.

In order to have a stable context of assessment in the case of the historical present, they specify this further as 'the interval [i.e. the time of the context of assessment] is conventionally set wide enough to accommodate the entire story'. One advantage of this analysis is that it explains why the historical present, but not the canonical use of the present tense, is compatible with nonstative predicates in English. The time of the context of assessment, noninstantaneous in the case of the historical present, can happily contain eventualities of predicates that don't have the subinterval property (cf. Dowty 1986). A drawback of the choice to set the time of the context of assessment wide enough to accommodate the entire story is that we do not explain the intuition that in a series of historical present tense descriptions as in (10) what is present/actual (or maybe 'where we are in the story') seems to change as the discourse unfolds. The context of assessment is stable on this account, and essentially so, to explain the interaction with predicates of personal taste. The context of utterance is updated throughout the narrative, but since the context of assessment is always in the past of the context of utterance in the case of the historical present, the context of utterance cannot do any work in explaining the updating effect.

As a research agenda Anand and Toosarvandani's enterprise of looking at the interaction between the historical present and experiential elements is very valuable and to be appreciated. The same holds for the role they let the notion

of 'narrative' play in their analysis. I believe that these are promising directions for the future and in both respects I believe that semanticists should benefit from the numerous observations and insights obtained in cognitive linguistics and narratology. I'll discuss this a little further in the next section.

7.5   Concluding Remarks and Outstanding Questions

We started our discussion of the present tense with a very simple picture: we use the present tense to indicate that the eventuality e that we describe holds at the time t_c at which we utter our sentence. We have seen that we need to modify this picture in at least two directions:

- On the basis of our discussion of present tense embedded in speech reports: what holds at t_c is not necessarily the eventuality described, at the very least not what we would *prima facie* take as such;
- On the basis of our discussion of the historical present: it may not always be t_c to which the present tense is related.

However, neither of the two present tense phenomena has received a satisfactory analysis to the best of my knowledge. How should we proceed from here? My general take on this is that we should see this as an interdisciplinary enterprise. I will sketch a few possible directions.[14]

Looking back at what we have seen, it is striking to find both in Klecha's account of the embedded present tense and in many accounts of the historical present the idea of 'nonliteral talk'. On Klecha's account, when present tense is used in the complement of a speech report we present things *as if* we can conflate the time of the reported utterance and the actual time at which we make this report. In many accounts on the historical present, we do *as if* we are at a different time. In Schlenker's account, for example, we present things *as if* the context of utterance is a nonactual context and significantly different from the context of thought. A major step forward could be set if we understood this *present as if* better.

In general, I expect that formal semantics could learn much from insights from narratology, cognitive linguistics and, more recently, philosophy of fiction. One may be Nijk's (2019) distinction, apparently going back all the way to Bühler (1934/1990), between two distinct conceptual scenarios that may facilitate 'paradoxical' combinations of indexical expressions, as we find with the present tense: a displacement scenario and a representation scenario.

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[14] I acknowledge that in many accounts of tense and aspect, it's not the eventuality time but a certain *reference time* (also called *location time* or *topic time*) that tense relates to the utterance time (and the relation to the eventuality is only indirect, mediated by this reference time, with aspect specifying the relation between eventuality time and reference time). I left aspect out for reasons of space.

While most scholars, according to Nijk, have taken for granted that the historical present must be resolved in terms of a displacement scenario where the 'conceptualizers' are mentally displaced to the distal space, there are examples of the historical present where this scenario is problematic, given the presence of retrospective elements. This holds for example for (17):

(17)   For about two minutes, Vleerlaag hears shots [fired] at irregular intervals. Translation of the Dutch original example: 'Ongeveer twee minuten hoort Vleerlaag schoten, met onregelmatige tussenpozen.' (van Krieken et al. 2016: 167–168; Nijk 2019: 43)

As Nijk puts it, an observer on the scene would not be able to oversee the temporal structure of the events in this way (on a par with (11), but not (10)).

   Probably related to this, it would be good to put more effort in understanding the role of *experiencers* in the interpretation of language. Free Indirect Discourse, originally the domain of narratologists and text linguists, has recently received a lot of attention in formal semantics (e.g. Schlenker 2004; Sharvit 2008; Eckardt 2015; Maier 2015). For Free Indirect Discourse it is has become very common to introduce a thinker, as distinct from the narrator/actual speaker. But in the narratological literature Free Indirect Discourse is just one form of *represented conciousness*. Represented conciousness is ubiquitous in narratives and also includes for example *narrated perception* where the eventualities described are the eventualities as perceived by some experiencer in the story, as in (18):

(18)   He opened his eyes. The sun was bright. Children were playing on the grass.

If some kind of thinker is introduced to deal with Free Indirect Discourse (which describes what a character thinks), we might expect the same for narrated perception (which describes what a character perceives), but this phenomenon is much less clearly present in the current formal-semantics research agenda. It is good to realize, however, that the interest of semanticists in narratological techniques is not new. In fact, in the 1980s formal semanticists working on tense and aspect did already look at narrated perception (see e.g. Caenepeel 1989 and Dowty 1986). Dowty writes, for example:

we are invited to interpret such 'scene-describing' statives as if they were the perceptual observations that a hypothetical human observer would make in the situation described, either the narrator or the protagonist from whose point of view the narrative is constructed. (Dowty 1986: 50)

   So, in addition to the narratological and cognitive-linguistic literature, a promising direction would be to reexamine this formal-semantic literature on tense and aspect from the eighties (as Anand and Toosarvandani already did for their contribution to this volume), since tense and aspect are clearly not just about reconstructing the temporal order between described events, as an objective matter, but are tightly connected to experience.

The results from Bary et al.'s 2018 experiments on tense in speech reports raise the question what kind of account would be able to deal with the observation that tense choice seems to be influenced by certain hard-to-formalize factors. Is compositional semantics still the field where we should try to deal with these observations (for example in terms of acquaintance relations (see Sharvit and Moss's contribution) to times or states as it is traditionally done) or should we rather move to looser pragmatic talk? And in addition, we have seen that the use of linguistic experiments almost inevitably leads to gradual outcomes and differences between language users. At the moment our semantic theories are not adequately equipped to deal with these methodological consequences. Should this change? These points should definitely be discussed in collaboration with psycholinguists, but I also see a role for philosophers of language here.

In a following stage, after consultation of and collaboration with the language disciplines I mentioned, the main question would be how to connect the formal-semantic elements to the insights from these collaborations. Is the formally worked-out part of the present tense just the simple picture as I called it and is the remainder of what we need external to formal semantics, or should we try to incorporate this?

In terms of the topic of this volume, at the very least, we can say that this study on the present tense suggests that a fruitful bridge between linguistics and philosophy is not to be found exclusively on the formal side. The two fields should also work together to deal with the challenges we encountered to make clearer some conceptual issues concerning, for example, perspective-taking, pretense, gradualness in language, and differences between speakers.

I want to end this chapter with a quote from the cognitively oriented linguists Sweetser and Fauconnier:

Natural language has a striking potential for making rich and extensive meaning available on the basis of very little overt linguistic structure. (Sweetser & Fauconnier 1996)

Indeed, even if you only consider the present tense it is amazing how this morpheme opens up a whole world with people who have certain beliefs, with experiencers and invitations to us to imagine. Exciting about the current time is that the interests from language disciplines as different as philosophy, formal semantics, narratology, and cognitive linguistics are very close to each other. If forces are joined, a better understanding of the present tense should be within reach.

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8   Evidentiality: Unifying Nominal and Propositional Domains

Diti Bhadra

8.0   Questions and Answers

(1)   Why do you think both linguists and philosophers find evidentiality interesting?

The phenomenon of evidentiality has been a prime topic of interest for linguists and philosophers because it lies at the intersection of the cognitive processes of human reasoning, perception, acquisition of beliefs, and the causal connections between these domains.* Evidentiality is also among one of the most well-studied phenomena empirically, with an extensive body of work describing diverse crosslinguistic patterns. Almost overwhelmingly, this body of work has been about propositional evidentiality, i.e. evidentials that have scope over a proposition and provide information about how that proposition came to be available to the agent. In this chapter, my goal is to also bring the sparsely studied phenonemon of non-propositional evidentiality into the fold and provide a unified approach to both domains. While propositional evidentials signal a particular flavor of evidence (sensory/perceptual, inference, report) towards propositional content, non-propositional evidentials scope over subsentential constituents (overwhelmingly noun phrases), and are fused with the determiner/demonstrative systems or with nominal tense markers. The juxtaposition of these subtypes of evidentiality makes the discussion even more interesting to researchers studying the mechanisms underlying the acquisition of knowledge and beliefs. I want to also highlight that a phenomenon like evidentiality is of high significance in the modern era of disinformation in written media, proliferation of fake news, and manipulation of our communication systems to delegitimize objective truth. We have seen in the very recent past legal and political debates over hearsay vs. direct evidence (late 2019, early 2020), claims taken out of context in political discourse (where the context contained evidential information), etc. Formal studies of

evidentiality can thus not only intrigue linguists and philosphers interested in theoretical and cognitive architecture, but also find direct applications in computational linguistic research aiming to fight disinformation, as well as socio-linguistic analyses of today's social and political world.

(2)   What recent developments in linguistics and philosophy do you think are most exciting in thinking about evidentiality?

There has been a great deal of exciting work in theoretical, empirical, and experimental approaches to evidentiality. However, the interaction between evidentiality and two other prolific corners of the grammar have revealed astounding underlying connections – between evidentiality and temporal and aspectual categories, and between evidentiality and speech acts. The latter work has revealed that the internal semantics of evidentials are sensitive to the grammatical point of view encoded by particular speech acts (Murray 2010; Bhadra 2020), while the former body of work has demonstrated how the boundaries of events and their internal structure are interwoven with flavors of evidence (Chung 2007; Fleck 2007, among others). In this chapter, I demonstrate that there are cohesive parallels in how flavors of both propositional and non-propositional evidentiality interact with verbal and nominal tense and aspect.

(3)   What do you consider to be the key ingredients in adequately analyzing evidentiality?

The biggest challenge in this research area is to be able to accurately capture the interactions between evidentiality and tense and aspect in compositional terms. This challenge is especially magnified by the attempt at unification of propositional and nominal evidentiality, since in the latter subdomain we do not have the familiar interactions between evidence-bearing elements scoping over propositional objects. In this chapter, I use tools from modal logic to show that we can: (i) unify the subdomains of evidentiality using modal accessibility relations while also preserving important distinctions between them, (ii) use the same tools to compositionally capture the interaction between evidentials and (nominal and verbal) tense and aspect, and (iii) have the representation of an agent's certainty of belief be reflected in quantificational force.

(4)   What do you consider to be the outstanding questions pertaining to evidentiality?

I model nominal evidentiality in this chapter with the same tools as propositional evidentiality, but with divergent outcomes to capture their differences. However, two outstanding avenues of inquiry can be formulated: (i) can nominal evidentiality (i.e. evidence for a nominal) be reanalyzed as markers of evidence for statements about existence of the nominal instead? Taking this path would entail committing that all nominal evidentials are always covertly propositional

evidentials. I believe much more empirical work in the very understudied nominal tense and demonstrative/determiner systems are needed before we can begin to formulate diagnostics to tease apart these distinctions and consequently weigh conflating them; (ii) the ontological status of nominal tense is well debated in the literature, with recent work claiming that such a category does not exist. This chapter aims to analyze evidentiality in the nominal domain (which is intertwined with elements that have been argued to provide tense information) without taking an explicit stance on the theoretical debate surrounding the ontology of nominal tense itself. More detailed empirical work is needed to ascertain where the faultlines of such interspersed phenomena lie with respect to the predictions of the theory presented here.

8.1   Introduction

An evidential is a linguistic marker of *how* an agent came across a piece of information (Chafe & Nichols 1986; Aikhenvald 2004). This 'how' is termed as the *evidence* for the information, and natural languages allow a variety of manners of evidence-collection, leading to a range of evidentials. The issue of evidence for a proposition has been viewed in both linguistics and philosophy as a complex issue. The cognitive processes that are involved in qualifying the content of an agent's utterance with the source of the information are sensitive to several kinds of considerations: via **what mechanism** was the evidence collected (perceptual senses, inference from some observable consequences of an event, inference based on world knowledge, hearsay from a third party, hearsay from legends); **when** was the evidence made available to the agent temporally (when the event took place, or when the results were detected, or at a time distal/proximal to the time of the verbal report, and so on); how **reliable** is the source of the evidence (an agent may rank a third-party source over their own inference in a judge of trustworthiness). Consider the sentence below from Jarawara (Dixon 2004):

(1)   [[mee tabori   botee]-**mete-moneha**] otaaA   awa-**hamaro**
         3nsg   home:f old-FPnf-REPf   nsg.exc see-FPef
         ama-ke
         EXTENT-DECf
         'We were seeing this in the far past what was reported to be their old camp from
         far past.'

This sentence has three different evidentials on different elements, marking different flavors of evidence. In Jarawara, the evidentiality paradigm is fused with tense (much like in many grammaticalized evidentiality systems). The speaker uses a combination of a firsthand far past tense and a firsthand eyewitness evidential to denote that even though it was a while ago, they witnessed everything in person. In addition, the speaker uses a combination of the non-firsthand past tense and the reported evidential to mark the fact that

they have only third-party reports about the location being another group's old village (cf. Aikhenvald 2018). Such richness in marking evidence is not rare in the world's languages; evidentiality is a robust phenomenon spanning diverse language families.

Evidentials have been prime objects of interest for linguists and philosophers interested in the cognitive processes of human reasoning, perception, acquisition of beliefs, and the causal connections between these domains. Evidentiality is also among one of the most well-studied phenomena empirically, with an extensive body of work describing diverse crosslinguistic patterns. Almost overwhelmingly, this body of work has been about *propositional evidentiality*, i.e. evidentials that have scope over a proposition and provide information about how that proposition came to be available to the agent. In this chapter, my goal will be to provide an approach to evidentiality that incorporates both propositional as well as *non-propositional* evidentiality (henceforth, PE and NPE, respectively). The difference between the two types is located in their scope. Propositional evidentials have sentential scope (syntactically they can only appear with finite clauses; see Bhadra 2018), and signal the particular flavor of evidence (sensory, inference, report) for the propositional content. Non-propositional evidentials scope over subsentential constituents (overwhelmingly noun phrases; Aikhenvald 2004; Jacques 2018), and are fused with the determiner/demonstrative paradigms or with nominal tense markers. In (1) above, both these types of evidential marking are visible: the noun phrase is marked with REPORTATIVE evidential (fused with a far past tense),[1] while the proposition is marked with two DIRECT evidentials.

I chose to begin our discussion with an example from Jarawara for a few reasons. Firstly, NPE itself is attested in only a handful of languages (Jacques 2018). Secondly, Jarawara is one of the very few exceptions in the world that has lexicalized manifestations of both PE and NPE in the same language. Thirdly, it is known that overwhelmingly, most non-propositional evidential systems encode only *perceptual/sensory* evidence, i.e. that the referent denoted by the noun phrase the evidential scopes over became available to the agent through perception with (one of) the five senses (Aikhenvald 2018; Jacques 2018). Jarawara and Ilonggo (Daguman 2018) are the only two exceptions where sentential/propositional evidentials (REPORTATIVES and INFERENTIALS) show up on noun phrases like in (1) (but see note 16 below for an explanation of this difference).

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[1] Many languages have been reported to have tensed nominals that interact with evidentials in that the same markers often perform both functions. In this chapter, although I will discuss non-propositional evidentiality at length and its interactions with temporality to some extent, I will not go into a full-fledged analysis of nominal tense (see Nordlinger & Sadler 2004; Haude 2004; François 2005). In fact, the ontological status of nominal tense itself is contested (see Tonhauser 2006, 2007).

With the sparse body of work on NPE (when compared to PE), several questions have remained unanswered: why does such a fundamental divide exist among languages with PE and NPE? More succinctly, what is it about nominals that favors only sensory perception? What can a unified view of evidentiality look like to capture its interactions with temporal categories like tense, and spatial categories like demonstratives/determiners?

I will attempt to address some of these issues through the main question I will pursue: **what is at the semantic core of an evidential?** This work will provide the first comparative formal semantic account of perception of nominals and propositions that tackles these questions, and adds another dimension: temporality. I will argue that the semantic core of an evidential is *a spatio-temporal modal accessibility relation*.[2] By defining the properties of this accessibility relation with the tools familiar to us from modal logic (Hughes & Cresswell 1986, among others), I will directly encode the subtype of evidence in the semantics, explore how this semantic core interacts with the possible arguments of an evidential – propositions most often, individuals/ entities in some cases, as well as map the vital property of speaker certainty. Concretely, three distinct flavors of evidentiality will be argued to embody three distinct spatio-temporal modal accessibility relations:

(i) at the semantic core of DIRECT (sensory) evidentials is a temporally sensitive *historical necessity* relation;

(ii) in contrast, INFERENTIAL evidentials of pure reasoning have an *epistemic accessibility* relation;

(iii) while INFERENTIAL evidentials of results have a *combination* of the above two.

This analysis will also allow us to unify nominal and propositional systems in a principled way. This chapter is organized as follows. Section 8.2 lays out the empirical facts spanning propositional and non-propositional systems; Section 8.3 delves into the issue of perception and its cognitive underpinnings in natural language; Section 8.4 explores the domain of inferences of different types; Section 8.5 concludes.

8.2   The Empirical Landscape

Propositions in natural languages can be qualified with a whole range of evidentials (these categories go back to Willett 1988): sensory, inference from results of events versus inference of general reasoning, conjecture, hearsay with few or many degrees of separation. Many formal analyses of such propositional

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[2] This semantics is thus going to be different in a fundamental way from the spatio-temporal extensional (non-modal) semantics proposed in Faller (2004), Chung (2007), and Koev (2016).

evidentiality classes exist (Izvorski 1997; Garrett 2001; Faller 2002; Matthewson et al. 2007; Murray 2010; Bhadra 2017, 2020, among others). The majority of languages allow all or subsets of these flavors of PE to be manifested in grammatical morphemes (languages with grammaticalized evidentiality) or in adjectives, adverbials, particles, and certain verbs (languages without grammaticalized evidentiality). For example, two types of evidential flavors are shown below: in (2), the reporter is overtly specified, and thus the quotative evidential is used (in contrast to a reportative where the source need not be overt); (3) is felicitous when the speaker has not actually seen the rain but infers it from the wet ground they see, and thus uses the inferential evidential to qualify the proposition.

(2)   nayil   pi-ka   o-n-**tay**-yo   Korean quotative
        tomorrow   rain-SU   come-INDIC-QUOT-POL
        'They said it will rain tomorrow.'   (Sohn 2018: example 7d)

(3)   de.ring char.pa btang-**zhag**   Lhasa Tibetan inferential
        today   rain   fall-PERF.INFER
        'It has been raining today.'   (Delancey 2018: example 18)

Non-propositional evidentiality, on the other hand, is mostly restricted to just the sensory/perceptual flavor of evidence; and even within that class, mostly just to visual perception. In addition, NPE is only instantiated in nominal tense paradigms, proximal/distal demonstratives, and some isolated cases of case marking (Jacques 2018). Jacques thus notes that PE and NPE form completely distinct systems in most languages.[3] For example, in Lillooet (Van Eijk 1997: 193, 195), two degrees of sensory evidential distinctions (visual versus non-visual) are encoded by determiners. Below, (4) shows the visual sensory determiner, and (5) shows the nonvisual sensory determiner in Lillooet.

(4)   pun-lkan   **ti**=n-lk'wal'us=a
        find-1SG.A   DET:VIS=1SG.POSS-basket=EXIST
        'I found my basket.' (the referent is visible to the speaker at utterance time)

(5)   ctas   lakwta   llakwu   **kwu**=s?'alalam=a
        come   NON.VIS there:NON.VIS DET:NON.VIS.=grizzly=EXIST
        'There is a grizzly coming from there.' (speakers hears a grizzly but does not see it)

8.2.1   A Space-Time Continuum

In both PE and NPE systems, considerations of space and time play integral roles in the phenomenon of evidentiality. In PE languages where temporality is intertwined with evidentiality, three temporal relationships have been argued to play a crucial role in determining which tense/aspectual marking is reflected

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[3] Jarawara, Ilonggo (Aikhenvald 2018), and Nivacle (Fabre 2014) are the only known exceptions, but see note 16.

on the verb in the presence of what flavor of evidence. The three salient times are the time the event occurred, the time the evidence about the event was acquired by the agent, and the speech time. The relationships between the event time (ET) and the evidence acquisition time (EAT), between the ET and the speech time (ST), and between the EAT and the ST are the main determinants[4] of temporal marking, with Korean, Bulgarian, and Matses (Pano-Tacanan, Brazil and Peru) being the most well-studied of such systems (Chung 2007; Fleck 2007; Lee 2011; Smirnova 2012; Koev 2016). In these works, the temporal relations are hard-wired in the semantics, while differing flavors of evidentiality are implications of the semantics (though see Pancheva & Zubizarreta 2018 for an approach in the opposite direction for the tenseless language Paraguayan Guaraní). For example, in Bulgarian, shown in (6), the use of the morphological 'perfect of evidentiality' signals that the speaker has indirect evidence (Izvorski 1997: example 14); similarly in Hunza Burushaski (Dené-Caucasian, Pakistan), shown in (7), the speaker uses perfect aspect to signal an inference made from the results of an event (Bashir 2006):

(6)   Maria   celuna-**la**   Ivan
        Maria   kiss-PE   Ivan
        'Maria apparently kissed Ivan.'

(7)   khuulto   giílt-ulo   buT-an   tiS   gutshari-**lá**   qheér
        today   Gilgit-in   great-INDEF   wind   blow-PERF.3S   disc
        'There was a storm in Gilgit today.' (concluded after seeing broken branches)

Many other languages embody this link between perfect aspect and inferential evidence apart from the ones mentioned above (including Turkic languages, Wakhi, Kalasha, Khowar, and Georgian, to name a few).

   In contrast to evidentiality being marked in the aspectual system, many languages also house evidential contrasts in their tense paradigms. For example, Bashir (2006) reports that Malayalam, among a large number of other languages, uses the simple past as a signal of a directly witnessed event, shown below:

(8)   Raman-re   acchan   i   viTu   nirmmiccu
        Raman-GEN   father.NOM   this   house   build.PST
        'Raman's father built this house.' (Speaker saw him building it).

   Bringing both tense and aspect languages into the fold, we observe that the primary factors in temporal PE systems is to determine the nature of linear and overlapping relationships between ET, EAT, and ST, and consequently, the evidential overtones are deduced. Let us call this parameter the *temporal factor*.

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[4] Employing terminology and acronyms borrowed from Lee (2011) here.

The most direct NPE counterpart of the temporality in PE systems is in NPE systems where evidentiality is marked in the *nominal tense* paradigms. The crucial parameter in such paradigms is the **visibility** of the referent:

- when the nominal past tense is used, then the implication is that the referent is **not visible** to the speaker at utterance time;
- when the nominal present tense is used, then the implication is that the referent is **visible** to the speaker at utterance time.

This paradigm is present in Somali (Cushitic, Somalia; Lecarme 2008), Naviclé (Matacoan, Paraguay and Argentina; Gutiérrez 2016), and Nambikwara (Nambikwara, Brazil; Lowe 1999). Nominal tense in general is a much rarer phenomenon than NPE (Jacques 2018), making this list the most exhaustive one of the empirical facts currently known (and see note 1 for the contested status of nominal tense). What is crucial to note here is that it is the parameter of visibility of the nominal referent at speech time that underlies the choice of the tense marking. Let us call this parameter of visibility the *spatial* factor – i.e. the one that evaluates whether the referent is present in the visual space of the agent at the moment of utterance. For example, Lecarme (2008: example 21a) describes the following situation in Somali: both the speaker and the hearer know that the girl is present in the next room; by the use of past tense, the speaker signals that the girl is absent from the immediate visual context. Thus crucially, the referent is '*epistemically* present/visible but *evidentially* past/hidden/distant' (Lecarme 2008) and that is when the nominal past tense is used:

(9)   Inantaa-**dii**   uur   bay   leedahay
        girl-F.POSS2S-DEFF.PAST[NOM] pregnancy C/F.3FS has.3FS
        Doctor to Mother: 'Your daughter is pregnant.'

Ivan and Özyildiz (2018) replicate this finding and further report that the *-dii* marker above is a part of pair of nominal tense markers (-KA and -KII)[5] in Somali which also function as definite determiners. The members of this pair are distinguished by the presence/absence of the same kind of visibility inference that Lecarme reports above in (9):

(10)   a. Shalay   waxa=an   firinayay   cadceed-**da**
           yesterday   FOC=1s   look.PAST   sun-KA
           'Yesterday I looked at the sun' ≈ **visible**
        b. Shalay   waxa=an   firinayay   cadceed-**dii**
           yesterday   FOC=1s   look.PAST   sun-KII
           'Yesterday I looked at the sun' ≈ **eclipsed**
                                             (Ivan & Özyildiz 2018: 27)

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[5] The *-dii* morpheme in (9) is an allomorph of -KII (Ivan & Özyildiz 2018).

The spatial factor is a robust one in evidentiality. There is a vast body of descriptive typological work that elaborates on how this concept of *distance* plays a role in the determination of evidential flavor (whether the agent was spatially proximal or distal to the salient objects/events being spoken about; see Friedman 2018 for a detailed list of works). Aikhenvald (2004) also observed that evidentials often develop from lexical expressions that are spatial deictics. In the formal literature, spatial relations have been encoded in the semantics of evidentials (Faller 2004; Chung 2007; Koev 2016)

The paradigmatic connection between visual perception and the known/unknown is not limited to nominal tense NPE systems only. Some NPE languages that do not have nominal tense but mark evidentiality in their *determiners/demonstrative systems* privilege visibility over other sensory sources (Van Eijk 1997). For example, reconsider the Lillooet data in (4)–(5); Tung et al. (1964) show the same pattern for Tsou. We saw a difference in the morphological paradigm based on whether the speaker *saw* the referent at speech time or a previous time (the 'known' demonstrative *ti...a* is used) versus the speaker *heard*, *touched*, *tasted*, *smelt* the referent at speech time (the 'unknown' demonstrative *kwu...a* is used). In languages like Lillooet/Tsou then, exactly when the perception happened (i.e. speech time or sometime in the speaker's lifespan) is not a distinguishing factor in the choice of the demonstrative, but the type of perceptual sense used is.

Careful empirical work has revealed that there are several systems similar to Lillooet. For example, in the Shina languages (Dardic, Pakistan, Afghanistan, and India), particularly in Kohistani Shina and Tileli Shina, it is the visibility of the referent (as opposed to nonvisibility) that determines the choice between proximal and distal determiners (Schmidt 2000; Schmidt & Kohistani 2001), and **not** the interaction with speech time:

(11) *aae/paár* proximal/deictic   visual/visible to sp./addr.

 asá/pér   distal/deictic   hearsay/not visible to sp./addr.

(12) **pér** bo   waá
      away [invisible] go.IMP EMPH
      'Go away!'

(13) mõ   **paár-aae**   váari   bój-m-as
      I   over.there (close, seen) direction   go-IMPV-1SG
      'I am going over there (a short distance in the speaker's line of sight).'

However, visibility at speech time vs. nonspeech time can definitely be a cutoff point for lexical choices in *other* determiner/demonstrative subclasses within NPE systems. For example, Huijsmans et al. (2020) show that in ʔayʔaǰuθəm (a.k.a. Comox-Sliammon, Central Salish, British Columbia), the subset of determiners classified as 'CDE' (current direct evidence) require

that the speaker sees the referent at speech time, while the other subset of 'PDE' (previous direct evidence) determiners require that the referent is not visible at speech time:

ɁayɁaj̆uθəm Current Direct Evidence determiner ɬə:
Context: There's a woman on the beach and you see her now.

(14)   nɛ   **ɬə**=saɬtxʷ   Ɂə=tə=q̓ʷɛt.
        be.there F.SG.CDE.DET=woman   OBL=CDE.DET=beach
        'There's a woman on the beach.'

ɁayɁaj̆uθəm Previous Direct Evidence determiner šə:
Context: I'm at your house, telling you about the bear encounter I had this morning.

(15)   niɁ-uɬ   **šə**=mixaɬ   Ɂə=šə=ət^θ=Ɂasq̓iyč
        be.there-PST   PDE.DET=black.bear   OBL=PDE.DET=1SG.POSS=outside
        skʷij̆uɬ
        morning
        'There was a bear in my yard this morning.' (Huijsmans et al. 2020: 11, 16)

Thus, within the determiner/demonstrative class of NPE languages, we have a divide between those that cut the pie along visibility/nonvisibility at any time (henceforth, Type I systems) vs. those that care about visibility/nonvisibility at speech time (henceforth, Type II systems). A striking similarity can be observed here between Type II determiner systems and the nominal tense paradigms above: in both types of languages, visibility at speech time is the crucial distinguishing factor in the choice of either using nominal past/present *tense* or a CDE/PDE *determiner*. An analysis which seeks to unify all these systems of evidentiality in the nominal domain has to represent these parallels in the semantics (see Figure 8.1). I model a semantics below which achieves this aim, and further unifies nominal evidentiality with its propositional counterparts using the same set of analytical tools.

We have seen the importance of both temporal and spatial deixis in the evaluation of evidence. The landscape of this interaction between the space-time continuum[6] and evidentials has been charted out well in PE systems. In this chapter, I will extend this landscape to include NPE systems. How can we represent the unifying factors across PE and NPE systems while preserving the differences?

In this comparative study of PE and NPE systems via the lens of the grammatical encoding of the space-time continuum, one of the major goals

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[6] I am using this term in a loose sense to refer to the joint involvement of temporality and spatiality in evidentiality, and not in the technical sense used in physics (i.e. where a space-time continuum is a mathematical model fusing three dimensions of space and one dimension of time into a single continuum; https://simple.wikipedia.org/wiki/Space-time).

the temporal factor   *the spatial factor*

TENSE
past = witnessed/DIRECT evidence
        for a proposition

ASPECT
perfective/resultative = inference of a
        proposition from results

PE

NOMINAL TENSE
past = the entity not visible at speech time
present = the entity visible at speech time

DETERMINERS/DEMONSTRATIVES
Type I:
{'known'/'proximal'}.**DET** = visual evidence for
the entity at speech time or at a past time
{'unknown'/'distal'}.**DET** = non-visual evidence
for the entity at speech time or at a past time

Type II:
{**current evidence**}.**DET** = visual/other DIRECT
evidence for the entity at speech time only
{**previous evidence**}.**DET** = visual/ other DIRECT
evidence for the entity at a past time only

NPE

Figure 8.1 Goal: A unified account of propositional and non-propositional evidentiality (PE and NPE)

is to provide a unified understanding of what is at the heart of an evidential. I will propose that at the core of an evidential is a spatio-temporal modal accessibility relation. The general spirit of the proposal is in keeping with other spatio-temporal deixis-oriented work mentioned above, but with fundamental differences that will be pointed out as we proceed. The differing range of evidential meanings will be achieved via a range of accessibility relations, ranging from historical necessity (for perceptual evidence) to epistemic accessibility (for inference based on general reasoning) to the interaction between the two (for inference based on results).[7] These formal notions will be incorporated using the tools of modal logic.

I will also discuss two fundamental issues arising from the comparison between PE and NPE systems: (i) why do nominal evidentials overwhelmingly appear only in perceptual form, while propositional evidentials allow the full range? (ii) what is a shared component between perceptual evidence for a nominal and for a proposition? In addition, in the analysis proposed here, it will become clear that commitment of the speaker and their evaluation of the

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[7] I am not going to discuss REPORTATIVE evidentials here, mainly because temporality has not been attested to be a strict factor for those, since no matter when you received a report it will always be an indirect source of information, given that your own perceptual/inferential processes are not coming into play for the proposition in the scope of the REPORTATIVE evidential. See Faller (2002), AnderBois (2014), Bhadra (2020), among others, for the semantics of reportatives.

reliability of the evidence source is a core component of evidentials as well, which will be built in simultaneously into the spatio-temporal accessibility relations.

8.3   Analysis: Perception

Let us begin by exploring the notion of perceptual evidence. Perception is crucial to intelligent agents in forming a coherent mental picture of the physical space surrounding them, encompassing objects, events, individuals. Perception, like inductive reasoning and hearsay, underlies the formation of beliefs, and yet enjoys a more privileged status in terms of reliability given its very direct relationship with physical properties of the environment. However, the nature of perception is inherently complex, and accounting for how connections are built between sensing the *appearance* of an entity and *reality* has been long recognized as a problem for any theory of perceiving by philosophers and cognitive scientists alike (Musto & Konolige 1993). Perception has been argued to be *causal* in nature, such that perceiving an occurrence in the physical world leads us to acquire a logical belief of what the truth/reality looks like, unless our prior knowledge base already contains information that defeats this new acquisition (Grice & White 1961; Cox 1971; Musto & Konolige 1993).

The main idea I want to underscore in this discussion is that perception has an epistemic component. The philosopher Dretske in his pioneering work (Dretske 1969, 1981, 1990) on the philosophy of perception (also see Jackendoff 1983 for the linguistic perspective, and Milner & Goodale 1995 for a neuropsychological one) has argued that what we are seeing at any given point of time is always evaluated against an existing body of knowledge he calls *proto-knowledge*.[8] The following (shortened) example from his work (Dretske 1969: 93) illuminates how our knowledge is incremented directly by visual perception, in a process Dretske calls *epistemic seeing*.

(16)   A: I have put some water on for tea; can you see whether it is boiling or not?
        B (perfunctorily): Yes, it is.
        A (suspiciously): Are you sure?

Dretske provides an extended discussion of how B cannot have known that the object on the stove is indeed water without visually experiencing it and confirming it himself. Thus, we have to be careful to not confuse the following: (i) *seeing that the water is boiling*, versus (ii) *seeing that something is boiling water* (Dretske 1969). In (i), the fact that it is water is asserted based on B's

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[8] We would not be very far amiss to argue that proto-knowledge is what modern day semanticists call an *epistemic modal base* (Kratzer 1991, 2002).

proto-knowledge (in this case taking A's assertion to be true), while the fact that it is boiling is accessed by B's own vision. In (ii), both the properties of the object being water and being currently boiling are confirmed by vision and thus added to the agent's knowledge. In formalizing a notion of perceptual evidence in this paper on evidentiality, I will apply these crucial insights. Mainly, what is termed as the process of perception is epistemic perception, such that the objects of perception are both evaluated against an agent's existent knowledge as well as help add to that knowledge new justified true beliefs causally formed via perception.

As stated above, my goal is to provide a view of evidentiality that encompasses both PE and NPE systems. In building the notion of epistemic perception just described, we will need tools that allow for "perceiving" both nominals as well as propositions (although intuitively propositions cannot be perceived; Lecarme 2008). How can we then build a cross-categorial model of epistemic perception that encodes both the spatio-temporal coordinates of physical reality and convey the (almost) absolute confidence that an agent places on the beliefs caused by perceptual processes?

The answer, I contend, lies in *historical modality* (Kamp 1979; Thomason 2002). A historical accessibility relation grants an agent a special kind of access:

(17)   **Historical accessibility relation** (Portner 2009: example 54)
         R is a historical accessibility relation iff for some time t, R = the relation which holds between two worlds w and w' iff w and w' are identical at all times up to and including t.

The guiding motivation behind historical modality is the need to model the asymmetry between a fixed past and an open future (based on a notion of "branching time," in which time is not a line but a tree with a fixed root (for past time) and many branching leaves (for possible future times) (Condoravdi 2001; Werner 2006)). A historical accessibility relation is a special modal relation whose role is to identify *historical alternatives* – i.e. given the world-time pair of evaluation $<w,t>$, its historical alternatives are worlds that are identical to w upto and including t, but are allowed to differ from w at times later than t. This accessibility relation can be pictorially represented as in Figure 8.2.

According to this model, at times later than t, the worlds start being different:

$$(\text{after } t) \; w \neq w' \neq w'' \neq w'''$$
$$(\text{before } t)'''w = {}''w = {}`w = w$$

Kaufmann et al. (2006) demonstrate this historical accessibility relation, denoted as $\approx$, is an equivalence relation in that it is reflexive, symmetric and
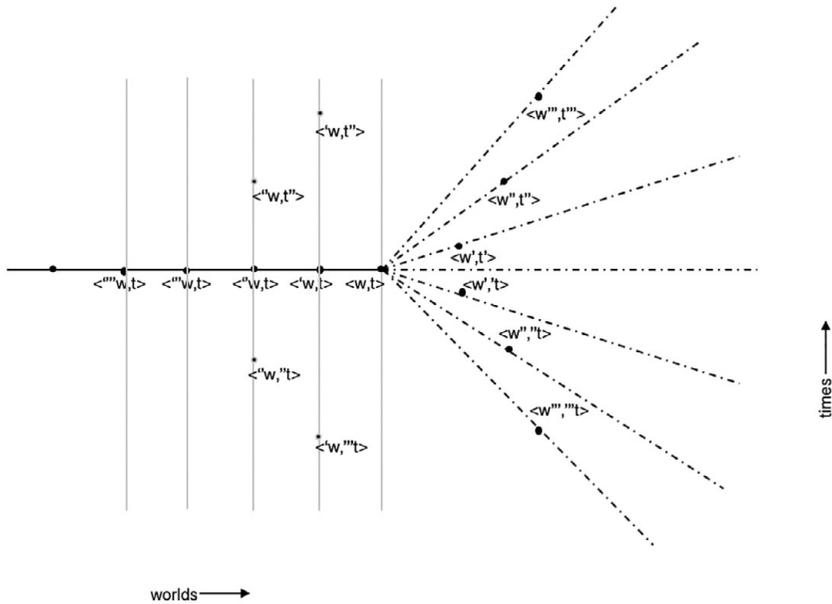
Figure 8.2 Historical alternatives

transitive. They formulate the crucial properties of the relation ≈ ('being a historical alternative to') as follows (Kaufmann et al. 2006: example 37):

(18)   Properties of ≈ (assuming $>$ and $<$ to be temporal precedence and succession relations, respectively (more on these operators below), and a truth assignment function V):
     a. ≈ is modal
     b. ≈ is an equivalence relation
     c. If $<w,t> ≈ <w',t>$ and $t'<t$, then $<w,t'> ≈ <w',t'>$
     d. If $<w,t> ≈ <w',t>$, then for all atomic sentences p, $V_{<w,t>}(p) = V_{<w',t>}(p)$

The last two clauses of the definition embody two important properties: (c) states that two worlds that are each other's historical alternatives at some time *t* have been historical alternatives at *all* times up to *t*, ensuring a hard-wired shared past. Accessibility of a world from the world of evaluation *w* at a given time is extended to all earlier times; (d) states that the truth assignment function assigns the same truth value to all atomic sentences that are evaluated at *w* and a historical alternative just like *w* – i.e. *w'*, given that they are identical worlds at a given time. The formulation in (18) then underlies the idea of **settledness** or **historical necessity**, because by design, truth at all historical alternatives results in necessity with respect to ≈. The past is thus incommutable in this design of metaphysical necessity (and the future

non-deterministically open), where an agent bases their certainty in their knowledge on the settledness arising out of universal access to all historical alternatives (denoted by $\square_{\approx}$ by Kaufmann et al.).

Access to all prior (identical) worlds at a given time seems certainly necessary in modeling epistemic perception. Crucially however, we also need *temporal* accessibility, whereby we have access to prior times as well, given that we are exploring the fundamental involvement of temporality in evidentiality in a large number of languages. Kaufmann et al. (2006) add a temporal dimension to possible worlds, by introducing an ordered set $(T, <)$. $<$ (the *earlier than* relation) has the following properties (which are preserved by its inverse operator $>$ (the *later than* relation) as well (Kaufmann et al. 2006: example 31):

(19)   Properties of temporal accessibility:
         a. *irreflexivity*: not ($t < t$)
         b. *transitivity*: if $t < t'$ and $t' < t''$, then $t < t''$
         c. *linearity*: $t < t'$ or $t' < t$ or $t = t'$

$>_{<w,t>}$ then gives us the set of all world-time pairs $<w,t'>$ that precede $<w,t>$ in time (given $t > t'$). The relationship holds in the opposite direction with $<_{<w,t>}$ as well, and additionally we have the sets $\leq_{<w,t>}$ and $\geq_{<w,t>}$ which include the current world-time pair $<w,t>$. We can quantify over these sets with the operators $\Diamond_{>/<}$ and $\square_{>/<}$ Prior 1967, and evaluate $V_{<w,t>}$ ($\Diamond_> \ p$) as 1 iff $V_{<w,t>}$ (p) is 1 for some $<w,t'>$ *in* the $>$ relation accessed from $<w,t>$, i.e. $>_{w,t}$.

Let us define perceptual evidence by combining both historical accessibility and temporal accessibility. I am going to use the symbol $\mathbb{K}$ to denote the combination of the operators $\square_{\approx}\Diamond_{\geq}$ (the historical necessity relation and the *earlier than* temporal accessibility relation including the present time). The mnemonic R_{V-N} stands for the accessibility relation $R_{visual-nominal}$, since we are first going to define perceptual/visual evidence in an NPE system. Assuming that our universe is represented by (variables over) entities (e), worlds (w), times (t), and that $<w,t>$ is the current world-time pair of evaluation:

(20)   Visual nominal: present
         $R_{V-N-Pres(<wt>, <e, w', t'>)} =_{def} \{< e, w, t > \mid \exists < w', t' > \in \mathbb{K}_{<w,t>}$
         SEE $(sp, e, w', t') \wedge t = t'\}$

The predicate SEE is true iff the speaker saw (in the pure sense of perceived via vision) the entity e at world w' and time t'. Since the *earlier than* temporal accessibility relation ($\Diamond_{\geq}$) grants access to the present time t and all times preceding t, the explicit restriction of equivalence between t and t' states that the seeing has be happening at the current time only. The output of this accessibility relation is a set of tuples with each member tuple consisting of

an entity, world, and time, and a specification that the speaker is seeing that entity currently as they are speaking, i.e. things/individuals visible to the speaker at speech time.[9] The morphological representation of this accessibility relation $R_{V-N-Pres}$ is the use of the nominal present in Somali, Naviclé, and Nambikwara.

In contrast, (21) has the same temporal accessibility relation that grants access to all of the times preceding t (including of course the historical alternatives as before), but with an explicit restriction that the seeing is not happening at speech time. Thus, the representation of the fact that at some point in all the world-time pairs before speech time, the speaker saw the referent is as follows:

(21)   Visual nominal: past
$R_{V-N-Past(<wt>,<e,w',t'>)} =_{def} \{< e, w, t > \mid \exists < w', t' > \in \mathbb{K}_{<w,t>}$
SEE $(sp, e, w', t') \wedge t \neq t'\}$

The output of this relation is a set of tuples with each tuple consisting of an entity, world, and time such that that entity was seen at that corresponding world and time. Crucially, the speech time cannot be any of these times. The nominal past tense shows up as the representation of this accessibility relation $R_{V-N-Past}$ in the same languages.

Now let us transition to propositional evidentiality while still remaining in the realm of perceptual/DIRECT evidence. The mnemonic R_{V-P} stands for the accessibility relation $R_{visual-proposition}$, since we are now going to define perceptual/visual evidence in a PE system. As soon as we are in the realm evidentials that scope over propositions, the validity of the propositions become salient. Assuming V is the valuation function in a frame in modal logic, and ψ is a proposition in the scope of a DIRECT evidential:

(22)   Visual propositional: past
$R_{V-P}(< w, t >, < w', t' >) =_{def} \{< w, t > \mid \forall < w', t' > \in \mathbb{K}_{<w,t>} \wedge$
$t \neq t', \ V_{<w',t'>}(\psi) = 1\}$

This semantics reflects the fact that a speaker considers a proposition available to her at some point in the past via her visual sense to be a *settled* matter. The validity of the proposition holds across all accessible historical alternatives. The output of the relation in (22) is the set of world-time pairs where ψ is true. Thus, ψ is being treated like a known fact, which is regarded as incommutable across (consistent) worlds and times. The flavor of evidence (i.e. visual in this case) is not encoded in the definition per se (as opposed to

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[9] Although the definitions in (20) and (21) are catered to visual evidence, they can be easily modified to reflect other sensory devices such as taste, smell, touch, and hearing. The predicate SEE can be replaced by any of these other predicates, with everything else in the definition remaining the same.

the nominal cases above); the universal quantification is a reflection of the measure of certainty.

This proposal can account for a large array of languages, where it has been observed that the simple past tense marking contributes a DIRECT evidential flavor or a **witnessed event**. For example, we saw above in (8) that Malayalam simple past carries such evidential overtones. Bashir (2006) provides similar data from many other languages, including Telugu, Tamil, Kannada, Marathi, and Wakhi, where the morphological past tense corresponds to the interpretation that the speaker saw/perceived the event happening themselves, and thus the proposition in the scope of the past tense is conveyed to have been learnt DIRECT-ly. The counterparts of the simple past tense, i.e. present or future tenses, are not attested as carrying evidential meanings in any of these PE languages (which is why Figure 8.1 does not include them either). The following examples are from Bashir (2006):[10]

(23)   viran inta viTaik   kaTT-**in**-an   (Tamil)
       Viran this house-ACC build-PAST-3SG
       'Viran built this house.' (personally witnessed or known as verified fact)

(24)   salim vaLl-a   nanna i   illu   kaTT-inc-**a**-Du   (Telugu)
       Salim ones-OBL   father this house build-CS-PST-3SG
       'Salim's father built this house.' (personally witnessed)

(25)   majhy-ā bhāvā-nī   salīm-lā   patra lihi-**lā**   (Marathi)
       my-OBL   brother-AG salim-DAT letter write-PST
       'My brother wrote a letter to Salim' (personally witnessed)

The claim then is that all of these are historical necessity statements combined with *earlier than* temporal accessibility (as denoted by $\mathbb{K}$ above). Even for a language like Bulgarian, where INFERENTIAL evidence is marked in the aspectual domain, Koev (2016: 1) describes the simple past tense (assuming null tense marking) as encoding a witnessing of the event by the speaker.

It is important to clarify that while this proposal directly encodes evidential information for nominals, the modal component ensures that the speaker's judgment about the reliability of the information source is represented in the semantics as well. The settledness/historical necessity operator ensures that the speaker has access to all historical alternatives and there is no room for uncertainty about past and present (cf. Kaufmann et al. 2006). We want this kind of strength given the privileged status of direct perception in natural languages. Sentences with DIRECT evidentials cannot be followed with a

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[10] In my surveys with native speakers of these languages aimed at confirming Bashir's findings, I have found an age-based demographic divide. All older speakers attested to the evidential interpretations being present, while much younger (usually multilingual) speakers sometimes did not.

contradictory continuation, unlike sentences with REPORTATIVE evidentials (see (39) below).

The definition of visual evidence provided in (20) is partially inspired by Faller (2004)'s conception of a speaker's perceptual field, which she terms as *P-trace*, and defines it as follows (Faller 2004: example 37):

(26) $P\text{-}trace(sp) = \{< \text{t}, l > \mid \text{t} \subseteq \tau(sp) \wedge \text{PERCEIVE}(sp, t, l)\}$

The predicate PERCEIVE is true iff the speaker perceives l at t, where t is a time in the lifespan of the speaker. Faller uses this definition to map out the immediate physical space surrounding the speaker. This formulation is then used to provide a semantics for the Cuzco Quechua verbal marker *-sqa* which requires that the event in question was not directly perceived by the speaker, i.e. is not contained in the P-trace of the speaker. Two important points to note about (26) are as follows. Firstly, Faller is not modeling any *evidence* per se in (26), but is providing a way to track what the speaker can perceive at a given time. Crucially, the perceptual field is meant to be a subspace of the bigger physical space, including only elements that are an appropriate size for the speaker to perceive and ones they are actively attending to. Note that the arguments of the predicate include the *whole location* at a given time, and not any object/entity/individual within that location. My analysis of NPE in (20)/(21) does not encode a direct relationship with the entire location associated with an utterance. This is because the speaker perceives and evidentially qualifies a particular entity, and given that the speaker has successfully perceived this entity entails that the entity is in the perceptual field of the speaker at the time of utterance (i.e. is in some salient subset of the accessible perceptual field). Thus, we do not need to represent a location coordinate into the semantics per se.

In Faller (2004), the two spatio-temporal trace functions *P-trace* and *e-trace* (the mapping of the event in question) interact in the following manner:

(27) $[\![-sqa]\!]$: $\lambda \text{t}_R\ \lambda \text{P}\ \lambda \text{e. P(e)} \wedge \text{t}_R < now \wedge \neg \forall < t, l > [\text{t} \subseteq \text{t}_R \wedge < t, l >$
         $\in e\text{-}trace\ (e) \rightarrow\ < t, l >\ \in P\text{-}trace\ (sp)]$
   a. where $e\text{-}trace(e) = \{< t, l > \mid \text{t} \subseteq \tau(\text{e}) \wedge \text{AT}(e, t, l)\}$
      AT(e,t,l) is true iff the event e takes place at time t at location l
      (cf. Condoravdi 2001)
   b. where t_R is the topic/reference time

The semantics of *-sqa* is thus an extensional statement about the spatio-temporal distance between the event and the speaker, and the lack of DIRECT/perceptual evidence is implied. There is no modal component in the formulation.[11] In fact,

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[11] Koev (2016) is another account of evidentiality in Bulgarian modeled along the lines of Faller (2004) that also argues for extensional spatio-temporal analysis over a modal one.

Faller explicitly rejects the following ideas with the following reasoning: (i) that -*sqa* is a true evidential, because it does not encode a relation between an agent and a proposition, and (ii) that -*sqa* is an epistemic modal, because there is no quantificational evaluation of the validity of a proposition with respect to the speaker's knowledge state.

I will make a departure from Faller (and many other major accounts of evidentiality) on a fundamental issue. Since we have seen that nominal evidentials exist, it is now too constricting to definitionally limit the phenomenon of evidentiality to just a relationship between an agent and a proposition. Nominal evidentiality as defined in (20) and (21) allows a relationship between an entity and the speaker at a world-time pair. The analysis of DIRECT evidence, and consequently of inferential evidence in Section 8.4, places the current proposal squarely in the ontological debate between evidentiality and epistemic modality (note that Von Fintel & Gillies 2010 observe that there are no attested epistemic modals that are not evidentials). Having argued for perception as being epistemic perception that provides access to historical alternatives (and inference in the next section on similar terms), the claim is that evidentials are modals (either historical or epistemic). The encoding of degrees of reliability of the source (which correlates directly with the degree of commitment the speaker has towards the argument of the evidential) of the evidence is a core component of evidentials, and the modal semantics allows us to successfully model that ingredient.

So far, we have explored NPE in languages where nominal tense marking functions as evidential markers. Recall that NPE is also found in systems without nominal tense, but with evidentiality marked in the demonstrative/ determiners paradigms: Type I systems such as Lillooet (see (4)–(5) above), Tsou (Tung et al. 1964), some Shina languages (see (11)–(13)), and Type II systems like ʔayʔaȷu̓θəm (see (14)–(15) above). In Type I systems, the core determining factor is *visibility* of the referent from the speaker's point of view. Quickly recapping, in Lillooet, for example, the determiner which marks a 'known' referent is used if the referent is either visible to the speaker at speech time and/or was visible to the speaker at any time in the past; in contrast, the determiner marking 'unknown' referents shows up when the referent is not visible to the speaker at speech time but is accessible by some other sensory device (auditory, olfactory, etc.) and/or was accessible by the same nonvisual means at a past time. So the choice of the determiner hinges on the seeing/ nonseeing difference and not on the current time/past time difference, which is essentially *the opposite* of the configuration we saw above for nominal tense systems. This distinction in accessing the same historical alternatives through different sensory devices can be pictorially represented as in Figure 8.3.

Now, can the proposal put forward for DIRECT evidence so far account for this opposite configuration? I suggest that it can, with essentially the same
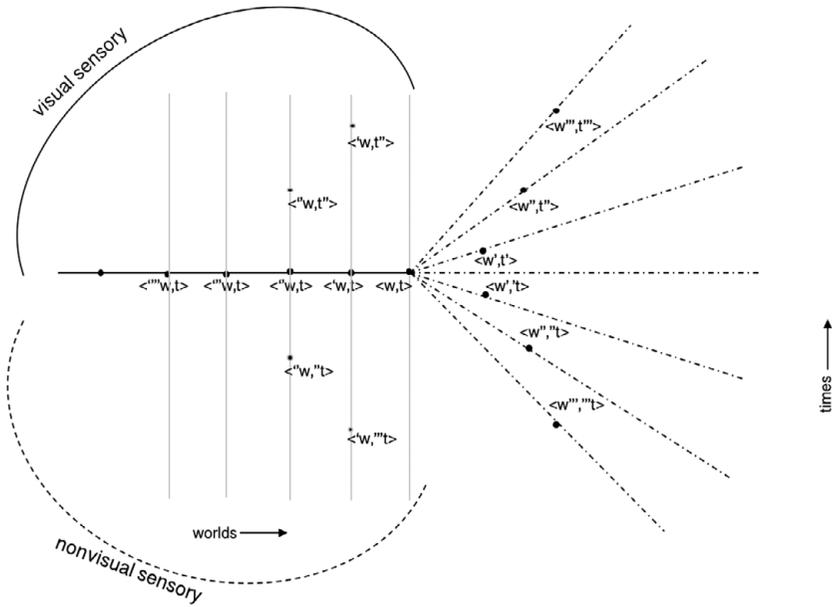
Figure 8.3 Visual/nonvisual access to historical alternatives

ingredients. With the same historical and temporal accessibility relation, now we can locate the difference in which sensory relationship holds between the speaker and an entity at some historically accessible world-time pair:[12]

(28) $R_{visual-dem(<wt>,<e,w',t'>)} =_{def} \{< e, w, t > \mid \exists < w', t' > \in \mathbb{K}_{<w,t>}$
         SEE $(sp, e, w', t')\}$

(29) $R_{non-visual-dem(<wt>,<e,w',t'>)} =_{def} \{< e, w, t > \mid \exists < w', t' > \in \mathbb{K}_{<w,t>}$
         SMELL/HEAR/TASTE/TOUCH $(sp, e, w', t')\}$

Note that we do not need an explicit temporal restriction stating whether the time satisfying the existential quantification is the speech time or not, since that consideration is not a factor in the Lillooet/Tsou/Shina type of demonstrative systems, i.e. the Type I dem/det languages. In these languages then, the determiner/demonstrative associated with 'known' is the lexical manifestation of the relation $R_{visual-demonstrative}$ ($R_{visual-dem}$) in (28), while the determiner/demonstrative associated with 'unknown' is the lexical counterpart of the $R_{non-visual-demonstrative}$ relation ($R_{non-visual-dem}$) in (29). The visual/nonvisual

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[12] As mentioned in note 7, for nonvisual cases, we would have to do the same thing for nominal tense systems.

distinction is a very integral one in the empirical landscape – Aikhenvald (2018) reports that no spoken languages have special evidentials to cover just smell or taste or touch individually. These sensory devices are often covered by a single lexical item, which is usually a nonvisual sensory evidential or 'non-firsthand' (as opposed to 'firsthand' for visual). Thus, even within perception, visual access has a privileged place.

In the Type II demonstrative/determiner variant of NPE, for e.g. ʔayʔaǰuθəm, where the choice between CDE and PDE ((14)–(15)) is dictated by the visibility of the referent at speech time (Huijsmans et al. 2020), can be captured with the same tools *as for nominal tense above*. As discussed above, this determiner system shares remarkable similarities with the nominal tense systems, in that the explicit temporal restriction has to interact with the flavor of evidence holding across historical alternatives:

(30)   Visual nominal: present (20) ⇔ CDE (Current Direct Evidence)
$R_{visual-current-dem(<wt>,<e,w',t'>)} =_{def} \{< e, w, t > \mid \exists < w', t' >$
$\in \mathbb{K}_{<w,t>}$ SEE $(sp, e, w', t') \wedge t = t'\}$

(31)   Visual nominal: past (21) ⇔ PDE (Previous Direct Evidence)
$R_{visual-previous-dem(<wt>,<e,w',t'>)} =_{def} \{< e, w, t > \mid \exists < w', t' >$
$\in \mathbb{K}_{<w,t>}$ SEE $(sp, e, w', t') \wedge t = t'\}$

Thus, the ʔayʔaǰuθəm CDE determiner ɬə (e.g. in (14)) is the lexical manifestation of the accessibility relation in (30), thus requiring visual access to the referent at a historical alternative that includes the speech time; while the ʔayʔaǰuθəm PDE determiner šə (e.g. in (15)) is the lexical spellout of the accessibility relation in (31), requiring that visual access to the referent held at a historical alternative not including speech time (thus necessarily, prior to speech time). With these analyses, we are able to maintain a **unified view** of all NPE systems (including nominal tense systems, Type I demonstrative/determiner systems which have a visual/ nonvisual divide and Type II demonstrative/determiner systems which have a speech time/non-speech time divide), using the *same* ingredients in the semantics of all evidentials.

A quick postlude to describe our stance on an important distinction: we have been modeling the result of obtaining perceptual evidence as adding to an agent's knowledge, and not beliefs. This might a priori appear to be too strong, because agents are capable of being mistaken in perception. For eg., a white and gold dress may appear to be blue and black under a certain light (cf. the viral internet sensation 'The Dress' in 2015 that spurred many scientific studies in human vision; Lafer-Sousa et al. 2015); bird A's call may be mistaken to be bird B's call in a noisy environment, etc. Thus, the interaction of aspects of the environment and human perception may lead to spurious correlations unbeknownst to the agent. However, *linguistically*

speaking, DIRECT evidentials do not allow contradictory continuations. For example, Murray (2010: 54) reports the following infelicitous judgment with the Cheyenne direct evidential, reflecting the 'apparent certainty of direct evidence' (AnderBois 2014: 240):

(32)   #É-hótaheva-Ø Floyd naa oha   é-sáa-hótahévá-he-Ø
        3-win-DIR.3SG Floyd and CNTR 3-neg-win-MOD$_a$-DIR
        'Floyd won, I'm sure, but I'm certain he didn't.'

Other scholars have also noted how direct evidentials often strengthen the force of a plain assertion (Faller 2002; Birner et al. 2007; Davis et al. 2007), whereby a presence of the direct evidential is taken to be a higher indication of the strength of commitment than its absence.

Usually, if a cooperative agent is not certain of their sensory input, a qualification is provided: *I think I heard a European robin, but I am not sure*, or *There appears to be a tiger hiding in that dark shed but don't quote me on that.* Convincingly distinguishing belief from knowledge is the task of the epistemologist, one that I do not take on here.[13] But we can acknowledge McCready's (2014) observation (see also Stanley 2005 and Davis et al. 2007) here – to assert a proposition, knowledge or even total belief is not necessary; belief beyond reasonable doubt often suffices. So, from a philosophical point of view perception may build beliefs only leaving room for uncertainty/ retraction/revision, but from a linguistic point of view, DIRECT evidentials feed knowledge.

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[13] Indeed, the body of work on the epistemology of perception is massive (see Grice 1962; Lewis 1980; Dretske 1981; Searle et al. 1983; Armstrong 1991; Burge 1991; McDowell 1991; Searle 1991; Davies 1992; Owens et al. 1992; Soteriou 2000; Prinz 2006; Brewer 2011, among many others). A few key notions stand out as particularly relevant to our discussion here. Prinz (2006) argues for a refinement within Dretske's notion of epistemic seeing, into the notions of *recognitional seeing* (which is visual perception and necessarily factive recognition of an object) and *seeing-as* (which is often a nonfactive reconstrual of a perceived object). Prinz points out that Dretske does not particularly discuss cases of nonfactive seeing, where an agent is mistaken in their perception. Brewer (2011) similarly discusses the possibility of falsehood with respect to our perceptual relationship with the physical world. He characterizes visual illusion as a "perceptual experience in which a physical object, *o*, looks *F*, although *o* is not actually *F*" (Brewer 2011: 73). One example he provides is of a pair of parallel lines of equal length a metre away directly in front of an agent may be perceived as being of unequal lengths or unparallel. However, the margin of error cannot be extreme in that these lines cannot be mistaken for two circles. If so happens, then we are in the land of hallucination and not illusion. This kind of a crucial link between the presentation of physical objects in our perceptual ethos and our possibly faulty engagement with these objects (albeit within reason) due to limits of human perception forms the core basis for allowing room for deniability of the factivity of perception in the philosophical literature. However, given overwhelming evidence that natural languages do not allow the same speaker to contradict their claims of perceptual evidence for a proposition, we will proceed with the assumption that linguistically encoded perceptual evidence is factive.

8.4 Analysis: Inference

Making an inference is a very involved process in intelligent agents, one that involves premises and conclusions intermingled with the nature of available evidence. Within the landscape of evidentiality, a basic divide exists between two types of inferential processes as lexically manifested in evidentials. The two types are *inference via reasoning* (henceforth, reasoning) and *inference via results* (henceforth, results) (Willett 1988 onwards). The category of reasoning is typically applied to propositions which are available to an agent purely through evaluating their validity relative to a consistent body of facts already known to the agent (our above-mentioned proto-knowledge or epistemic modal base). The category of results is more contingent on perception – without knowing anything previously about an event/situation, a rational agent can perceive the results of an occurrence/events and make an inference.

Representative examples of both types of inferences are below, from Gitksan (Peterson 2012: examples 9b–c). The INFERENTIAL *n'akw* is felicitous only in contexts with visible physical results, while =*ima* is felicitous in both reasoning and results contexts.

(33)   Reasoning context: *You're sitting at home talking about going berry-picking. It's August, and the berries are usually ripe this time of year on the Suskwa (a traditional picking ground).*
    a. mukw=**ima**=hl   maay'
       ripe=MOD=CND   berries
       'The berries might/must be ripe/Maybe the berries are ripe.'
    b. #**n'akw**=hl mukw=hl maa'y
       EVID=CND ripe=CND   berries
       'The berries must be ripe/Looks like the berries are ripe.'

(34)   Results context: *People are arriving home after a day of berry-picking up in the Suskwa. They're carrying buckets of berries, and their hands are all purple.*
    a. mukw=**ima**=hl   maay'
       ripe=MOD=CND   berries
       'The berries might/must be ripe/Maybe the berries are ripe.'
    b. **n'akw**=hl mukw=hl maa'y
       EVID=CND ripe=CND berries
       'The berries must be ripe/Looks like the berries are ripe.'

It is a given that in the latter scenario, there is still some amount of world knowledge that comes into play, that helps to link the premises obtained by perceptual evidence to the most obvious conclusions. This is why =*ima* is felicitous in a results context as well. Both types of inferences then are sensitive to pre-existing knowledge in important ways.

Let us see how far we can maintain the same ingredients from the previous section while providing a semantics for both genres of INFERENTIAL evidentials.

I am assuming, to begin with, that every agent has a body of knowledge or a knowledge base by virtue of being human.[14] This knowledge base is traditionally represented with an epistemic accessibility relation in modal logic (Hughes & Cresswell 1986, 1996; Kratzer 1991; Portner 2009; Hacquard 2011), as shown in (35). This relation gives us a set of world-time pairs such that in all those pairs the known facts in the world-time pair of evaluation ($<w, t>$) hold:

(35) $R_{epis} = \{<w, t> \ | \ <w', t'> \text{ is a world} - \text{time pair in which all the}$
        known facts in $<w, t>$ hold$\}$

Facts are represented as propositions, and propositions are sets of world-time pairs. Beginning with inference from pure reasoning, we can provide the following definition:

(36)   Inference: reasoning
        $R_{reasoning(<wt>, <w', t'>)} =_{def} \left\{ <w, t> | \forall <w', t'> \left[R_{epis<wt>} \subseteq [\![\psi]\!]^{R_{epis}} \rightarrow <w', t'> \in [\![\psi]\!]^{R_{epis}} \right] \right\}$

The output of this relation is a set of world-time pairs where ψ holds iff ψ is entailed by the set of world-time pairs accessible via the epistemic accessibility relation. This formulation makes clear two notions: (i) an inference has to be compatible with what is already known, (ii) the inference is being made using only information that is epistemically accessible and nothing else. The accessibility relation in (36) reflects inference drawn from pure reasoning then.

In contrast, the other type of inference is based primarily on sensorily accessed consequences/results as evaluated against the same body of known facts. In (22), I had defined an accessibility relation based on visual evidence for a proposition. We can define that same relation on perceptual terms now (R_{P-P} stands for $R_{perceptual-proposition}$; it is the exact same definition as R_{V-P} in (22) with just the label now expanded to include the whole array of perceptual sources):

(37)   Expanded from (22) to include all perceptual processes:
        Perceptual proposition
        $R_{P-P(<w,t>, <w', t'>)} =_{def} \{<w, t> \ | \ \forall <w', t'> \in \mathbb{K}_{<w,t>} \wedge t \neq t', V_{<w', t'>}(\psi) = 1\}$

Consequently, inference by results can be defined via the following relation:

(38)   Inference: results
        $R_{results(<wt>, <w', t'>)} =_{def} \left\{ <w, t> \ | \ \forall <w', t'> \left[R_{P-P<wt>} \subseteq [\![\psi]\!]^{R_{P-P}} \rightarrow <w', t'> \in [\![\psi]\!]^{R_{epis}} \right] \right\}$

The output of this relation is a set of world-time pairs such that each world-time pair is a ψ world-time pair if ψ is entailed by the set of world-time pairs subject to historical necessity. In this case, the space-time continuum directly

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[14] I am going to gloss over the detail of *whose* knowledge it is in every sentence, assuming the default to be the speaker. We can envisage building that information in by adding the restriction of an agent *i* in the formula. Nothing in the discussion about the representation of perception, inference, reasoning, etc. hinges on this choice.

influences an agent's epistemic state. In fact, by definition then, both reasoning (36) and results (38) feed knowledge, assuming a self-aware agent is sensitive to the consistency of her R$_{epis}$. Consequently, we predict that INFERENTIAL statements should not allow contradictory continuations either, and this prediction is empirically well supported. A representative minimal pair highlighting the difference between inference and third-party reports is below, from Central Alaskan Yup'ik, as reported in Krawczyk (2012: 24, 50):

(39) a. Aya-llru-**llini**-uq
          leave-PAST-INFER-IND-3RDSG
          Aya-ksaite-llru-yuka-a
          leave-NEG-PAST-think.that-3RDSG
          # 'Evidently, she left . . . I don't think that she left.'
      b. Aya-llru-uq-**gguq**
          leave-PAST-3RDSG-HEARSAY
          Aya-ksaite-llru-yuka-a
          leave-NEG-PAST-think-that-3RDSG
          'It is said that she left . . . I don't think that she left.'

Similarly, Hindi (40) and Bangla (41) show disallowance of contradictory continuations after a statement of inference with periphrastic (verbal) evidential constructions:

(40) **Lag-ta hain**   Ram   aur   Ravan dost   ban   gay-e
      feel-HAB COP   Ram   and   Ravan friend   become   go.PST-PERF
      hain, **#**   par   dost   nahi   ban-e   hain.
      COP,   but   friend NEG   become-PERF COP
      Intended: 'It looks like Ram and Ravan have become
      friends, but they have not become friends.'

(41) **Mon-e hoy**   Ram   aar   Rabon bondhutyo   patieye-che,
      heart-LOC happen Ram   and   Ravan friendship   launch-PERF
      # kintu   ora   ekhono bondhu   hoy-ni.
      but   they   yet   friend   happen-NEG
      Intended: 'It looks like Ram and Ravan have started a
      friendship, but they are not friends yet.'

In Section 8.3, we explored the connection between the simple past tense and the witnessing of events in a number of languages. In many of these languages, an agent's inferential reasoning is reflected in the aspectual system, especially in perfect, perfective, and resultative aspects (Aikhenvald 2018; Comrie 1976 suggests a diachronic link between these categories). Morphologically, perfect aspect shows up when the speaker wishes to signal that the proposition has been arrived at via inference from results (Turkic, Bulgarian, South Asian languages, Georgian; see Slobin & Aksu 1982; Bybee & Dahl 1989; Izvorski 1997; Bashir 2006, among others).

What can be a natural way to characterize the link between a completed event (assuming the definition of perfect aspect to be an event/process that is

taken to be completed in the past but is still relevant for present purposes) and inference based on results? The answer is readily available in an approach like the one laid out in (38) – the propositional content deduced via the perceptual relation subject to historical necessity can only be arrived at once a coherent picture of a past event is sensorily made accessible to an agent who was not present when the event/process occurred. A *present imperfective* aspect, on the other hand, would then be predicted to denote DIRECT evidentiality, and not an INDIRECT inference of any sort because the time of the event/process correlates directly with the speech time, or the internal temporal structure of the event is accessible during speech time. And this is indeed what we find in many aspectual systems (see Aikhenvald 2018 for an overview).[15]

The general concept of possessing INFERENTIAL (or REPORTATIVE) evidence entails that what is possessed is a *proposition*. By the very nature of the processes of inference and hearsay, the most natural communicative unit is one that has an assignable truth value and explicit truth conditions. In contrast, perception is often deployed in accessing objects/entities, in addition to propositional content that is accessed via sensory devices. We may now be in a position to suggest that this vital difference in subtypes of evidence is the answer to one of the questions we started out with – why do most NPE systems encode DIRECT (mostly visual; other senses to a lesser extent) evidence only?[16] The semantics given to perception versus inference in this chapter also underlines this difference – in that:

(i) perception is a relation between entities and world-time pairs, while
(ii) inference is a relation between bodies of knowledge.

One of the key novel goals here has been the forging of a common definition of perception across perceived nominals and perceived propositions – via historical necessity in both cases. This discussion may naturally raise the question of why more languages *do not* exhibit nominal visual evidentiality? There is no satisfying answer to this typological question to be found in current formal theories of evidentiality, and I leave it for future work.

8.5   Conclusion

In the vast literature on the phenomenon of evidentiality, there is surprisingly little technical clarity about what the formal definition of *evidence* is. Many major

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[15] One note about Korean: Korean appears to be different from the host of languages cited above in that the simple past tense corresponds to INDIRECT evidence/inference, and only the present tense can signal DIRECT evidence. I suggest this difference is because Korean does not employ aspectual distinctions in the evidentiality paradigm, and thus does not have a tension between tense and aspect with regard to signaling distinct flavors of evidence.

[16] In the only known exceptions of Jarawara and Illongo, "reportative evidentials" attached to nominals function like nominal adverbs, such as *purported thief*, *alleged robber*, etc., which can be argued to have a semantics different from core evidentiality.

accounts take the notion of evidence to be a primitive (see McCready 2014 for a detailed overview). Consider for example two representative examples from presuppositional accounts of evidentials (some of which are Izvorski 1997 for Bulgarian; Matthewson et al. 2007 for St'át'imcets; Peterson 2008, 2010 for Gitksan; Sauerland & Schenner 2007 for German and Bulgarian, among others).

(42) Bulgarian perfect (INDIRECT)   (Izvorski 1997; Peterson 2012: example 36)
      Assuming the following:
      $B = \{p$: a speaker considers p indirect evidence in $w\}$
      $B(w) = \{u \in W : \forall p \ [(p$ is **indirect evidence** in $w) \rightarrow u \in p]\}$
      $g(w) = \{p$: a speaker believes p with respect to the indirect evidence in $w\}$
      then, an evidential statement EVp is denoted by:
      $[\![EVp]\!]^{c,w} = 1$ iff for $\forall w' \in O_{g(w)}(B(w)) : [\![p(w')]\!]^{c,w} = 1.$

(43) St'át'imcets *k'a* (INFERENTIAL)   (Matthewson et al. 2007: 245)
      $[\![k'a]\!]^{c,w}$ is only defined if c provides a modal base B such that for all worlds
      $w' \in B(w)$, the **inferential evidence** in w holds in w', and f is a choice
      function such that $f(B(w)) \subseteq B(w)$.
      If defined, $[\![k'a]\!]^{c,w} = \lambda f.\lambda p.\forall w'[w' \in f(B(w)) \rightarrow p(w') = 1]$

In these formulations, we see a monolithic statement of evidence type. McCready observes that the concept of evidence is "not epistemologically innocent," since it is not a trivial assumption to make that the correct piece of evidence that is of the desired flavor that can induce the sufficient amount of conviction will be found in order to meet the definedness conditions formulated above. McCready makes the same argument for extensional accounts of spatio-temporality which assumes a monolithic notion of evidence that is not technically defined. Chung's (2007) *v-trace* function is as follows, that tracks spatio-temporal information relating to evidence for an event:

(44) *v-trace* $(e) = \{<$ t,l $> \mid \exists v[\text{EVIDENCE-FOR}(v,e) \wedge \text{AT}(v,t,l)]\}$, where AT$(v,t,l)$
      is true iff **the evidence** v for the occurrence of the eventuality e appears at a
      location l at time t.

In the study of variable force evidentials such as in Gitksan, St'át'imcets, Cuzco Quechua, and Nletkepmxcin, it is evident that the same evidential is ambiguous between a reading where the speaker is fairly certain of the truth of the proposition/reliability of the source and where they are not/they are neutral. For example, the Gitksan REPORTATIVE *kat* can have a reading with a personal report and a neutral/less certain *apparently* (Peterson 2012: example 30):

(45) lumakt-i-(t)=**kat**=s   John=hl   daala
      donate-TR-3=REP=PND   John=CND money
      'I heard John put in money (for the feast).'
      'Apparently, John put in money.'

Matthewson et al. (2007), Littell et al. (2010), and Peterson (2010, 2012) argue for an epistemic modal analysis of such markers, where existential or

universal modal force is correlated directly with the measure of the speaker's confidence. While I am in agreement with the general principle in these works of modeling certainty/reliability as a core property of evidentials (one that cannot be straightforwardly modeled in extensional semantics), the definitional absence of evidence leaves a gap in terms of both predictability and testability.

We cannot have a good theory of evidentiality without defining what evidence is. Sharing McCready's concerns over the lack of theoretical clarity, I have suggested here that a nature-of-evidence-informed modal analysis is a superior approach, since it can also accommodate the interaction of tense with evidentiality. I have directly encoded the subtype of evidence in the semantics, in arguing that three distinct flavors of evidentiality embody three distinct spatio-temporal modal accessibility relations:

  (i) DIRECT (sensory) evidentials = a temporally sensitive historical necessity relation (yielding the factive nature of perception);
 (ii) INFERENTIAL evidentials of pure reasoning = an epistemic accessibility relation;
(iii) INFERENTIAL evidentials of results = a combination of the above two.

Given that the nature of evidence is formally defined in this approach, the force of quantification over accessible world-time pairs where that kind of evidence holds can be more straightforwardly correlated with the agent's evaluation of and certainty about the reliability of the source. A desirable consequence of this approach is its potential applicability in the computational-linguistic aspects of analysis of social and political discourse in the modern world which is rife with concerns about discerning disinformation, fake news, and engineered falsehoods aimed at delegitimizing objective truth, an area of research I leave for future collaborative work.

The theory presented here also highlighted the link between information about the space and time coordinates of the acquisition and processing of evidence and overt lexical choices in a diverse set of languages. This approach was shown to be defensible for both propositional and non-propositional evidentiality (evidentials scoping over propositions and nominals, respectively), thus unifying these domains for the first time. Our discussion also explored some aspects of the cognitive underpinnings of perception, with some juxtaposition with the epistemology of perception. This spatio-temporal modal analysis, while accounting for languages where these categories interact morphologically, can also account for languages where we do not see the same interactions play out on the surface but can assume they hold, given the language-independent processes of perception, inference, temporality, reasoning about causality, and acquisition of beliefs.

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Part V

Typologizing and Ontologizing

9   A Typology of Semantic Entities

Jessica Rett

9.0   Questions and Answers

(1)   Why do you think both linguists and philosophers find the typology of semantic entities interesting?

The goal of this chapter is to discuss which basic semantic entities should be included in formal semantic theory, and on which principles we should include or exclude them. While some framework-internal assumptions in formal semantics are hotly debated, the matter of how many and which basic entities a theory assumes is largely treated as a matter of personal taste or convenience. It will be useful for linguists to have a common standard for introducing and constraining basic entities in their frameworks, so they can better understand and model natural language semantics. Philosophers will find this discussion useful for the same reason, and also to learn more about the possible formalism that can model natural language, and what consequences these conclusions have for metaphysics or the philosophy of science.

(2)   What recent developments in linguistics and philosophy do you think are most exciting in thinking about the phenomenon in question?

The issue of which entities are basic has been building momentum for decades, as some semanticists have presented empirical motivations for proliferating types (to include e.g. degrees and events) while others have presented empirical motivations for reducing or combining them (e.g. to situations). But the issue has really gained a toehold in recent work arguing that specific languages can differ in which basic entities they employ; in particular, that languages

seem to differ in whether their semantic representation must include degrees (Bochnak 2015b).

(3)   What do you consider to be the key ingredients in adequately analyzing the phenomenon in question?

This chapter presents the most prominent empirical motivations for proliferating types (to include e.g. events) and reducing them (to combine e.g. events and worlds). Effectively, arguments in favor of type-proliferation identify distinct morphology for quantifiers or proforms ranging over different types, and that failing to include a distinct type or entity could predict incorrect truth conditions. Arguments in favor of type-collapsing emphasize languages or phenomena in which morphology seems to be shared across putative type domains, and constructions for which the meaning of one putative type of entity is intrinsically tied to the meaning of another, related putative type of entity. I end by concluding that the arguments for type-proliferation are slightly more compelling in terms of empirical coverage and diachronic considerations.

(4)   What do you consider to be the outstanding questions pertaining to the phenomenon in question?

I conclude this chapter by arguing that type-collapsing arguments are each individually compelling but inconsistent as an aggregate. It remains to be seen whether a semantic theory with minimal basic types could satisfy the wide variety of distinct empirical constraints placed on it by type-collapsing arguments across different empirical phenomena.

9.1   Introduction

The goal of this chapter is to discuss which basic semantic entities we should include in our formal semantic ontology, and on which principles we should include them (cf. Bach 1986b). The vast majority of formal theories employ individuals as a basic type and primitive; these theories model quantification over, modification of, and reference to individuals in the metalanguage. But many theories include additional types or entities, including possible worlds, but also less common ones like vectors. Some papers have argued that types should be constrained or reduced; others that they should be proliferated. I'll present some representative arguments on both sides and suggest a path forward in evaluating them against one another.

Standard Montagovian semantics employs individuals as a basic type, but in practice, some theorists embrace many more basic types. Champollion (2010) uses at least five (differentiating between degrees, numbers and intervals) in just an extensional semantics; Bittner (2003) uses seven (differentiating

between animate and inanimate entities); and Landman (2006) assumes nine basic entities, differentiating between kinds, events, and event-kinds. In contrast, others have taken for granted that the adoption of different types should be constrained by Ockham's Razor, and have posed and taken up the challenge of eliminating as many as mathematically possible. Thomason (1980) argued that possible worlds aren't necessary to model propositional attitudes, and Partee (2009) and Keenan (2015, 2018) propose doing away with individuals as a basic semantic type.

As a semanticist, I take semantic adequacy to be the primary goal of a formal semantic theory. But a metasemantic concern about modeling the right entities – or at least the right quantity of entities – seems like a plausible secondary goal. This is highlighted by the reductio ad absurdum put forth in Ritchie (2016), which depends on the principle that equally semantically adequate treatments should have equal voice in determining the ontological commitments carried by natural language theory. If there are indeterminately many – or even multiple – semantic formalisms that postulate a distinct set of entities, we cannot hope for a principled relationship between semantic theory and ontology.

There are, as far as I can tell, three logically possible positions to take regarding basic entities in a semantic model:[1]

(1) **Type Reductionism**

Type Reductionalism assumes no basic types, or no nonfunctional types. This position is best instantiated historically by Henkin (1963), and more recently by Partee (2009) and Keenan (2015, 2018), whose foundational type is a set. Following Gallin's (1975) notation, a Type Reductionalist account is Ty-0, because it has no basic types.

(2) **Type Ersatzism**

A Type Ersatzist assumes one basic nonfunctional type – usually entities in general – and proposes to treat all natural language phenomena using this type. In Gallin's notation, a Type Ersatzist account is Ty-1. Church (1932) exemplifies Type Ersatzism, as does Carlson (1977) for times and Klein (1980, 1982) for degrees.

(3) **Type Proliferationalism**

A Type Proliferationalism account is a Ty-n account, for $n > 1$ entities that pass some linguistic tests, e.g. that they have dedicated pronouns. (This test, a modern adaptation of Quine's 1948 generalization 'to be is to be the value of a variable,' is explicitly assumed as one of a few tests for entityhood in Schlenker 2006.)

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[1] The classic Montagovian semantics in Montague (1970, 1973) offers a mixed case because it employs one basic entity (individuals) but two basic types (s, for possible worlds) in addition to truth values. These approaches are equivalent to a Ty-2 logic (Kaplan 1976; Zimmermann 1989).

The difference between Type Ersatzism and Type Proliferationalism is a subtle one, reminiscent of selectional restrictions on verbs and adjectives, illustrated in (1).

(1)   a. *Jane met.   *number restriction*
        b. *She's a bachelor.   *gender restriction*
        c. *The plant tried to grow.   *animacy restriction*
        d. *Jane bounced the cloud.   *(solid-)state restriction*
        e. *The piece of paper is fat.   *(three-)dimension restriction*

The predicates are picky about what sorts of arguments they take. Example (1a) is ungrammatical because intransitive *meet* requires that its subject denote a plurality; (1b) is ungrammatical because the adjective *bachelor* can only be predicated of males. It's standardly assumed that these are all predicates of individuals; they can be modeled as denoting partial functions from the subclass of entities that satisfy the relevant selectional restriction. This is something like a Type Ersatzism approach; it treats different kinds of entity within the same type. In contrast, a Type Proliferationalism approach might assign different types to singular and plural entities, male and female entities, etc.

Example (2) illustrates this difference between Type Ersatzism and Type Flexibility for the adjectival modifier *very* (and some contextually valued standard *s*); the former involves individuals, type *e*, and requires a partial function to model the fact that *very* must modify something gradable (*very student*); the latter involves entities other than individuals – degrees of type *d* – and thus does not require a partial function.

(2)   a. **Type Ersatzism:** $[\![\text{very}]\!]$ $= \lambda P_{\langle e,t \rangle} \lambda x_e : \texttt{degree}(x). P(x) \wedge x > s$
        b. **Type Flexibility:** $[\![\text{very}]\!]$ $= \lambda D_{\langle d,t \rangle} \lambda d_d. D(d) \wedge d > s$

I'll end this section with some ground-clearing. First, I restrict myself to the discussion of basic types – not complex ones – because I assume that the latter come for free, in every formal model, via type formation. This is despite the interesting empirical arguments that some complex types (e.g. quantifiers) are unavailable in some languages (e.g. St'át'imcets, which I take to be a separate discussion, Matthewson 2014), and also despite the fact that the same arguments used to differentiate between basic and complex entities (Link 1983) might also be useful in differentiating between two basic entities.

And while considerations of economy and parsimony are certainly relevant when it comes to evaluating theories, these considerations presume empirical equivalence (i.e. Can semantic theories that presume different basic semantic entities account for the same natural language data?). And since it is this empirical equivalence that I will be discussing, I will treat considerations of economy and parsimony as secondary to the discussion at hand.[2]

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[2] There have been impressive contributions made on this front into reducing entities in a Montagovian semantics to a single type (Liefke 2014a, 2014b). Liefke (2015) represents

When I discuss the question of how many basic entities or types there are, I view the issue as regarding the semanticist's toolbox, rather than a given speaker's i-language. In particular, if some language were to have what we decide to be irrefutable evidence that the semantic modeling of that language requires e.g. degrees as a basic entity, then this is sufficient evidence that there are degrees in the semantic ontology, but not sufficient evidence that there are degrees in every human being's i-language. This is compatible with the possibility that some languages do not require degrees in their semantic modeling, or even should not be modeled using degrees, as has been argued for Washo (Bochnak 2015b) and some other languages.

Finally, there is one diagnostic for basic semantic entities that I will not use: I will not assume that the presence of a referring expression over a particular sort of thing privileges that thing as an entity (cf. Schlenker 2006). More broadly, I will focus on linguistic tests that don't involve categories of words whose inventory is potentially infinite; this is the standard lexical vs. functional distinction. It seems as though we can coin a referring expression for anything, really, at least in particular contexts – e.g. Twin Earth (Putnam 1973) – and so it is a trivial test.

9.2   Metasemantic Arguments

Before I turn to empirical arguments made in favor of proliferating or collapsing types, I'll briefly present two instances of semanticists directly addressing the question of how many basic entities the ontology should include, and discuss why their claims don't seem to completely settle the issue.

In his 2006 paper, Philippe Schlenker observes that "Reference to individuals, times and worlds is uniformly effected through generalized quantifiers, definite descriptions, and pronouns" (2006: 504). He interpreted this observation as evidence that there is a single type, ξ, ranging over an $\langle$individual, time, world$\rangle$ triple.

As argued above, there is no limit on the sort of entity that can be referred to with a name or definite description, given the innovativeness of natural language. And, as we'll see below, it seems clear that there are types of entities other than individuals, times and worlds (namely degrees, events, and/or situations) that are associated with quantifiers and proforms as well. So if Schlenker's criteria are necessary and sufficient for differentiated basic entities – and he provides no arguments that they are, especially as he

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possible worlds and situations as ultrafilters, and Liefke and Werning (2018) represents individuals and propositions as parameterized partial sets of situations. This work tends not to include discussions of degrees, kinds, or vectors, but it does rely on type-raising – which seems independently motivated in all of these theories – to make some of the other distinctions discussed below. I do not review them here because they do not introduce any novel empirical arguments for type reduction.

considers them members of a triple – they lead to a more inclusive ontology than he advocates for.

In her 2003 paper, Maria Bittner adopted a similar perspective. She advocates for a Ty-7 formal semantics, including worlds, times, places, events, states, animate individuals, and inanimate individuals as basic entities. What's more, she meaningfully differentiates between basic types – like states and events – and derived or complex types, like processes and habits, which she takes to denote partial functions. Bittner's criterion for a basic type (see also Bittner 2006, 2014) is whether entities of that sort participate in anaphora in a language, and thereby whether a dynamic model of that language requires a separate discourse stack for that type.[3]

However, Bittner herself acknowledges that discourse reference can be to complex types (or, rather, to the basic components of a complex type): "In general, simple episodic discourse involves only simple types of drefs – the seven basic sorts (possibilities $\omega := \mathbf{w}t$, agentive entities α, non-agentive entities β, events ε, states σ, times τ, and places π or else simple functions (mostly processes $\varepsilon \ldots$)" (2003: 645). She specifies, of discourse referents to processes, "Formally, these are ε-dependencies, mapping each stage of the process, except the last, to the next stage" (2003: 641).

So perhaps the ability of a proform or anaphor in a language to refer to an entity is a necessary but not sufficient condition for its being a basic type, as it could be anaphoric on a subcomponent of a complex entity. The result is a very robust and comprehensive crosslinguistic ontology, but one with no clear, reliable way of differentiating between basic and complex or derived types.

In the next section, I present several prominent empirical arguments that natural language semantics needs to include a given entity as basic.

9.3   Type-Proliferation Arguments

Across the formal semantics literature, there have been a number of implicit and explicit arguments for a number of different non-individual entities. I have summarized the most prominent ones in Table 9.1.[4]

The empirical arguments for adding different types or entities to the semantic ontology have been very similar, and they fall into two broad categories. First, there is morphological evidence: arguments that a given language has functional items that seem dedicated to particular, nonindividual domains. Second, there is

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[3] "In online update anaphora resolution is primarily based on the current centering rank, restricted to the relevant type of the 7-sorted NL ontology, and only secondarily on world knowledge" (2006: 6).

[4] I do not include a discussion of tropes, which have been proposed by Moltmann (2013), or essences, as proposed by Ramchand (2016) and in this volume ("Nonfinite verbal forms and natural language ontology"), as these objects have been proposed to replace individuals as basic types (and cover some additional empirical ground), not in conjunction with individuals.

Table 9.1. *Basic entities: the usual suspects*

Entity	Type	Conventional variables	Origin(s)
Individuals	*e*	*x, y*	Montague (1970, 1973)
Possible worlds	*s*	*w*	Kripke (1959)
Events	*v*	*e*	Davidson (1967)
Times	*i*	*t*	Partee (1973, 1984)
Degrees	*d*	*d*	Cresswell (1976)
Kinds	*k*	*k*	Carlson (1977)
Situations	*s*	*s*	Barwise (1981); Kratzer (1989)
Vectors	*v*	*u, v*	Zwarts (1997)

semantic evidence in the form of arguments from semantic adequacy: phenomena that seem to be able to be modeled only in a formalism that includes nonindividuals. For several familiar nonindividual entities, I will review some prominent arguments in favor of their inclusion in the semantic ontology.

9.3.1   Possible Worlds

The original Montagovian semantics (Montague 1970, 1973) manipulated only individuals as a basic semantic entity, but included possible worlds as a restriction on the interpretation function. Explicit world variables were quickly added to Montague-inspired formalisms in part based on the empirical arguments from modal semantics in Hintikka (1957) and Kripke (1959): they allowed for a set-theoretic representation of entailment, and a treatment of weak and strong modals as dual quantifiers, in parallel with individual quantifiers.

Effectively, in arguing that possible worlds should be represented as semantic variables, these papers instantiate both of the types of arguments I outlined above. The observation that languages lexicalize (strong and weak) modals like *must* and *might* differently from (universal and existential) individual quantifiers like *all* and *some* constitutes a morphological argument for adding possible worlds to the semantic ontology. And the claim that relationships between propositions can be best modeled using set theory – and thereby that propositions must be associated with sets – constitutes a semantic adequacy argument.

Interestingly, there appears to be no language that does not have modals, although languages do seem to differ with respect to which elements they unite lexically (i.e. quantificational force; flavor; and evidential base; Matthewson 2013). This lack of crosslinguistic variation seems in concord with the relatively uncontroversial status possible worlds enjoy in formal semantic theory (in contrast with many other entities in Table 9.1; although see e.g. Kaplan & Montague 1960; Fine 2012 for arguments that possible worlds shouldn't be used to model certain phenomena). But the question of how to deal with crosslinguistic variation, in cases where we do find it, will turn out to be a central one.

9.3.2   Times

In a series of papers, Barbara Partee (1973, 1984) argued that tense markers should be thought of as temporal proforms rather than operators. While these accounts both include times in their semantic models, they differ in whether they require the modeling of times as a basic entity. A formalism in which tense markers denote temporal operators is compatible with a formalism in which times are restrictions on the interpretation function, an analogue to Montague's treatment of modals qua possible world operators.

  Partee's arguments that tense markers are temporal proforms amount to arguments of parity. They take for granted that there are individual pronouns, and that individual pronouns are individual pronouns by virtue of their semantic behavior. If tense markers demonstrate identical semantic behavior, then they, too, must be proforms (only over times, not individuals). Stone (1997) made parallel arguments for the words *will* and *would*, which he assumed were modal or possible world proforms. The key data are reproduced below.

(3)   *nonlinguistic antecedents*
  a. [at a bar] She left me.   *individual*
  b. [on a road trip] I didn't turn off the stove.   *temporal*
  c. [at a stereo store] My neighbors would kill me.   *modal*

(4)   *definite antecedents*
  a. Sam is married. He has three children.   *individual*
  b. Sheila had a party last Friday. Sam got drunk.   *temporal*
  c. The company would face bankruptcy if the merger goes   *modal*
      through.

(5)   *indefinite antecedents*
  a. Pedro owns a donkey. He pets it.   *individual*
  b. Mary woke up sometime during the night. She turned on the *temporal*
      light.
  c. Jane might give a presentation. She would use slides.   *modal*

(6)   *bound variable use*
  a. Every woman believes that she is happy.   *individual*
  b. Whenever Mary telephoned, Sam was asleep.   *temporal*
  c. If a mathematician proves the Reimann hypothesis, they will *modal*
      gain notoriety.

(7)   *donkey-anaphoric use*
  a. If Pedro owns a donkey, he pets it.   *individual*
  b. If Mary telephoned on a Friday, it was (always) Peter who *temporal*
      answered.
  c. If a submarine cannot self-destruct if an enemy captures it, the *modal*
      enemy will learn its secrets.

These constitute morphological arguments for times and possible worlds as distinct entities, and they have been influential. But it's worthwhile noting that there are other anaphoric elements that display the same behavior which we do not tend to associate with basic types, including VP ellipsis; propositional anaphors as in *Jane believes that too*; and adjectival *such* (Landman 2006; King & Lewis 2018). This is a good illustration of one of the limits of morphological arguments for proliferation, at least for those semanticists who don't consider verbal properties and propositions to be basic entities. And Sharvit (2013) argues that whether tenses are proforms or quantifiers is a crosslinguistic parameter (although, arguably, both must be modeled in a formalism in which times are basic entities).

Many languages have been observed to lack tense marking of any kind: so-called 'tenseless languages'. Interestingly, these languages differ in how their tenseless clauses can be interpreted, leading to a series of proposals that constitute semantic arguments for times as a distinct entity, as well as cross-linguistic variation with respect to whether or not a language should be modeled using times.

The simple matrix clause in (8), from Lillooet (a Salish language, Matthewson 2006) lacks any sort of overt tense marker.

(8)   Táytkan
        hungry.1sgS
        'I am/was hungry.'

In her analysis of such sentences, Matthewson (2006) observes that while they are underspecified with respect to a present- and past-oriented interpretation, they can never be future-oriented (i.e. can never mean 'I will be hungry'). She thus concludes that they must include a (morphologically null) nonfuture marker, effectively a covert tense operator.

However, in other tenseless languages, versions of (8) behave slightly differently, leading other researchers to offer distinct analyses of tenseless sentences (Bittner 2005; Lin 2005; Tonhauser 2011; Mucha 2013). While none of these analyses assume that times are explicitly introduced in the language, they all assume that it is nevertheless manipulated in the language's compositional semantics, in some way.

For instance, while Hausa sentences lack overt tense markers, they do include (overt) aspectual operators. And the truth conditions of sentences that include e.g. prospective aspect do involve the manipulation of times. Mucha (2013: 203) argues that the prospective aspect should be given the analysis in (9), which involves the restriction of an event's runtime $\tau(e)$ to precede some temporal argument t.

(9) $[\![\text{prospective aspect}]\!] = \lambda P_{\langle v, \langle s, t \rangle \rangle} \lambda e \lambda t \lambda w [P(e)(w) \wedge \tau(e) > t]$
        for the runtime $\tau(e)$ of an event e

We can conclude from this body of work that times – or at least some subtype of strictly ordered entities, or some entity (like events or situations) from which runtimes can be calculated – are necessary for modeling languages universally, despite the fact that not all languages have dedicate time-introducing pronouns. Once again, we have a situation in which there seems to be no crosslinguistic variation with respect to whether languages need to be modeled using times (the semantic arguments), although we do, for the first time, see crosslinguistic variation with whether reference to times is morphologically encoded (the morphological arguments).

I'll end this section by highlighting the significant empirical and theoretical overlap between times and other temporal entities. While the arguments discussed here explicitly advocate for times, others have used similar arguments to instead advocate for the existence of situations (to be discussed in more detail in Section 9.4.1), events (Section 9.4.2), or states (Parsons 2000; Altshuler 2016; Stojnić & Altshuler 2021), cf. Katz (2003). Insofaras they advocate for treating these or related phenomena using an entity other than individuals, the arguments in these other works are in some loose sense parallel to the arguments detailed here, but I have of course not done them justice. Section 9.4 discusses reference to events, situations, etc. in type-collapsing arguments.

9.3.3   Degrees

Based on a suggestion in Cresswell (1976), a common and intuitive way of semantically differentiating between nongradable and gradable adjectives is in their arity; specifically, that nongradable adjectives denote individual properties, while gradable adjectives denote relations between degrees and individuals.

(10)   a. $[\![\text{single}]\!] = \lambda x.\texttt{single}(x)$
        b. $[\![\text{tall}]\!] = \lambda d\lambda x.\texttt{tall}(x,d)$

Ewan Klein (1980, 1982) argued that the phenomena Cresswell focused on – specifically, positive constructions like *Jane is tall* and comparatives like *Jane is taller than Bill* – can be dealt with instead in a semantics with only individuals as basic entities. In his analysis, gradable adjective constructions manipulated comparison classes of individuals, partitioned according to meta-semantic principles that assure that e.g. *a* is not both bigger and smaller than *b*.

However, since Klein's proposal (and refinements offered in Neeleman et al. 2004; Bale 2011), there have been several adjectival phenomena that, it's been argued, cannot be properly characterized using a degree-free semantics. Kennedy (1999) argued that a Kleinian degree-free semantics can't differentiate between antonyms like *tall* and *short*. He also argued that it can't account

for the semantic contribution of measure phrases (MPs) like *two feet*, especially in their function as comparative differentials in e.g. *Jane is two feet taller than Bill* (Schwarzschild 2005). And in a particularly influential paper, Kennedy and McNally (2005) argued that the different types of intervals degrees can form – closed, open, partially closed – are needed to predict the behavior of different subtypes of gradable adjectives, i.e. the difference between relative, absolute, and total/partial adjectives.

Finally, English has different comparative strategies, and it's been argued that some of them involve the comparison of degrees, while some of them involve the comparision of individuals. This argument, like the others, is a semantic adequacy argument: if there are semantic differences between two comparative strategies that are predicted by modeling one with degrees and one without, then we can conclude that degrees must be in the semantic ontology.

Three comparative strategies are listed below, although there are others, even in English (Stassen 1985).

(11)   a. Jane exceeds Bill in height.   *'exceed' comparative*
       b. Jane is tall compared to Bill.   *implicit degree comparative*
       c. Jane is taller than Bill.   *explicit degree comparative*

Explicit degree comparatives, formed with the English *-er* or *more*, exhibit subtly different semantic behavior than other comparative strategies (Beck et al. 2004, 2009; Kennedy 2005). They (i) don't require a 'crisp judgment' scenario, in which the difference in values is significant; (ii) are nonevaluative when formed with positive relative adjectives like *tall*; (iii) can be modified by a differential; and (iv) can be formed with absolute adjectives. These differences are illustrated in (12)–(15).

(12)   *Context: Jane is 1 mm taller than Bill.*
       a. Jane is taller than Bill.   *explicit*
       b. #Jane is tall compared to Bill.   *implicit*

(13)   a. Jane is taller than Bill. → Jane is tall.   *explicit*
       b. Jane is tall compared to Bill. → Jane is tall.   *implicit*

(14)   a. Jane is six inches taller than Bill.   *explicit*
       b. Jane is (#six inches) tall (#six inches) compared to Bill. *implicit*

(15)   a. This pole is more bent than that one.   *explicit*
       b. ?This pole is bent compared to that one.   *implicit*

A broad consensus is that the best way of accounting for these semantic differences is by treating the explicit comparative *-er*, *more* as denoting a degree quantifier, or a relation between a set of degrees corresponding to the matrix argument and a set of degrees corresponding to the embedded argument (Beck et al. 2004, 2009; Kennedy 2005). For example, a Kleinian account of

comparative constructions – in which the embedded argument forms a comparison class restrictor for evaluating the matrix argument – predicts the 'crisp judgment' requirement we see in (12b), and cannot account for the acceptability of the explicit comparative in (12a). There is a directly parallel argument for the semantics of various equative strategies (Rett 2020).

Even more compelling, there seems to be variation with respect to whether a language's comparison strategies must be modeled using degrees. A series of languages have been identified as 'degree-free' languages, meaning they lack any sort of construction that has been argued to require degrees to be adequately semantically modeled: Motu (Beck et al. 2009); Fijian (Pearson 2010); Washo (Bochnak 2015a, 2015b; Beltrama & Bochnak 2015); Navajo (Bochnak & Bogal-Allbritten 2015);[5] Walpiri (Bowler 2016). These languages do not have explicit comparatives (or superlatives), but they also do not have measure phrases or measure phrase constructions (e.g. *five feet tall*) or degree modifiers like *very*.

In conclusion, there have been attempts to model English adjectival constructions without the use of degrees as basic semantic entities (Klein 1980, 1982; Neeleman et al. 2004). These accounts have been argued to fail on empirical grounds, because they cannot account for the semantic behavior of many constructions, including explicit comparatives. Furthermore, there seem to be languages for which an entire class of constructions are not available, and this class is very naturally characterized as constructions that must be modeled using degrees.

9.3.4   Interim Summary

There are, roughly, two types of arguments made in favor of adding basic entities to the semantic ontology: morphological and semantic ones. The morphological arguments pertain to the language's inventory of functional morphemes. They assume (generally implicitly, as in Partee 1973, 1984), that a language differentiates between entity x and entity y if: (i) it lexicalizes different **proforms** for x and y; (ii) it lexicalizes different **modifiers** for x and y; and (iii) it lexicalizes different **quantifiers** for x and y. These arguments have all been extended – implicitly or explicitly – to possible worlds, times, and degrees.

The other arguments for type-proliferation pertain to semantic adequacy: in the case of times, there was the argument that, even in the absence of a dedicated temporal proform or quantifier in Hausa, aspectual markers need to reference times in order to impose strict enough truth conditions. And in the

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[5] Cf. Bogal-Allbritten and Coppock (2020), who argue not only that Navajo has degrees, but that it has degrees and degree quantifiers (but not individual quantifiers).

case of degrees, there was the argument that a semantic model that does not include degrees can adequately model implicit comparatives in English, but not explicit comparatives.

In the case of degrees – but not, as far as I know, any other putative basic entities – there has also been a robust research project arguing that languages can differ with respect to whether they must be modeled using degrees. Evidence for this distinction comes in the different inventory of constructions or morphological strategies for expressing certain situations, so they constitute a sort of comparative morphological argument.

These criteria – imposed by the morphological and semantic arguments – are arguably not necessary conditions, as we can imagine a language with a relatively impoverished lexicon and accidental homophony or syncretism in e.g. its proform inventory, but not its quantifier inventory. This sort of thing happens all the time, and I'll return to discuss it in more detail in Section 9.5.

They are also arguably not sufficient conditions for basic entities, which is a very unsatisfying situation. *Wh*-phrases could be construed as either proforms or quantifiers, depending on one's semantic theory, but they do not perfectly track what is generally thought of as being a plausible basic entity. On the one hand, English and several other languages co-opt the same *wh*-phrase to range over degrees and manners (*how*), prompting some to argue that these are the same sort of entity (see Section 9.4.3). On the other hand, English has a dedicated *wh*-phrase *where* for locations and vectors (it has a locative and a directional interpretation) but two distinct ones, *why* and *how come*, for reasons.

However, it's worthwhile noting the consistency of these morphological and semantic arguments across different, unrelated theoretical projects and empirical phenomena. The idea that e.g. distinct proforms belie distinct basic entities seems to be a common and thereby intuitive assumption.

Finally, the introduction of the possibility that languages can differ with respect to their basic entity inventory predicts the existence of a robust and theoretically attractive universal typology, reminiscent of Greenberg's (1963) Universals (e.g. "If a language is exclusively suffixing, it is postpositional; if it is exclusively prefixing, it is prepositional"). The claim that arises from this discussion of type-proliferation arguments is that if a language has morphemes and constructions that must be semantically modeled using degrees, it also has morphemes and constructions that must be modeled with individuals, possible worlds, and times, but not vice versa. However, there is arguably more work to do in replicating the detailed study of degrees in other domains, including times.

9.4   Type-Collapsing Arguments

In contrast to those who have advocated for adding basic entities to the semantic ontology are those who have argued that basic entities should be

collapsed or eliminated. These arguments, too, come in two forms: those from morphological cues and those from semantic convergence.

9.4.1   Situations

In a several prominent papers written in the 1980s, it was claimed that the putative basic entities possible worlds, times, and locations, were collectively too blunt to model natural language semantics (Barwise 1981; Barwise & Perry 1983; Kratzer 1989). These papers highlighted a number of constructions that seemed to restrict all of these things, dependently. Since these modal/temporal/spatial restrictions covary in a predictable way, they argued, a semantics that modeled them independently can't be restrictive enough.

There are many sentences that can illustrate this point, I focus on one (from Cresswell 1990; Kratzer 2007):

(16)   If, whenever it snowed, it had snowed much more than it actually did, the town plow would have removed the snow for us.

The point is that the putative anaphor *would* can't range just over possible snowing events (cf. Cresswell 1990; Stone 1997), but it must range over possible snowing events indexed to a particular location (the town in question) and a particular time (the reference time, prior to the time of utterance). As Kratzer (2007) explains,

we have to be able to consider for each actual snowfall *s* a set of counterfactual alternatives and compare the amount of snow in each of them to the actual amount of snow in *s*. This means that we have to be able to 'go back' to the actual snowfall situations after considering corresponding counterfactual situations.

The proposed solution involves situations: spatio-temporally specified partial worlds, or particulars. They are a basic entity that effectively collapses possible worlds, times, and locations into one. Incidentally, Kratzer (2007) argues that situations can be used to define Davidsonian events, so the use of situations actually obviates four distinct putative basic types:

(17) $\lambda e[P(a)(e)]$ is an abbreviation of $\lambda s[P(a)(s) \wedge \texttt{exemplify}(P(a), s)]$, where $[\![\texttt{exemplify}(p, s)]\!] = \text{T}$ iff p exemplifies s

It's been assumed that situations have corresponding proforms, although it's not clear that these proforms have a single common morphology in English.[6] On the one hand, assuming situations as basic entities – instead of worlds,

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[6] Schwarz (2012) ostensibly addresses the distribution and interpretation of 'situation pronouns,' but he uses the term to refer to (null) situation indices or arguments in noun phrases, so his discussion doesn't amount to a morphological argument for situations as a basic entity.

times, and locations – seems to explain the synonymy of *when* and *if* clauses (cf. Rothstein 2009), as in (18).

(18) a. Mary opens the door when(ever) the bell rings.
      b. Mary opens the door if the bell rings.

But if *when* and *if* do both range over situations in this assumed way, it would be nice to have an explanation of why English has more than one situation proform (or quantifier, as the case may be).[7] Such arguments are reminiscent of those in Lewis (1975) about domain-unspecified quantification, which highlights the challenge of empirically differentiating between a theory that assumes a single basic type with dedicated quantifiers or one that assumes a variety of different types with unspecified quantifiers (i.e. a Type Ersatz theory and a Type Flexible theory).

9.4.2 Individuals and Events (and Degrees)

A distinct but simultaneous semantic tradition has blurred the lines between individuals and events, beginning with Bach (1986a), who argued that individuals and events have the same mereology.

Bach was inspired by Link's (1983) observation that plural count nouns and mass nouns behave similarly, and his consequent conclusion that both should be analyzed as denoting join semi-lattices (individuals whose plurality is modeled in their internal Boolean structure). Bach extended the empirical parallels to events, arguing that Link's 'cumulativity of reference' property extends to atelic events – which are like mass nouns and plural count nouns – but not to telic events, which are like singular count nouns.

The empirical parallels between individuals and events have been strengthened further by the observation that some sentences are ambiguous between individual and event readings (Krifka 1989, 1990, 1992; Lasersohn, 1995).

(19) a. Four thousand ships passed through the lock last year.
      b. The library lent out 23,000 books in 1987.

In (19a), the numeral *four thousand* could be counting distinct ships or events of passage; in (19b) the numeral could be counting distinct books or events of lending.

Krifka treats this polysemy as a homomorphism from "concrete entities to abstract entities" (1990: 194), but assigns individuals (the concrete entities) and events (the abstract ones) different types. In his compositional analysis, the

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[7] Starr (2014) analyzes *if* and its crosslinguistic counterparts as an interrogative complementizer that maps a proposition p to its polar question denotation $\{p, \neg p\}$, but that (in contrast to *whether*) highlights the positive answer p. If this is right, the relationship between *if* and *when (ever)* in (18) is more complicated than I am considering here.

cardinality operator that allows for the semantic composition of the numeral and the NP – associating the nominal property with an argument corresponding to its cardinality – is polysemous between measuring individuals, events, or sets of events.

Some quantifiers seem to be domain-general in just this way, too; *most* in (20) can range over ships or events of passage.

(20)   Most ships passed through the lock at night.

A number of recent articles have examined this polysemy in much more detail, for e.g. French *beaucoup* (Doetjes 2007; Nakanishi 2007; Burnett 2012).

There seems to be a directly parallel DP polysemy between individuals and degrees (and events). Some examples are illustrated in (21) (from Rett 2014).

(21)   a. Four pizzas are vegetarian / is enough.
         b. Four feet of the plywood are warped / is more than Betty had asked for.
         c. French fries were eaten by the senators / is not enough, the senators will need protein.

In each example, the DP can denote a plural individual, in which case it is modified by an individual predicate (*be vegetarian*, *be warped*, *be eaten*) and triggers plural agreement on the predicate. But it can also denote a singular degree, in which case it is modified by a degree predicate (*be enough*, *be more than*) and triggers singular agreement on the predicate. Note that this is not a polysemy triggered by the numeral or measure phrase (cf. Landman 2000; Rothstein 2009), as bare plurals are polysemous in the same way (21c).

In Rett (2014) I observe that the degree interpretations of DPs are restricted to dimensions of measurement that are monotonic on the part–whole structure of the plural individual, in the sense documented by Schwarzschild (2005). I conclude that the polysemy is the result of a homomorphism from individuals to degrees (not in the other direction, cf. Brasoveanu 2009) that is bound by a restriction that requires the homomorphism be meaning preserving in a particular way. But it is unclear whether these homomorphisms are evidence in favor of Type Ersatzism (i.e. the semantic kinship suggests we should represent them using the same type) or Type Proliferationalism (i.e. the meaning-preservation constraint on the homomorphism suggests we need to represent the homomorphism using different types).

9.4.3   Degrees, Kinds, and Manners

There also seems to be a morphological kinship between degrees, kinds, and manners. Landman and Morzycki (2003) and Anderson (2016) (see also Haspelmath & Buchholz 1998; Rett 2013) note crosslinguistic evidence for the assimilation of degrees, kinds, and manners. This is shown in (22), in

which the same morpheme *as* ranges over manners in the similative in (22a) and over degrees in the equative in (22b).

(22)   a. Jane danced as Maria danced. *manner*
         b. Jane is as tall as Maria is.   *degree*

The polysemy is more expansive in Polish (23), in which the proform *tak* ranges over manners, kinds, or degrees.[8]

(23)   a. On   tańczyl   **tak**.
            he   danced   thus
            'He danced like that.'   *manner*
         b. **Taki**   pies   uciekłwczoraj w   nocy.
            such.MASC.SG.NOM   dog.NOM   ran.away   yesterday in.night
            'Such a dog ran away last night.'   *kind*
         c. **tak**   wysoki
            such   tall
            'that   tall'   *degree*

To account for these data, Anderson (2016) explicitly argues for a particular version of 'enriched degrees' (Grosu & Landman 1998), in which degrees are modeled as kinds of Davidsonian states, and manners are modeled as event-kinds. Formally, the approach is similar to situation semantics, in that it treats words like *tak* and *as* as involving abstraction over degree state-kinds.

9.4.4   Degrees and Vectors

Schwarzschild (2012) notices another crosslinguistic trend: in Hindi and Navajo, there is polysemy between spatial prepositions and comparative standard markers (equivalent to *than* in English comparatives). This is illustrated in (24) for Hindi.

(24)   a. anu raaj   se   lambii   hai
            Anu Raj   FROM   tall.FEM   PRES.SG
            'Anu is taller than Raj.'
         b. anu us   baRe   kamre   se   niklii
            Anu that.OBL big.OBL   room.OBL   FROM   come.out.PERF.FEM
            'Anu came out of that big room.'

Schwarzschild (2012) uses data like these to argue for an analysis of an entity he calls a 'directed segment,' essentially a two-dimensional interval. Schwarzschild (2013) expands on this analysis, drawing on semantic arguments regarding comparison classes (Kennedy 2007; Bale 2011). In the analysis, segments σ are shorthand for ordered quadruplets $\langle u, v, >, \mu \rangle$, with u, v

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[8] There is a similar kind/degree polysemy in sentences like *It's amazing the cars he owns!* (Castroviejo Miró & Schwager 2008).

individuals representing endpoints; $>$ a total ordering; and μ a dimension of measurement (e.g. height). It is effectively a relational version of the triples Bartsch and Vennemann (1972) interpret degrees to represent. The result is a semantics for a comparative (25) formalized as (25a) and informally summarized in (25b).

(25)   Tom is taller than Susan.
    a. $\exists \sigma [\nearrow (\sigma) \wedge \text{START}(\sigma) = \mu_\sigma(s) \wedge \text{END}(\sigma) = \mu_\sigma(t) \wedge \mu_\sigma = \text{HEIGHT}]$
    b. 'There is a rising directed scale segment: it starts with Susan's measurement on the scale, it ends with Tom's measurement on the scale, and it is a segment of the height scale.'

9.4.5   Lattice vs. Interval Plurals

Finally, in Rett (2015), I argue that there are two different sorts of plural entities, intervals and lattices. Interval plurals (Schwarzschild & Wilkinson 2002; Dotlačil & Nouwen 2016) have strictly linearly ordered atomic members, e.g. degree scales, temporal intervals, and spatial vectors. Lattice plurals (Link 1983) have atomic members that form a (semi-)lattice structure.

I argue that relations between interval plurals – like comparatives, temporal relations like *before* and *after*, and spatial prepositions – are interpreted with respect to the same general principle: the matrix argument is related to the most informative closed bound of the embedded argument. In contrast, relations between lattice plurals are interpreted with respect to the maximal plural entity. In addition to explaining parallel semantic behavior between degree, temporal, and spatial relations, it predicts that only interval plural relations have antonyms, and that antonymic constructions are associated with reverse orderings.

9.4.6   Interim Summary

In sum, just like arguments in favor of expanding the ontology, type-collapsing or eliminating arguments tend to take one of two forms. First, there are morphological arguments that we should collapse two or more types together because there is a tendency for (unrelated) languages to use the same functional word or morpheme to range over them. These include degrees, manners, and kinds on the one hand (Anderson 2016), and sets of degrees and vectors on the other (Schwarzschild 2012). They also include the observation that operators like *many* and *most* range over individuals and events (Doetjes 2007; Nakanishi 2007; Burnett 2012), and that operators like *when* and *if* range over worlds, times, and locations.

Second, there are semantic arguments in favor of collapsing or eliminating types. Whereas semantic type-proliferation arguments deal with the issue of semantic adequacy – a model *needs* a different sort of entity to properly

characterize a construction or language – type-collapsing arguments deal with semantic convergence. Situation semanticists (Barwise 1981; Barwise & Perry 1983; Kratzer 1989) have argued that restricting and quantifying over worlds, times, and locations independently predicts more truth-conditional variation than we see. Bach (1986a) and Krifka (1990) were the first to observe a widespread polysemy between individuals and events in constructions with numerals and quantifiers; in Rett (2014) I argued that the polysemy extends to degrees as well. And in Rett (2015), I argued that there is a real semantic difference between the way relations are calculated between interval plurals and between lattice plurals.

9.5   Concluding Summary and Discussion

Proponents of both proliferating types and collapsing them seem to care about the same sorts of things, which makes it easy at least in principle to compare the two perspectives. They care about capturing truth conditions (either making the theory sufficiently fine-grained or preventing it from being too fine-grained). And they take seriously the morphological cues of the language (explaining either the use of the same functional morpheme for more than one putative type, or two different functional morphemes for a single putative type).

Luckily, linguistic theory has something to say about the morphological arguments; specifically, it seems to have principled answers to the question: What's more compelling, differentiated morphology or syncretic morphology? Loosely speaking, studies of grammatical change have suggested that it's more likely natural language would co-opt function words for different entities than it would innovate different function words for the same entity. First, when languages add morphemes, especially via borrowing, they either tend not to be, or cannot be, functional morphemes (Thomason 2001). So the typical process by which we see lexical growth in a language generally does not extend to functional items, which has been the focus of the morphological arguments discussed here.

Second, functional items like proforms are more likely to converge over time (cf. Norde 2009), via processes like analogical change (Hock 2005) or syncretism (Baerman et al. 2005). Bußmann (1996) characterizes the former as the "diachronic process by which conceptually related linguistic units are made similar (or identical) in form … often regarded as the result of the move towards economy of form" (p. 21). Syncretism is a term for this sort of process when it affects inflectional paradigms, exemplified in Table 9.2.

In terms of semantic arguments, the question of what is more important, a powerful theory or a restrictive one, transcends discussions of semantic ontology and even linguistics. But there is an important difference between

Table 9.2. *Syncretism in German verbs*

	Old High German	Modern German
infinitive	*neman*	*nehman*
1PL	*neměm*	*nehman*
3PL	*nemant*	*nehman*

the two approaches in the consistency of their conclusions. The arguments for proliferating types seem to lead to consistent conclusions, crosslinguistically, possibly trivally. And they also result in an attractive (albeit incomplete) universal typology: {individuals, times, worlds} < {degrees} (for instance).

The arguments for collapsing types, on the other hand, seem more inconsistent. Consider events: should they be type-assimilated with individuals, as suggested by individual/event polysemy (Bach 1986a; Krifka 1990)? Or should they be associated with possible worlds and locations, as the situation semanticists have argued? And consider degrees: are they more like vectors (Schwarzschild 2013; Rett 2015), or are they more like manners and kinds (Anderson 2016)? While these empirical arguments are compelling in isolation, amalgamating them in a single semantic theory seems problematic.

I'll close by reiterating that none of these arguments appear to be able to differentiate between Type Flexibility – a semantics with numerous basic types – and Type Ersatzism, with a single type that differentiates between e.g. individuals and events at some subtype level. I know of no empirical argument that can do this. Instead, I hope to have presented a wide variety of existing arguments for leaning towards Type Reductionism and for leaning towards Type Flexibility/Ersatzism, and I have tentatively argued that the latter are more morphologically plausible and semantically consistent.

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10 Nonfinite Verbal Forms and Natural Language Ontology

Gillian Ramchand

10.0 Questions and Answers

(1) Why do you think both linguists and philosophers find the question of ontology interesting?

Philosophers have long been interested in questions of ontology, but from a metaphysical point of view.* In semantics, it is the philosophical versions of ontological primitives that are used in the construction of the nonlinguistic side of the meaning equation, and which inform the structure of semantic theories. The starting point of this chapter is the idea that metaphysical ontologies are inappropriate when it comes to natural language semantics. Moreover, the claim is not only that ontologies motivated by studying the structure of natural language are superior as a basis for building a natural language semantics, but also that the nature of those ontologies is an important intermediary in the more overarching metaphysical discussion (see also Rett, this volume). In other words, given that we use language to reason about the world, the metaphysical questions cannot be sensibly answered without being explicit about the ontological intermediates required by language.

(2) What recent developments in linguistics and philosophy do you think are most exciting in thinking about ontologies for natural language?

There is much recent work in philosophy of language in the area of natural language ontology (Moltmann 2017; Fine 2014; Hinzen 2016), which is reinvigorating a strand of (heretical) philosophy that questions the hegemony of Quine, Carnap, and Lewis in motivating the building blocks of meaning. On the linguistics side, recent work by e.g. Potts, Henderson, is attempting to extend the dominant frameworks to accommodate phenomena and modalities of expression that are deeply integrated in human linguistic expression, but

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which are not so easily accommodated within the traditional, classical model (Potts 2007; Henderson 2015; Gehrke & McNally 2015).

(3)   What do you consider to be the key ingredients in adequately analyzing ontology when it comes to natural language?

A detailed compositional treatment of natural language semantics distinguished by an emphasis on the lexical primes and category types that we can show have psychological reality as primes of memory and computation.

(4)   What do you consider to be the outstanding questions pertaining to natural language ontology?

As with all empirical questions that require a close study of natural language phenomena, the question is always the extent to which the evidence from a single language generalizes crosslinguistically. In other words, which of the natural classes of syntactic and semantic primes are universal/cognitively unavoidable within natural language systems, and which are more linguistically parochial and contingent.

10.1   Ontology and the Problem with Truth

Consider the following three sentences of English.

(1)   a. John closed the door.
         b. John is closing the door.
         c. The door is closed.

These three sentences all use forms of the same 'verb' in English, *close*, and that verb contributes to the semantics of what is being said in an important and systematic way, as indeed all scholars of meaning in language would concede. It is natural to associate the meaning of the verb *close* with all the situations that are 'closing' events. However, there is something interestingly different about the three cases. While in (1a), the verb meaning can be elucidated in terms of the situations in which it could be said to be true, namely actual closing events, the verb meanings in (1b) and (1c) are not so straightforward to describe in this way. This is because the situations in which we would judge (1b) to be true are not literally 'closing' events in the sense that if John stops half way then what he has done is not 'close the door'. Nevertheless, what he is doing must be sufficiently similar to a fulfilled 'closing' event for it to justify the use of that particular verb, and the situation so described must somehow perceptually and cognitively evoke actual closing events as their organic continuation. The task then becomes how we describe in a formal and precise way what it means to evoke a 'closing' event even if it never comes to fruition.

The problem with (1c) is essentially the converse. The verbal form used here is *closed*, the past participle, and it is systematically and paradigmatically part

of the same verbal item as in (a) and (b). Situations that make (1c) true are those in which the door is in a particular kind of state, specifically, the state it would be in *if somebody had performed a 'closing' event on it*. But it is easy to see that no such 'closing'. event need actually have transpired for (1c) to be true – the door could have been manufactured closed, for all we know. The task here is the temporal inverse of the task in the progressive case – how do we describe in a formal and precise way what it means to be the potential outcome of a 'closing' event without making reference to that closing event itself as a primitive.

The problem for both cases reflects choices that have been made in the *ontology* of how we talk about semantics in linguistics: we choose the actualized event of closing as the primitive with respect to which the subparts of 'criterial activity' and 'criterial result' should be defined. The reason that the actualized event of 'closing' is chosen as the primitive here is because it has a clear and transparent role of truth-making for natural language expressions using the *close* lexical verb. However, every language I have ever worked on or seen discussed has, in addition to its finite verbal forms, at least one related verbal form which is used in nonfinite contexts, often several. In many cases, these nonfinite forms are at least as morphologically simple, sometimes more so, than the finite inflected forms of the same verb. As we have seen, these nonfinite forms create complexities for the articulation of truth conditions for even the simplest of sentences containing them. Specifically, these 'simple' forms have classically been treated by invoking possible worlds as an addition to the ontology required for describing natural language meanings (Lewis 1973, 1986). This allows the event of 'closing' to live not just in the real world, but in all worlds imaginable, counterfactual, hypothetical and future. With this toolbox we can talk directly of events that could have happened even though they actually didn't, or which might come to pass *if* things continued normally.

In this chapter, I will argue that choosing the actualized event, the truthmaker, as the *primitive* of our semantic theory, while successful and elegant for some descriptive purposes, fails to make sense of natural language in the sense that it gives us no purchase on the details and specifics of what has elsewhere been called *natural language ontology*. This question has been a central concern in the work of e.g. Friederike Moltmann (see Moltmann 2017, 2020 for summaries of the area). In this article I will be fully endorsing her position that natural language ontology is an important domain within 'descriptive metaphysics' (using the term from Strawson 1959), which is distinct from the kind of foundational metaphysics that the philosophical tradition tends to engage itself in. This project analyses the ontological commitments implicit in natural language(s) itself, one of the most pervasive and important reflections of our human engagement with the world. As Fine (2017) argues, there is even

a case to be made that progress in foundational metaphysics *relies* on a close and nuanced understanding of the descriptive metaphysics involved in natural language ontologies. But even if that were not the case, as a linguist, it seems to me that the project of natural language ontology is crucial if we are to understand the compositional products of meaning and meaning-building in language, and the mechanisms by which it is embedded in our cognition and cognitive processing more generally. The spare and elegant axiomatization of semantic descriptions anchored just in truth and reference to particulars simply does not do justice to content and partial and incremental contents that we see in language. Exploring natural language ontology in its own right, taking the internal evidence as primary is a prerequisite to getting this kind of deeper understanding.

In other words, I will be arguing that the ontological categories that we require for understanding the domain of natural language meaning ("its properties and the relations between them"), cannot and should not be identified with external objects in the world or the nature of being, and certainly cannot be explicated in terms of the latter's ontology. Anchoring all denotations in the primitives of extensional reality justified by some kind of foundational metaphysics, ends up 'flattening out' and making opaque the different *ways* in which such meanings are built up. The internal pieces of compositional meaning in such a system are reverse engineered from their connections to metaphysically justified primitives, and are not taken as evidence of natural language ontological primitives. Of course I would not deny that we clearly want to understand the use of language to 'say things about the world', and that a good theory of utterance meaning must ultimately anchor itself in a truth-making relation to situations in the world (Fine 2014). What I do deny is that natural language meanings for the lexical and functional formatives of a particular linguistic code should be stated *directly* extensionally. While we sometimes use meanings to build truth-evaluable thoughts or refer to things in the world, the meanings of lexical items themselves are the cognitive precursors of those acts (see Pietroski 2018).

The central empirical, descriptive ground in this chapter will be 'nonfinite verbal forms' as illustrated briefly in this introduction. In Section 10.2, I take the example of the English participle in -*ing* and discuss its 'meaning' in terms of the classic imperfective paradox that it gives rise to in the English progressive construction. In Section 10.3, I take on a slightly less well discussed case of the same sort of paradox, this time involving the English participle in -*en/ed* the passive/perfect. In Section 10.4, I provide an overarching diagnosis of the problem and in Section 10.5 I lay out the structure of the solution. As indicated in my introductory paragraph, the solution will require a rather different set of grounding assumptions than those we have become accustomed to over the past 40 years.

10.2   *V-ing*: The Imperfective Paradox

I start with the English participle in *-ing*, productively formable from every single verb in the language and ubiquitous in the speech of children and adults alike.

(2)   (a) John is singing.
        (b) Mary is riding her bike.

It turns out that even these most basic of English sentences involve a troubling paradox that becomes visible particularly when a verb with a natural telos is chosen. To see the problem, let us compare the simple past tense of the verb *cross* in (3a) with the past progressive using the *-ing* participle in (3b).

(3)   (a) John crossed the street.
        (b) John was crossing the street.

Difficulties that arise when one attempts to express the truth conditions of the English progressive in terms of the truth conditions of the verb it is based on. Bennett and Partee (1972) noticed that you could not give a semantics of the progressive that said it was 'true at a proper subinterval of the interval at which the nonprogressivized sentence is true'. This is because if you say that, you commit yourself to John actually getting across the street at some future time.

10.2.1   *Possible Worlds Accounts*

To get out of this unwanted completion entailment, one needs to say that the complete interval corresponding to 'John cross the street' is not necessarily true in the real world, but rather in some possible world, plausible given the starting conditions (i.e. 'inertial' in Dowty's 1979 terms), leading out from the situation that the progressive sentence describes (Dowty 1979). The solution in terms of possible worlds was considered a satisfying one when it was proposed. Possible worlds after all had already been accepted as a necessary addition to the toolbox in any case (Lewis 1973) because it is a fact about natural language that meanings can be 'displaced' – we can and do talk about things that are not happening now because they are in the past, things that may or may not happen in future, things that we *know* did not happen, but would have, if . . . etc. etc. So possible worlds (or something equivalent) is a necessary addition to the ontology of natural language semantics in this view. Note that it is not strictly necessary to see this as an aspect of foundational metaphysics, although many semanticists including Lewis would be happy to commit themselves to this idea. Even if we do not believe that we are living in the multiverse (with or without a different Spiderman in each one), it does not diminish the fact that we need to make reference to some such thing to make sense of how we as humans speak. The question for natural language

ontology is descriptive and empirical: *How* does natural language achieve the expression of these ideas and with which ingredients? There are ways of capturing the notions of choice and indeterminacy without using possible worlds as a technical device. I will show as we go on that possible worlds are used to plaster over many of the cracks that emerge from pursuing the extensionalist agenda. They allow the theorist to count and quantify and verify as usual, while farming out the mysteries of intensional content to an explication of the ontology of possible worlds (something which is just as hard as the problem it is trying to solve). But in fact, in the case of the imperfective paradox, we are still far from being out of the woods. It was quickly noticed that even if all of Dowty's inertial worlds could never lead to a successful street crossing (because for example a large truck was rushing towards John without him realizing it), we can *still* say that 'John was crossing the street'. So inertial worlds simpliciter are insufficient; further research shows that what we need is a notion of continuation that is relativized to the event and modulated by event internal properties such as intention and abilities of the agent (Landman 1992). And we are still not done because analyses of the imperfective paradox continue to this day, with more and more fine-grained scenarios forcing the semanticist to precisify the nature of the modal base, and/or call into question the nature of the quantification involved. It is fair to say that we have had nearly 40 years of possible worlds accounts of the humble progressive. The overwhelming consensus of the field is that some such analysis involving possible worlds is the correct one for this construction, and for imperfectives in other languages.[1]

Let us look for concreteness at the denotation of the progressive as given in Landman (1992). First of all, the progressive operator is defined in terms of the full actualized event, as in (a), and the denotation of the progressivized sentence is given in (b).

(4)   John was crossing the street.
        (a) (where $ing(VP) \rightarrow \lambda x \lambda e.Prog(e, VP(x))$)
        (b) $\exists e'[\tau(e') < now \,\&\, Prog(e', \lambda e \exists x[Cross(e) \,\&\, Agent(e, \text{'John'}) \,\&\, Theme(e, x)]$

For this to have truth conditions, we need to specify the conditions under which $\lambda x \lambda e.Prog(e, VP(x))$ would be true given a particular e and a particular denotation for x. This is given by Landman using three crucial notions: the *stage-of* relation between events, and the idea of a continuation branch which is a property of the possible worlds network and relations therein, and an intuition about what counts as a 'reasonable' possible world. The stage-of

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[1] The chief rival account, Parsons 1990's nonmodal account in terms of INPROGRESS STATE, seems to be rather unfashionable, although to my mind its difficulties are no greater than the ones that plague the modal accounts, and its benefits are substantial. But see Altshuler et al. (2019) for a recent semantics textbook which embraces the idea.

relation is a special kind of subpart relation in which we would be willing to say that 'it is the *same* event in an earlier state of development'. The definition of continuation and continuation branch is shown in (5).

(5)   (a) *e* is a stage of *f* if speakers would be willing to say that *e* is the *same* event as *f* in an earlier stage of development.
       (b) *f* is a continuation of *e* iff *e* is a stage of *f*.
       (c) *f* stops at *j* in *w* iff there is not continuation of *f* beyond *j* in *w*.
       (d) A continuation branch CON(f, w) of f in w is a chain of world, event pairs such that the each event is a 'continuation' of the previous one in the chain, and each world is the closest to the previous one in the chain and is 'reasonable'.

Note that 'continuation' in the continuation branch is now stripped of its normal real-world connotations because it does not reflect normal extensional temporal contiguity, but is defined at its heart in terms of the speaker's judgment of 'stage-of', itself anchored in a judgment of 'sameness'. With the machinery in (5) in hand, we are now finally in a position to state the truth conditions for Prog, given in 6).

(6) $[\![\text{Prog}(e, \ P)]\!]_{w,g} = 1$ iff $\exists f \exists v: \ <f, v> \ \in \text{CON}(g(e), w)$ and $[\![P]\!]_{v,g}(f) = 1.$

In other words, the in-progress event of 'crossing the street' for example would be true *now*, if we could find some continuation branch for 'cross the street' which maintained sameness of event and continued into some future close and reasonable worlds in which at some point 'cross the street' does become true.

Landman's (1992) main insight, and the reason why his analysis improves on the earlier rather similar account of Dowty (1979) is that he notices and builds in the importance of event internal properties in underwriting people's actual on the ground judgments of the truth of the progressive in certain scenarios. He builds it in by defining continuation branches in terms of judgments of event 'sameness'. But it is important to see that it is this judgment of 'sameness' that is doing all the work here. On top of the machinery of possible worlds, we still need 'stage-of' primitive, a residue that is never given complete objective explicitness. This is not just true of Landman's account (although see Landman 2008 which is an admirable attempt in that direction). In Portner (1998) it is the relativization to event descriptions, in Hallman (2009b) situational version it is the relation R called 'the relevant subpart relation'. In other words, if you look at these accounts very closely, the essential question of "What does it mean to be an in-progress version of an event?" remains essentially primitive.

My critique at this point is not based on a request for more formal explicitness in defining what it means to be the 'stage-of' an event, or what underlies our judgments of 'sameness'. In fact, I suspect that deconstructing this further

is liable to put us on a path of explication in which we are constantly placing the burden on a more and more abstract notion that defies formal explicitness, in a kind of 'turtles all the way down' kind of situation. It is exactly in this kind of situation that we as formal modelers should recognize the role of the primitive, or atom in our natural language ontology. Once we embrace and acknowledge the notion of event 'sameness' as a primitive cognitive judgment, the question then becomes whether there is anything else of the possible worlds machinery that we actually need.

The problem here is not that we foolishly tried to express the progressive in terms that *build on* the nonprogressivized version – that is just a basic compositional desideratum. The problem is that the toolbox forces us to start with an extensional meaning for the nonprogressivized version. But I would argue that the essential meaning of a verb (unprogressivized) cannot be captured via extensions, so this strategy is doomed to failure, and the progressive is intuitively related to the main verb in a way that is not defined in terms of truth, but in terms of the primitive of event 'sameness'.[2]

10.2.2 The Progressive as a Stative Construction Built from -ing

The progressive is surely built from the simple verb via some systematic meaning operation, but one in which meanings are not extensions.[3] If we are really to take language seriously in what it is telling us about how these meanings are built up, we need to look at the syntactic and morphological devices that recur in language after language to do precisely this kind of thing. The existence of nonfinite verbal forms of particular types are interesting because they point to a recurrent pattern in natural language where the conceptual content of a particular event type is severed from the information expressed concerning the temporal and locational actualization of those events.

In short, verbal lexical items seem to be encoded as belonging to particular aktionsartal categories which then have an effect on how they can be used linguistically and what kinds of entailments they eventually give rise to (see Vendler 1967 and Dowty 1979 for the basic aktionsartal system found in natural language, including a fundamental difference between dynamic and static eventualities and dynamic eventualities which either do or do not make

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[2] Deciding that this notion is primitive in writing a semantics for the sentence does not mean that our system lacks a firm foundation. Judgment of event sameness is a sufficiently precise and plausible candidate for a science of cognition more generally to elucidate. Within that adjacent scientific endeavor, the thing that *we* use as a primitive can be further deconstructed, understood and grounded in predictive theory construction. This is one of the important ways in which the study of natural language ontology can begin to communicate directly with more general theories of mind and its relation to external reality.

[3] See Ramchand 2018 for such an account.

essential reference to a final telos). In addition, languages often provide systematic morphological means to create aspectual modulations of those lexically specified roots, where the latter specifies the particular conceptual information that characterizes the event (i.e. provides lexical encyclopedic content), while the affixation contributes information about the way in which the unfolding of that event in time is anchored to reference and utterance intervals. The latter information is contingent and related to the particular instantiation of the event being described whereas the former represents essential content that is reusable over instantiations. In many languages, aspectual and temporal modulation of verbal content is achieved via 'auxiliary constructions' where nonfinite versions of the verb are combined with helping verbs that carry the required tense/aspect morphology required for finiteness. Thus, auxiliary constructions in the world's languages show in very tangible form some sort of division of labor in building up the meaning ingredients of a complex construction. If we consider the sentence in (7),

(7)   John is crossing the street.

we see that the situation is described by using the *-ing* form of the verb *cross* as well as the tensed form of the copula *be*, which carries no particular encyclopedic information, but does minimally bear tense/anchoring information. The primary question must therefore be: how do we characterize the meaning of the nonfinite form *crossing* such that when it combines with the tensed *be*, gives rise to something that has the truth conditions of the progressive? Note here that I am not asking "What are the truth conditions of the progressive?" (that is the question we have been working on for 40 years with turtles all the way down). I am asking rather, how do we understand the meaning contribution of the participle *crossing* – it must be built from the stem *cross* in a systematic way, and it must contribute an important ingredient to what the progressive ends up meaning. Moreover, whatever we choose as the meaning for *crossing*, we must also be aware of the fact that it shows up in attributive, gerundive and nominalizing constructions. We have no linguistic or cognitive evidence that there are multiple participles in *-ing* in English, as opposed to a single form that can be used in multiple constructions as an input to multiple ultimate truth-conditional outputs.

There are a number of things we know about the relationship between *crossing* and the verbal root *cross* that it intuitively depends on. One is that whatever aktionsart properties are associated with the lexical item *cross* as the descriptor for an event, they become flattened out once *crossing* has been chosen. Specifically, any 'progressive' sentence built from an *-ing* participle and the tensed form of *be* is, from an external distribution point of view, stative, regardless of the initial aktionsart of the verb.

The modern treatment that takes this fact most seriously is the one in Hallman (2009a), although he essentially builds on insights from Mittwoch (1988) and

Vlach (1981). In the literature, the interest in the imperfective paradox has meant that semanticists have focused on the differences between aktionsart categories in the way they feed the progressive construction (accomplishments and achievements give rise to the imperfective paradox, while activities do not; states do not make well-formed progressives). There has been less emphasis on the homogenous *output* in the form of the progressive construction. For this reason, I go over the clear linguistic diagnostics in English that systematically separate stative verbs from dynamic verbs. There are many. In each case, where you find a diagnostic that successfully separates verbs like *know* on the one hand from verbs like *run* (activity), *break* (achievement) and *build* (accomplishment) on the other, the progressive construction patterns with the former class.

Most obviously, as emphasized by Hallman (2009a), the progressive patterns with statives in being possible in the present tense in English with the same interpretation as the past tense (unlike eventives which shift to a habitual interpretation, or a narrative present). The reason is, as Hallman also argues, statives and the progressives can be true at a 'point' in time, while eventives which have duration cannot.

(8) a. John looked tired when I saw him yesterday and he looks tired now too.
     b. John was writing a novel when I saw him yesterday, and he is writing a novel now too.
     c. John ate a mango when I saw him yesterday, and ?? John eats a mango now too.

In case we are accused of taking evidence from the very phenomenon we are attempting to explain, consider the other stativity diagnostics we find in English. In the following presented contrasts, I use activities as my example of the dynamic predicate to keep all of the verbs 'homogenous'. Homogeneity is not the deciding factor underlying these diagnostics, stativity is.

Interaction with 'When'-Clauses, and Narrative Progression When the progressive construction is the main clause modified by a *when*-adverbial clause, the situation of the *when*-clause overlaps with the main clause situation (9a). This is like statives (9b) and unlike dynamics (9c), which get a sequential interpretation. The point about the progressive and *when*-adverbials was originally made by Leech (1971)

(9) a. When we arrived she was buying up all the restaurants in town.   *progressive*
     b. When we arrived, she owned all the restaurants in town.   *state*
     c. When we arrived, she danced for joy.   *activity*

In terms of narrative progression, in (10c) the event in the middle sentence advances the narrative time while in (10b) and (10a) it does not (cf. also Kamp & Reyle 1993).

(10) a. John arrived. He was sweating. Then he left in a hurry.   *progressive*
      b. John arrived. He looked hot and bothered. Then he left in a   *state*
          hurry.
      c. John arrived. He laughed hysterically. Then he left in a hurry.   *activity*

Semantic Selection Hallman (2009a) adds further diagnostics to the stativity claim. For example complements of ECM *discover* and *reveal* in English must be specifically stative and are bad with events of all kinds, including activities. Once again, the progressive patterns with the statives with respect to this test. The following data is from (Hallman 2009a: 8)

(11) a. The inspector revealed/discovered Max to be lying.   *progressive*
      b. The inspector revealed/discovered Max to be a liar.   *state*
      c. *The inspector revealed/discovered Max to lie.   *activity*

The Universal Reading of the Perfect Portner (2003) points out that the universal reading of the perfect is triggered in English for states, and is impossible for events of all stripes including activities. In (12), I use the *since 5 o'clock* phrase to trigger and force the universal reading of the perfect. Only statives (12b) and progressives (12a) are licit.

(12) a. John has been jogging since 5 o'clock.   *progressive*
      b. John has known the answer since 5 o'clock.   *state*
      c. *John has jogged since 5 o'clock.   *activity*

Epistemic Readings under 'Must' Finally, Ramchand (2014), points out that the modal *must* in English can only get an epistemic reading with stative prejacents, where it is ambiguous with a deontic interpretation. For dynamic predicates, only the deontic interpretation is available

(13) a. Mary must be jogging in the park.   *progressive*
      b. Mary must know the answer.   *state*
      c. Mary must jog in the park.   *activity*

10.2.3   Taking Stock

We have seen that attempting to be explicit about the meaning of the English participle in *-ing* throws up some tough desiderata. Let us summarize what has been learned:

(i) The progressivized eventuality in *-ing* is related in an organic way to its nonprogressivized counterpart, but does not actually entail it (in the actual world) at a future time.

(ii) The perceived relationship between a progressivized event and the event simpliciter gives rise to variable judgments across speakers. In this

regard, *internal properties of the participants and their intentions*, and the *nature of the process evidenced* seem to be more important than external circumstances.

(iii) The progressive functions like a state in its temporal semantics and external distribution.

As I have argued in the previous section, all of the possible worlds accounts we have seen fall short of complete objective explicitness when it comes to point (i) above. In all cases, the appeal to possible worlds still leaves an unexplained residue completely independent of the possible worlds mechanisms themselves. The unexplained part is the core of the progressive meaning itself – the idea of what it means to be a subpart of a particular event described in a particular way. It is unclear what the rest of the machinery is contributing.

Instead, we need to assume the equivalent of the unexplained part as the basic cognitive primitive. In other words, the ability to identify an event as being of a certain 'type', as represented by the reusable lexical item *run*, *build*, or whatever, is a sensory/cognitive judgment that forms the basis of our ability to classify the world based on symbolic labels. There is good evidence that the building of the derived stative participle in *-ing* is in fact cognitively basic. It has been known for a long time that the progressive participle in *-ing* is one of the very earliest pieces of morphology acquired by English children. It is acquired between the ages of 19–28 months, and appears *before* both irregular past tense (which in turn appears often before regular past inflection) and the copula (Brown 1973; Owens 2001). The use of the *-ing* participle thus appears before any actual tense inflection or modal expression, and is used correctly immediately.[4] A fully modal and intensionalized analysis of the progressive would require us to believe that English children acquire a modalized meaning accurately before they are two years old, and always do so before they even have the ability to express tense or use modal auxiliaries. The pragmatic complexity of inferences connected to the setting up of modal bases and ordering sources is supposed to be something that children need some social and interactional maturity in order to develop. But standard accounts seem to assume that they can do this even before they pass theory of mind tests.

The meaning of the participle in *-ing* must indeed be tethered in some way to the finite verbal form, and it must be so in a direct and cognitively obvious way. Let me state it pretheoretically in terms of descriptive content, independent of how we cash out the intuition in a formal semantics framework.

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[4] When it appears it appears first without the helping *be* verb, and it seems to occur first in telic verbs and then is gradually extended to verbs without salient endpoints. It is never apparently overextended to stative verbs.

(14)   **The Meaning of *V-ing***
V-ing expresses a *stative* eventuality that gives cognitive/perceptual evidence for the essential descriptive-classificatory content associated with V.

So the idea here is that the nonfinite verbal form in *V-ing* is related to V by the most basic of identificatory relationships, with all specific dynamic and instantiational information removed. In other words, *V-ing* describes a state (which can be true at a moment), which nevertheless is apprised by human cognizers as being qualitatively classifiable by the descriptive content of V. For this informal characterization to work, V's descriptive content in turn must be that part of the meaning that has to do with its 'essential nature' (in the sense of Fine 2005) and *not* defined in terms of the set of eventualities it is true of.[5]

10.3   *V-en*: The Paradox of Target States

We turn now to the other major nonfinite form in English, the *ed/en-participle* found in the passive (and perfect) constructions. I will abstract away from its use in the dynamic constructions (eventive passive and perfect) and concentrate on the stative use of this participle, since this is where the paradox emerges (but see Ramchand 2018 for an account of the participle that encompasses all three uses).

Even confining ourselves to the stative use, in the literature a number of different types of stative participle have been claimed to exist. In Embick (2004), these are called 'resultative' vs. 'stative' participles (although they are both actually stative, as he acknowledges). In Kratzer (2000) a 'resultant state' vs. a 'target state' passive participle are distinguished. In fact, these two authors are not making precisely the same distinction with these labels, so we cannot simply choose our terminology here. In the case of Embick, what is important in distinguishing the two classes is the presence or absence of 'event implications': resultative stative participles have event implications, 'pure stative' participles do not. In the case of Kratzer, what is important for the label is the relationship of the stative meaning to the meaning of the verb as a

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[5]   Kit Fine is famous for arguing against modal approaches which attempt to characterize essence in terms of a kind of *de re* modality (necessity). While the two notions are related, he suggests a reversal in the usual dependency, whereby metaphysical necessities (some of them) hold *because of* the essences of things (Fine 1994). For Fine, essence must be studied and understood as a primitive in its own right, and is not reducible to necessity (of which truth in possible worlds is one implementation). It is a special notion which is implicated in human reasoning and which has implications for our judgments, but necessity itself cannot make a distinction among all the necessary truths to single out just those propositions that are necessary *by virtue of the essential nature of things*. Thus the notion is independent and irreducible and should be studied philosophically in its own right.

whole: 'target state' participles denote a state which is already an internal component of the verbal denotation; 'resultant state' participles denote a state that holds forever by virtue of the event in question having occurred, as in the distinction originally proposed by Parsons (1990) for the perfect. Each of these distinctions comes with its own set of diagnostics. In fact, as we will see, it is not the case that target state participles are the non-event-implicating participles and resultant state participles are the event-denoting participles. Rather, target state participles can be both event-implicating and non-event-implicating in the relevant sense, while resultant state participles are only event-implicating.[6]

The point I am interested in here is in what is meant by 'event implications'. Let us consider first the following diagnostic, as proposed by Embick (2004).

(15)   a.   The door was built open.
        b.   *The door was built opened.

According to Embick and much subsequent work, the problem with (15b) is that the state of being 'opened' simply cannot be true in the world unless there has been a prior event of 'opening', i.e. it is not something that can be one of the door's properties before anything has happened to it. This is not true of the underived adjective *open*, which can be true regardless of how that state so described came about. In the case of *open*, there is an underived adjective which has the non-event-implicating reading, effectively blocking that interpretation for the participial form. But in English, there are many participles in *en/ed* which do in fact allow this kind of reading. Consider the participle *closed*.

(16)   The door was built closed.

In other words, it is perfectly sensible to describe a door as 'closed' even if that particular state was never actually preceded by a 'closing' eventuality. What is important to note about this situation is that the nature of the state described by the participle *closed* is in fact related in an intimate and organic way to the verbal concept *close* – the state we are describing is one that would typically result from an action of 'closing'. To give another example, one can describe a drawn object as a 'flattened cube' because it has exactly the configuration of lines and angles that you would get if you took a three dimensional cube and flattened it symmetrically. There is no implication that it *is* a cube that has been

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[6] This is similar to the point made by Alexiadou and Anagnostopoulou (2008). In Greek, it turns out that participles in *-menos* can be both target state and resultant state in Kratzer's terms, but always have event implications. Participles in *-tos* on the other hand do not have event implications. Those authors also make a distinction between event-implicating participles that include Voice and those that do not.

flattened, just that it can be accurately described as such. The description is crucially dependent on a knowledge of what it means to 'flatten' something, but not on the actual existence of such an event.

The criterion of event implications in the literature that stems from Embick's original distinction refers to the property of entailing the previous instantiation of an event particular. Thus, target states do *not* have event implications in Embick's sense, but they are conceptually related to the corresponding dynamic event and thus give rise to what I will call the 'resultative paradox' – they describe the result of an event, which in fact did not have to happen to produce it.

Can Kratzer's distinction between 'resultant state participles' and 'target state participles' get us out of the resultative paradox? Unfortunately not. Kratzer distinguishes between 'resultant state' participles and 'target state' participles, but as Embick (2004) points out, the phrasal target state reading that she analyses and gives a denotation always has event implications of necessity, since it requires existentially binding the Davidsonian event variable corresponding to the verb. It is only a pure adjectival reading that corresponds to the 'pure state' reading in Embick's terms. The denotation for the adjective *cool* vs. the target state *cooled* from Kratzer, cited in Embick (2004) is given below in (17).

(17)   a. *cool* : $\lambda x \lambda s[\text{cool}(x)(s)]$
        b. *cooled*: $\lambda x \lambda s \exists e[\text{cool}(x)(s) \wedge s = f_{target}(e)]$

We can see that in the case of the non-event-implicating reading of *closed* and *flattened* given above, this definition has the unwanted eventuality entailments built in to it and simply won't do the job. However, Kratzer's denotation for the target states is importantly correct in one respect, namely that the verb that gives rise to the target state *includes* specific conceptual information corresponding to the result state that the participle eventually denotes.

The resultant state passives in Kratzer (2000), on the other hand, are the ones where there is no readily available state in the denotation of the verb's meaning. Instead, the state that the participle denotes is the state that Parsons (1990) calls the 'resultant state'. The definition from Parsons is given in (18).

(18)   **Resultant states**
        "For every event e that culminates, there is a corresponding state that holds forever after. This is 'the state of e's having culminated,' which I call the 'Resultant state of e,' or 'e's Rstate.' If Mary eats lunch, then there is a state that holds forever after: The state of Mary's having eaten lunch."

Kratzer's diagnostic to distinguish resultant states in this sense from the others (the target states and the pure adjectives) is the incompatibility with the adverb *immer noch*-'still'. This is because the definition of resultant state

means that the state persists indefinitely for ever after the event is over, and therefore trivially the adverb 'still' cannot meaningfully be applied to it.[7] The resultant state passives given by Kratzer (2000) are shown below in (19).

(19)   a. Das   Theorem   ist   (*immer noch)   bewiesen.
           The   theorem   is   (*still)   proven.
           ? 'The theorem is (*still) proven.'
        b. Der   Briefkasten ist   (*immer noch)   geleert.
           The   mail box   is   (*still)   emptied.
           ? 'The mailbox is emptied.'
        c. Die   Gäste   sind (*immer noch)   begrüsst.
           The   guests   are   (*still)   greeted.
           ? 'The guests are greeted.'
        d. Die   Töpfe   sind (*immer noch)   abgespült.
           The   pots   are   (*still)   washed up
           ? 'The pots are washed up.'

Kratzer (2000)'s semantics for the resultant state does not produce a property of events, but rather a property of times directly. However, it is important to note that her semantics for both the target state and the resultant state require actualization and have real event implications, since for her events are instantiated particulars. So with respect to event implications, target state passives and resultant state passives are on a par. The only difference is the *way* in which that state is constructed.

The Target State passive participle, the one that is compatible with *immer noch* 'still', has a strong constraint imposed on it. For these to be formed, the verb in question must contain a caused result state in its denotation. Kratzer (2000) diagnoses this by the fact that a 'for'-phrase is felicitous as a measure of the duration of that caused state. It is precisely these verbs that form good target state passives with *immer noch*, Kratzer argues, that consist of an activity portion and a final state. It is this 'final state' that ends up being the denotation of the formed up participle.

If we consider the denotation Kratzer assumes for the target state verb *aufpumpen* 'pump up', we see that it contains the representation of a caused final state.

(20)   *das Boot aufpump-* - 'pump up the boat'
        $\lambda s \lambda e[\text{pump}(e) \wedge \text{event}(e) \wedge \text{inflated}(\text{the boat})(s) \wedge \text{cause}(s)(e)]$

According to Kratzer's semantics, the output of the stativizer *-en/ed* is a predicate of states, exactly the one that is inside the verb's complex event

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[7] The test is not perfect, because, as Kratzer explains, the failure of felicity of 'still' could also be due to the fact that the target state is not reversible. For failure to combine with 'still' to truly diagnose a resultant state, one must exclude the possibility that it fails for trivial real-world-reasons.

semantics. The external event variable (the 'process' variable in my terms), is existentially bound.

(21)   Stativizer : $\lambda R\lambda s\exists e\ R(s)(e)$
         Output : $\lambda s\exists e[\text{pump}(e) \wedge \text{event}(e \wedge \text{inflated(the-boat)}(s) \wedge \text{cause}(s)(e)]$

So the participle morphology in Kratzer's system does not do very much work except to existentially bind the 'Davidsonian' event, and also to license the absence of verbal inflection. Since in the vast majority of cases, 'a pumped up' state is actually preceded by a 'pumping up', Kratzer does not notice or address the resultative paradox. But it is a fact that the target state stative participles, defined in terms of being a subpart of the whole verb's event decomposition, are precisely the ones where the resultative paradox emerges. Once again, the existence of the meaning in question is conceptually dependent on knowledge of the whole event description corresponding to the verb, but this *cannot be cashed out in terms of actual events*.

Going back to the case of the 'closed door'. To describe the truth conditions precisely, we would have to make reference to possible worlds, counterfactual worlds in this case, preceding the current moment, which would contain dynamic subparts of the event of 'closing' that culminate in the final state of 'closedness' in the actual world. We must find a continuation branch from a previous possible world into the present, even though in fact, that previous possible world is not the real one. This is all that is required to felicitously refer to something as 'closed'. Most times when we use the stative participle, there is in fact a dynamic act of 'closing' that leads to it, but this does not appear to be necessary. Although I do not know if anyone has stated the semantics in exactly these terms before, I would contend that the case of pure stative participles of the non-event-implicating kind, what we are seeing in the resultative paradox is in fact the perfective counterpart of the 'imperfective paradox', and would require the equivalent move to the possible worlds toolbox.

10.3.1   *Taking Stock*

Here once again we have a problem with relating the meaning of the nonfinite verbal form, in this case the participle in *-en/ed*, to its finite counterpart. We must somehow keep some core contribution to the truth conditions constant, while removing any actual entailments about the way that event will play out or has played out in real time. But how do we even talk about this part of the 'meaning' of the verb when meanings are given only in terms of actualized events? In both cases, it seems, we can preserve the extensionalist-style mapping by augmenting the system with nonreal and hypothetical worlds in the model.

But even this move, as with the imperfective paradox in the previous section, doesn't add any formal explicitness. This is because there is no real way of making sense of the notion of 'subpart of an event' without making reference to teleological intentions and mentalist conceptual characterizations related to the *very lexical items* used as categorization devices.

(22)   **The Meaning of *V-en/ed***
        V-en/ed expresses a *stative* eventuality that gives cognitive/perceptual evidence for the essential descriptive-classificatory content corresponding to the result state associated with V.

Once again, we seem to need V's descriptive content to be part of its 'essential nature' (in the sense of Fine 2005) and *not* defined in terms of the set of eventualities it is true of.

In a nutshell, the problem of nonfinite verbal forms is the problem of maintaining the identity of descriptive content across formatives in the absence of actuality implications.

10.4   Diagnosis

The discussion of the meaning of these two core nonfinite verbal forms in English (and I have no reason to believe that trying to understand participles in any other language would be any easier), has led us to seemingly unresolvable paradoxes, which I have argued cannot actually be defused by helping ourselves to a model invoking possible worlds. Moreover, the paradox in question is actually *the same one*, and has the same ultimate cause – it results from attempting to express essentially internalist compositional ingredients in externalist terms.

Chomsky (1995) argues convincingly to my mind that reference and truth are themselves mystical notions, and that the attempt to fill out some materialist agenda closing the gap between mind and body by bypassing the mental in favor of external reality fails to do justice to the reality and structuredness of mental representations.

It is a hopeless task to 'complete the materialist world picture' by translating accounts of 'mental phenomena' in terms of a 'description that is either explicitly physical or uses only terms that can apply to what is entirely physical' or perhaps give 'assertability conditions' on 'externally observable grounds'. (Nagel 1993: 37) (Chomsky 1995: 4)

In other words, by starting from the assumption that sentences denote truth or falsity and that meanings of lexical items are functions from entities to truth values, or some recursive type associated with those extensional primitives, one effectively begs the question. In other words, it tells us nothing about what precisely the cognitive ingredients are, and how human minds combine them to create these complex truth-evaluable expressive acts.

I wish to argue that the difficulties described above in characterizing the meanings of perfectly ordinary elements of natural language should be evidence that we need to rethink the very foundation of our formal theories of semantics, and abandon truth as the language in which we explicate meanings of natural language formatives. We do need to preserve an indirect relationship with truth-making, via the explication of the pragmatically enriched sentence or proposition, but we should simply abandon the idea that 'meanings' of language ingredients are stated *directly* in terms of truth conditions. This heretical position has been argued for by others, most particularly Paul Pietroski in a series of articles and books and most recently in Pietroski (2018). Problems with the truth-conditional approach to natural language meanings are well known, but often ignored strategically because of the payoffs gained in getting a robust theory of semantics off the ground. It is time to revisit those problems and reassess the foundations.

10.4.1   Problems Too Hard for Truth Theories

There are certain number of classical paradoxes for the current system that are well known. The first is the fact that even with the addition of possible worlds (Lewis 1973, 1986), truth-conditional meanings do not seem to be quite fine-grained enough to do justice to Fregean 'senses'. The problem arises with logically equivalent statements, which should give the same truth value in any possible world, but which are obviously distinguishable in terms of sense or naive meaning (cf. Pietroski 2018: chapter 1).

(23) $2 + 2 = 4 \neq 150 + 160 = 310$

It is hard to see how an extensional theory of meaning based on truth conditions avoids this, without resorting to a condition on the use of *particular lexical ingredients*. See Kratzer (this volume) for an extensive discussion of this problem and for a proposal concerning how to capture the specificity of content in speech and attitude reports even for logically equivalent propositions. In a nutshell, while Kratzer makes a case for putting aside mathematical statements, the problem remains even for regular language. For the two kinds of cases that Kratzer considers, it turns out they can only be solved by giving up on compositionality, and making the truth conditions of the larger speech dependent on more than just the intensions of its parts. In the case of Kratzer's own solution for speech predicates, this involves including the 'guise' of the reported speech, specifically, the intensional structure, or the *way* in which the proposition is put together. As we will see when it comes to my own proposed 'solution' in Section 10.5, I take the intuition behind the idea that the *way* in which the proposition is structured matters to its extreme conclusion and build explicit reference to the symbols deployed right into the heart of the meaning

composition. While Kratzer is showing us how to solve the problem of composition under attitude and speech predicates with minimum disruption to the standard toolbox, invoked only when nothing else will work, I will pursue a different strategy and take the hard cases as evidence that foundational aspects of the composition system for natural language need to be rethought.

Problems for truth theories also arise in interaction with the use of the predicate truth itself which leads to the Liar's Paradox (cf. Pietroski 2018: chapter 4). These problems are well known and there has always been a tacit agreement among working semanticists at any rate to just ignore them and get on with things.

There is also the problem of semanticity. Consider the truth theorems that Davidson urges on us as things that a suitable theory of meaning should be able to derive.

(24)   'Snow is white' is True if and only if *snow is white*.

This is all very well and good, but it is not just important for the theory to derive (24), it also must *not* generate (25)

(25)   'Snow is white' is True if and only if *snow is white and 2 + 2 = 4*

This leads us inexorably to the final problem, and the real deal breaker in my opinion. This is the problem of the meanings of open class lexical items – their flexibility, their polysemanticity, even while exhibiting productive and generative composition with each other. One could argue that building truth theorems of the type in (24) is already hard, and good enough, and that it really is not the immediate job of the formal semanticist to elucidate the meanings of the individual lexical concepts *snow* and *white*. However, it simply will not do if our aim is understand how natural language works. The problem is that the meanings of open class lexical items are not monolithic blobs of coherent conceptual stuff encapsulated and insulated away from the combinatorial system, the fact is that both (i) they are conceptually polysemous, *and* (ii) they undergo productive compositional processes with each other. The latter point shows that understanding their behavior is an important component of understanding the central properties of the human language system and its powers of productive meaning generation. So, we cannot ignore the word *book*, to take an example, and we cannot ignore the fact that *book* in (26a) refers to the content, while in (26b) it refers to the physical artifact.

(26)   a. The book is interesting.
         b. The book is on the table.
         c. The interesting book is on the table.

No natural language that I know of fails to have this particular ambiguity or codes it by means of explicit morphology. There is a lot of interesting semantic

work on this topic, most prominently Pustejovsky's work on the generative lexicon (Pustejovsky 1995), and Asher's work on semantic types (Asher 2011). This tradition seems to exist in a separate dimension from much linguistic semantic work, although it has been extremely influential in computational applications, partly because the current toolbox puts this kind of work in a separate, independent module which nonlexical semanticists can decide not to worry about.

The by now standard approach from formal compositional semantics is to reverse engineer the meaning required based on the truth conditions for the sentence as a whole. This would, effectively, create two distinct lexical meanings for (a) and (b), with no real engagement with the systematicity of the alternation. In (26c) natural language seems to allow it to refer to both things simultaneously, throwing up insurmountable problems for standard denotations of type <et> (see the computational literature on dot types, Pustejovsky 1995 and Asher 2007, for a discussion of the hardness of this problem).

10.4.2   *Problems Too Easy for Truth Theories*

Pietroski (2018) points out that the Frege–Tarski–Church playbook (having been designed ultimately for rather different purposes) offers the possibility of many more types of function than are ever used in the analysis of human meaning combinations, and even those that are used could be rethought in more minimal terms.

In many ways, actual natural language combinatory relationships are a much simpler subset of what is potentially expressible in the lambda calculus. So it seems that it is the job of linguists to actually make decisions concerning how natural language fits into this machinery.

It is precisely the job of linguistic semanticists to classify the primitive cognitively realistic meaning units and the substantive types of meaning composition we actually find. So for every detailed problem of meaning composition natural language throws up for our consideration, and there are many, the solution offered by lambda calculus is simply *too easy, and basically trivial to implement*.[8] In the absence of a real theory of meanings and meaning combination, we hide behind the rich descriptive power of the toolbox which for this reason never fails to deliver *as a description*, but ultimately fails to explain.

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[8] It is also too complex, in the sense of creating a complexity of symbology that does not match the relative simplicity of the linguistic primes.

10.5 Towards a Natural Language Ontology for Meaning

I contend that we cannot just acknowledge the flaws the current system and use that wisdom to deploy the system carefully and circumspectly. All the puzzles and paradoxes are the same, all the dead ends have the same deep problem at their heart. All the technical solutions contain the same self-defeating trick (structure the possible world space in an increasingly elaborate, context-sensitive way, often depending on *the actual words used* in building the construction). This shows that we really have not understood the meanings of words in a way that is helping us to solve the compositional issues.

The bottom line here is that we can grant that formal semantics is a computational theory (in the sense of Marr 1982) of meaning and still hold it to certain standards of correctness. Even if successful in its own terms, correctness needs to be understood at least partly in terms of a theory's potential to inform and constrain theories of representation and algorithm. The current theory, even when wielded by extremely intelligent and knowledgeable linguists ends up forcing us into dead ends and paradoxes. All of which could be avoided by dropping the empirically undermotivated assumption that meanings are immediately extensional.

And it's not so bad actually to have had 50 years of this particular tradition of formal semantic theorizing. There is a lot we know that we did not know before. In concentrating on the externally verifiable truth conditions of sentences, we have a sort of E-semantics (in the sense of Chomsky's E-Language) descriptively in place, that can form the foundation for an I-semantics of language, if we are willing to take the next step.

In the case of Pietroski, he proposes that we think of Meanings as instructions to fetch a potentially polysemous network of concepts, and further that Meanings are confined to a restricted version of monadic predication (M predicates) and dyadic predication (D Predicates). They combine in ways that are severely restricted compared to the full combinatorial power of the type-based approach using functions. These are defined so as to ensure that the meaning of two joined meanings properly includes those individual pieces.[9] Pietroski defines two basic semantic combinatoric operations: M Predicates combine with M Predicates by M junction and M predicates combine with D predicates by D junction.

I welcome the Pietroskian critique of truth, which is close to my own position, but I think that the meanings of nonfinite verbal forms which formed the empirical heart of this chapter tell us something important about what needs to be added to natural language ontologies to get a satisfying account of

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[9] This is a stronger notion of compositionality than simply saying that the meaning of a complex form can 'be expressed in terms of' the meanings of the parts as in the Fregean system.

partial contents and compositionality at the sentence internal level. In what is left of this chapter, I will briefly lay out my own formal solution to the paradox of maintaining the identity of descriptive content across formatives in the absence of actuality implications. To anticipate, the surprising new addition to the ontology required by natural language for the expression of complex meanings will be *the linguistic symbol itself*.

The starting intuition follows an old line of thought most forcefully articulated in Barwise and Perry (1983) concerning the *reusability* of the sign. For human language to get off the ground, and because of the reusability of the signs of natural language, we need to have (i) common possession of symbols that are abstractions over the different actual situations encountered in the learning phase, and (ii) a speaker to deploy those symbols as a means of characterizing new situations in the world as she comes across them. Put in this way, we can see an important logical separation between the symbols, or elements stored in declarative memory with their rich web of associational content, and the external world which the speaker is using those symbols to describe. Because symbols are reusable they cannot be tied to a particular time and place, and they cannot be overly rigidly tied to particular worldly particulars. Polysemy and flexibility must be seen as features of the symbolic inventory not bugs. Thus symbols, because they are stored as abstractions or generalizations over particulars function as *types* rather than tokens, although crucially they are not 'kind level' in the formal semantic sense as being literally built from particulars, as in some attempts to capture this intuition. To be sure, the process of acquisition must involve the experiencing of particulars, but symbols are then stored and used in the system as abstract associational bundles, in much the same way that the cognitive scientists have assumed and maybe even best implemented in terms of a vector semantics (see Rett, this volume for more discussion). How then can we move from this psychologically plausible internalist conception to a formal semantics describing real-world objects and situations, and how can we model it computationally? Intuitively, the bridge is made by understanding that the symbol is to be literally deployed by a speaker at a particular place and time in order to describe a new real-world particular in the human being's flow of experience. To do this, symbols must literally become objects in the ontology themselves, artifacts of human language.

I thus propose a radically different computational theory of meaning composition: this logical architecture seeks to reconcile internalist conceptions of meaning with the well-established formal foundations of an externally grounded theory of meaning. I argue for a view whereby the symbol is reified in the formal system and then explicitly deployed via an act of communication. The separation of the act of communication from the symbol itself allows for an internalist conception of the symbol qua symbol to be embedded within an

Inner: the lexical symbolic core of the innermost cycle of meaning composition contains all of traditionally lexical knowledge, as far as it relates to essential conceptual characterization,

Outer: referential, instantiational and functional information that requires knowledge of the speaker for anchoring.

Figure 10.1 Meaning layers of the Symbol-within-Reference model

SYMBOL (internalist representation) + SYMBOL combinatorics   [run]

$\updownarrow$ (*deployment*)

Context in the form of the demonstration/speech event   (speaker, here, now)

$\updownarrow$ (*function words*)

Extensional representations   run-PAST
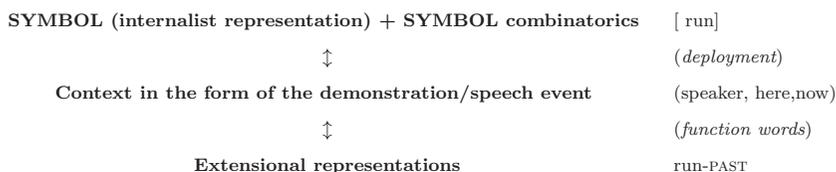
Figure 10.2 Information composition in the (Sym)Ref model

extensionalist semantics for the content that is created after deployment in a context.

In Ramchand (2018), I argued that typological meaning layering in the verbal domain and was part of an argument against purely extensional meanings of lexical items (see also Pietroski 2018). Here I take the idea further and propose that lexical items (items stored in declarative memory) are the reusable symbols whose meaning needs to be represented nonextensionally (internalistically). Functional items, on the other hand, contribute information that is directly relevant to reference in the world and the instantiation of situations (see Figure 10.1).

To bridge the internalist–externalist divide (chasm, one might say), information about the context of utterance (via an event variable corresponding to the very *act of communication*) must be used to mediate the internal representation and the externalist one and gives rise to a second zone where externalist content is structured and manipulated.

So in brief, *the symbol is deployed by a user in a communicative context, giving rise to content that actually says something about the external world.* Actual reference only occurs in the second step, crucially mediated by the speaker, the here and the now. This general architecture is represented schematically in Figure 10.2.

This is different from the standard classical semantic formalism where the most primitive denotations are couched in terms of objectual referents and truth, while intensional concepts have to be built by generalizing these

denotations over possible worlds. The present model inverts the primitive-derived distinction found there, and structures the system around a primitive abstract and essence-like core with referential objectual and instantiational facts built up on top of that.

Formal semantic theories as we know them sit squarely in the domain of 'computational theories' in the sense of Marr (1982) and as such are independent of the nitty gritty of minds and brains that might implement them, and Marr's work has been widely read in linguistics as a plea for and a legitimization of this level of scientific theorizing. But Marr was interested ultimately in understanding the functioning of our internalized systems in creating behaviors in response to stimuli, and notationally equivalent computational theories could nevertheless be distinguished by how well they help us understand the other, more algorithmic levels. His model included both an internal representation (the primal sketch) fed directly by light stimulus, and a final 3-D representation of our cognitive uptake. For Marr also, there is crucially a role for the subjective perspective in between the two (what Marr called the 2 1/2-D level), which in a sense allows the transition from the primal sketch to the objectual 3-D representation. In my own system, the reification of the utterance event and the parameters of context c that it brings with it performs the same cognitive function as the folding in of the subjective perspective in Marr's own algorithm. I do not think it is an accident that the two systems mirror each other in this way. Marr's own proposed computational system, which was designed to interface with a more algorithmic understanding of visual perception in the mind is a blueprint for cognitive neuroscience more generally. The idea that explicit information about the Self, or *Origo* is necessary to convert the stimulus into the information necessary to build an objectual 3-D representation is echoed in my claim that the reification of the utterance context is necessary to convert abstract symbolic content into representations with truth-conditional import. This model of meaning puts the identity of the anchoring information, consciousness of Self and the cognitive appreciation of the fact of other minds at the heart of the creative construction and comprehension of meaning respectively, and it makes different predictions for the role of context in the time course of complex meaning construction than other models of meaning.

In logical and philosophical terms, the picture above is a more Kaplanian (Kaplan 1989) view of context as mediator between character and content, but it is at odds with the more classical formal semantic strategy of integrating context after linguistic form has been processed. This means that no current theoretical semantic proposals incorporate it – it would require a formal rift between symbol and symbol deployer in the build-up of the compositional system. Conversely, cognitive and internalist theories of meaning struggle with dealing with the aboutness of language and with reliable facts about how

speakers judge entailment. In addition, cognitive theories do not concern themselves centrally with the structural meaning that arises procedurally from hierarchical syntactic structure. So far neither view has succeeded in building a genuinely algorithmic theory of meaning composition in the brain, which to my mind must deal with both of these kinds of phenomena.

Because it is the symbol that is being combined and manipulated in the earliest zone of compositional combination, we are not yet dealing with actual events in the world, but with complex concept combination. At this level of formal composition, we need to be manipulating elements of a new domain D_μ which we add to the model, following Potts (2007), which is essentially the domain of well-formed linguistic symbols, possibly nonatomic, of type μ. To do this formally we need to add to the usual model, a domain which is the domain of well-formed linguistic objects. I will assume that these linguistic objects are triples, consisting of a $<$ phonological information, syntactic features/information, semantic representation $>$, very similar to what is assumed in the psycholinguistic literature as a structured associational bundle. So we could think of the denotation of the English verbal symbol *run* as an ordered triple as in (27).

(27) $[\![\text{run}]\!] \; = \; < /\text{r} \wedge \text{n}/, \; < \text{V}, \; \_ >, \; running(\text{e}) >$

where we represent the content of the third, semantic, position in terms of a (necessarily incomplete) set of properties of events to indicate that it is a shorthand for a certain abstraction of cognitive properties, a meaning contribution which is partial on the one hand when it comes to describing an event in the world since it lacks temporal and locational specifications, but also potentially excessive and irrelevant on the other in that it includes 'irrelevant' and associational information as well (including the fact that meetings can 'run' as well as things like water and trains). This triple is also the piece of information that is stored in declarative memory, and which indeed may turn out to be most satisfactorily represented through vector semantic notation, as suggested by e.g. Baggio (2018).

The point is that the internal structure of the elements in the domain D_μ include a semantic contribution, which can in principle be filled in with whatever associational and incomplete meaning contributions turn out to be psycholinguistically and neurologically justified. Crucially, we do not need to state the meaning member of the triple in terms of the kinds of extensional formulas that formal semantics traffics in. To reiterate, the reason we have the freedom to place an internalist conception of meaning in this part of the 'denotation' for the symbol run is because 'meaning' in the internalist sense is encapsulated away from the formal computation. The encapsulation is effected by reifying the symbol itself as an object of the ontology. The symbol itself is an artifact of human communicative life, and it is an object in the domain of reference as much as a book, or a piece of string.

Importantly, the 'meanings' of the symbols of D_μ need to be devoid of temporal or worldly information. They form the hierarchically inner core which is then clothed with the contingent information of time, place, and world, to link descriptions to actual particulars. True, the symbols of a person's language are acquired through actual experience of the world, both sensory and cognitive, but they are, importantly, abstractions over the particular instantiations exposed to. The result (which may be fine tuned over the life of the speaker) is a partial description of essential properties for the event that, on grounds of reusability, are necessarily devoid of information related to the particularity of the instantiation (time, place and the reference of the participants). Humans possess an inventory of symbols, which are then consciously deployed in multiple situations. It is reusability, this third factor property of the symbolic system itself that leads to temporal and spatial, and referential information being represented morphosyntactically external to the memorized sign (the topic of Ramchand's 2018 monograph).

Now, let us imagine that conceptual content is associated to symbols we store in declarative memory, and that it can be combined by simple processes of primitive semantic combination to create complex concepts. We can call this Stage-One-Semantics for convenience. It is going to be an open question exactly what the possibilities and limits of internal concept combination are, but the hypothesis is going to be that it is qualitatively different from the next stages.

The reification of the symbol *qua* symbol in the computational representation is what allows us to embed the internalist intuition in the clothing of an externalist computational paradigm. Once the symbolic layer (possibly complex) has been constructed, these partial descriptions (properties of symbols) can be converted into formal properties of events that are identical to the kinds of denotations we are used to from formal semantics. To do this, Stage-One-Semantics must be followed by the integration of meaning corresponding to the *Origo*, the speaker in the here and the now, in order to convert abstract conceptual content into actual claims about the world. This is done by means of an explicit deployment operation. Our starting point is the innovation proposed in Henderson (2015) who needs it to incorporate ideophonic, or depictive content into the descriptive system. The conversion operator (called QUOTE) by Henderson, combines with a complex symbol, notated u in (28) below, and a demonstration event d, to produce a property of events. The predicate TH_d relates the demonstration event d to the symbol being deployed, u. The DEMO predicate relates d and a general event variable e, saying that d 'demonstrates' or has certain structural properties in common with e.

I propose to carry the QUOTE function over to the general case, proposing that the reusable essential symbolic content of any perfectly ordinary sign is the equivalent of Henderson's ideophone. In other words, a symbol, as reconceived this way, is a hyper-conventionalized 'ideophone' used to invoke and

describe an event, with a higher proportion of descriptive as opposed to depictive content. In order to make this fully general, though, we need to replace Henderson's DEMO predicate with what I will call CONVEY, and replace the exotic idea of a demonstration event with the ordinary garden variety utterance act itself. Thus, Ramchandian externalization operator would have the following general form.

(28)   **The Deployment of Symbolic Content**
λdλe$\exists$u [Utterance(d)] & 'u is the symbolic content of d' & CONVEY(d,e)
Property of of an utterance event d and event e, which has u $\left(\in D_{\mu} \right)$ as its theme, and where d deploys u to convey e.

To build the externalized representation, I follow Champollion (2015) in closing the event variable low, at the point of inclusion of the deployment act of communication, introducing a variable over spatiotemporal properies of eventualities. In other words, these are now properties of fully objectual eventive particulars.

(29)   **The Externalized Representation**
λfλd$\exists$e$\exists$u [Utterance(d) & 'u is the symbolic content of d' & CONVEY(d,e) & f(d,e)]
Where f is a variable representing spatiotemporal/worldly properties of events which I propose is a complex property relating d and e. Put another way, f is a property of events e, anchored in d.

In other words, this is now a property of a communication event d and event e in the world, where d deploys the (possibly complex) symbol u $\left(\in D_{\mu} \right)$ in order to convey e. Truth-conditional content is created only *after* deployment in a context by a speaker. This corresponds to the idea of demonstration in the gestural and ideophonic literature. The novelty of this model is that the symbol is *always* in some sense 'demonstrated', whether that symbol is conventional or possesses some iconic properties.

It is only at the point where an externalized denotation has been built up that what linguists term functional items, or grammatical words, can be integrated with the message. Here I am thinking about functional items like the determiner *the* or the past tense marker *-ed* in English. These items have the semantic property that they are related to extensional meanings, or in simpler terms they involve actual reference to entities in the world. The very earliest studies of aphasias and language disorders show a robust double dissociation between function words and richly contentful lexical items. Both of these kinds of items have a 'semantics', in my view, but of a radically different kind. The meanings of lexical items are associational and abstract, while lexical items clothed in function words have truly referential meanings. Formal semantic theories with their insistence on extensional denotations for everything including lexical items like *dog* and *run* are not in a position to

make a distinction in these terms. Because it builds in meaning layering explicitly into the formal semantic account of meaning, with an internalist compositional core embedded within an outward-looking externalist representation, I have referred to the framework outlined above as the *Symbol-within-Reference model* of meaning composition. This is different from the standard classical semantic formalism where the most primitive denotations are couched in terms of objectual referents and truth, while intensional concepts have to be built by generalizing these denotations over possible worlds. The present model inverts the primitive-derived distinction found there, and structures the system around a primitive abstract and essence-like core with referential objectual and instantiational facts built up on top of that.[10] When it comes to holistic meaning, there is an additional layer of downstream inferencing based on whole sentence meaning, and conversational assumptions, but this is not directly my concern here.

A reviewer rightly asks how a model such as the Symbol-within-Reference model helps us with the problem of explicating the truth conditions of sentences containing the progressive, for example. For example, the present model allows us to state the relationship between *ing* forms and root forms of the same verbal symbol in terms of a 'criterial state with the 'same' cognitive recognizers', thus defusing the immediate imperfective paradox. However, we still do need an explanation of why sentences containing accomplishment verbs give rise to a failure of entailment between the progressivized version and the simple past verb, while activity verbs do allow such an entailment. I fully agree that this is part of our responsibility as semanticists, and elsewhere I have discussed how this theory does allow us to have an account of the empirical facts as just stated (Ramchand 2018). The central idea here is that although the 'meanings' of lexical uninflected verbs are not stated in terms of truth conditions directly, propositions that contain them *do* have truthmakers, and there are principles that systematically relate the use of these lexical items to the truthmakers of the sentences that contain them.

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[10] A reviewer asks to what extent the reification of the utterance event and these higher metalinguistic types is actually necessary. In other words, many of the effects that we need to understand can be described in the metalanguage while keeping the semantic representation more traditional. I fully agree that many of the same external facts can be described with a more traditional architecture, but my point has been that the morphology of natural language sentences show patterns and generalizations that traditional architectures leave unexplained. In terms of the reification of 'd', the utterance event in particular, I would argue that the same considerations that motivated the inclusion of explicit temporal variables in our representations also motivate 'd': the existence of linguistic devices that introduce and modify this variable internal to the syntactic and morphological hierarchies of the sentence representation. In general, what I am arguing for here is an expansion of the explanandum to include implicit ordering and organizational facts about natural language sentences. Currently, semantic theories can be mathematically configured to track syntactic organization but we do not consider these facts to be relevant for motivating their ontologies.

For example, the principles of Taylor (1977) constitute a theory of how stative vs. activity vs. accomplishment lexical verbs produce different kinds of entailments when clothed in temporal information. This theory, plus the claim that the progressive operator creates a derived *state*, combine to provide an account of why "John is building the house." does not entail "John built a house" while "John is running." does seem to entail "John ran." at least under certain contextual conditions. It is important to underline that the agenda I am pursuing here does not entail an abandonment of the principle of truth-making in explicating what people take to be what propositions 'mean'. I am proposing that lexical items and certain operations over them are primitive meaning ingredients in a natural language ontology and occur as cognitive *precursors* to truth-making.

The lesson of nonfinite verbal forms is that language is telling us something quite specific about natural language ontology, namely that the 'meanings' of lexical roots must be stated in a way that is *neutral* with respect to finiteness. Finite inflection is what anchors the use of the verb to a particular event in a particular world at a particular time. Nonfinite verbs very transparently do not have any such direct entailments, and therefore throw up technical complications for semantic theories rooted in extensional denotations. But internal structuring of complex meaning in natural language shows us that we need to have a common meaning ingredient for both finite and nonfinite verbal forms that is simple and primitive. If I am right, that common meaning ingredient must be stated in nonexternalist terms.

10.6   Conclusion

We started on this journey by noticing the repeating paradoxes thrown up by truth theories, exemplified here by the attempt to relate the denotations of nonfinite verbal forms to the finite verbal counterparts. I have insisted that the job of semantics is to understand the ontology of natural language and how it then relates to truth-making. Natural language ontology forces us to acknowledge that meaning ingredients are not directly extensional. This, combined with typological facts about meaning layering in all natural languages, suggests a layered architecture for natural language semantics involving the integration of internalist and externalist-anchored ingredients, mediated by the utterance context.

While there is something important about establishing the connection to truth-making, there is nothing in the logic of how we got here that says we *have* to state natural language ingredients in terms of functions which take extensional primitives as their inputs and truth values as their final output. The theory we currently have is essentially reverse engineering based on externally verifiable behavior, which denies any role to internal representations. It is akin

to constructing a theory of the sound system of human languages by relating objective acoustic primitives of the message to the articulatory primitives that produce that message, without passing through a mode of organization and internal representation in terms of abstract phonemes. In addition, such a theory has no way of modeling the kind of 'partial content' that I think actual linguistic forms traffic in. And as Pietroski (2018) points out, for natural language, there is no logical necessity for our truth-evaluability to be so direct. Rather, we need to see how sentences constructed systematically by natural language, eventually end up building something that *is* truth-evaluable, but this does not mean that meanings themselves, the linguistic ingredients of sentence, are extensions.

Finally, this sort of study of nonfinite verbal forms in natural language is important because of how it can inform both linguistics and philosophy. I endorse the position of Fine (2017) and Moltmann (2020), who argue that the descriptive work of natural language ontologies is an important stepping stone to both the understanding of the human mind, and for any subsequent theorizing about foundational metaphysics.

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Part VI

Determining and Questioning

11 Vagueness and Discourse Dynamics

Sam Carter

11.0 Questions and Answers

(1) Why do linguists and philosophers find the discourse dynamics of vagueness interesting?

Questions about the logical properties of vague languages are often the primary focus of work on vagueness in philosophy. These questions have traditionally divided into two groups. The first concerns issues to do with the **indeterminacy** of vague expressions: questions about the correct logic of higher-order vagueness (e.g. Sainsbury 1991; Wright 1992, 2009; Williamson 1994, 1999; Soames 2003; Bobzien 2011, 2012, 2013, 2015; Dorr 2009, 2015) or the bivalence of vague utterances (e.g. Horwich 1990; McGee 1991; Williamson 1994: §7; Keefe 2000b: §8; Raffman 2005a). The second concerns issues to do with the **tolerance** of vague expressions: questions about the correct resolution of the sorites paradox or the existence of sharp cutoffs (e.g. Cargile 1969; Fine 1975; Wright 1975, 1987; Sainsbury 1988, 1996; Edgington 1992, 1997; Fara 2000; Shapiro 2006; Gaifman 2010; Cobreros et al. 2012; Ripley 2013).

Independently, the last 40 years has seen a large growth in work on the systematic features of conversation by linguists, logicians, and philosophers. Much of this work has focused on categories of expression which exhibit two kinds of interaction with context. First, features of the use of the expressions are sensitive to discourse context; and, second, features of discourse context are sensitive to the use of the expressions. For want of a label, we can refer to this kind of two-way interaction between utterances and context as **discourse dynamics**. Formal and informal frameworks for theorizing about discourse dynamics have been developed for, amongst other kinds of expressions, anaphoric pronouns, modals and presupposition triggers.

As a range of authors have noticed, two-way interactions also appear between utterances of vague sentences and context (e.g. Lewis 1979; Kamp 1981a; Pinkal 1983; Eikmeyer & Rieser 1983; Bosch 1983; Barker 2002). This has given rise to a large, if frequently fragmented, literature on the discourse

dynamics of vague language. Underlying this trend is the prospect that traditional problems of vagueness might be amenable to tools developed to model other discourse-level phenomena.

(2)   What recent developments in research into the discourse dynamics of vagueness are most exciting?

A noteworthy recent trend has been a surge in experimental work on a range phenomena related to the discourse dynamics of vagueness. Égré et al. (2013) report positive evidence of order effects in 'dynamic' or 'forced march' sorites sequences – though of a kind which conflict, to a greater or lesser extent with the predictions of e.g. Kamp (1981a), Raffman (1994, 1996). Syrett et al. (2010) provide empirical research into the use of definites with vague complements – including the discourse-level effects discussed in Section 11.2.1. Finally, there has been a substantial investigation of judgments about sentences, both atomic and complex, in the borderline region of a vague predicate (Bonini et al. 1999; Alxatib & Pelletier 2011; Ripley 2011; Serchuk et al. 2011).

(3)   What are the key ingredients to adequately analyzing the discourse dynamics of vagueness?

First, any minimally adequate theory of the discourse dynamics of vagueness should provide: (i) an explanation of the mechanism by which the use of vague expressions is sensitive to discourse context; and (ii) an explanation of the mechanism by which discourse context is sensitive to the use of vague expressions. Various responses to these two questions are possible, and can be combined in a number of different ways. I discuss and assess a range of these alternatives in the course of this chapter.

(4)   What are the outstanding questions pertaining to the discourse dynamics of vagueness?

There are a number of issues which remain unresolved, even amongst those authors who take discourse-level phenomena to be of central interest in the study of vagueness. One prominent question concerns the extent to which the discourse dynamics of vague expressions can or should be assimilated to analogous behavior by other expressions (such as anaphoric pronouns, modals, and presupposition triggers).

A second question concerns the connection between discourse dynamics and traditional questions of vagueness. Discourse-level phenomena can be treated as an important object of study, without being taken to provide a solution to puzzles such as the sorites paradox. Accordingly, it is an open issue whether the interaction of vague language and context is worthy of investigation in virtue of its connection to the traditional questions discussed

above, or merely as an independent phenomenon alongside them. I'll make some brief proposals bearing on these questions in the concluding section of this chapter.

11.1   Preliminaries: Indeterminacy and Tolerance

Imagine a series of one hundred bottles of wine, where for $1 \leq n \leq 100$, the nth bottle in the series costs n dollars. Over objects in this series, predicative and attributive uses of the adjective 'expensive' exemplify a range of phenomena associated with vagueness. Of these, work in philosophy especially has tended to focus on two: **indeterminacy** and **tolerance**.

Indeterminacy

In response to the question 'Is bottle #50 expensive?', what a competent speaker knows about her language may fail to require that she answer affirmatively, and, likewise, fail to require that she answer negatively. Furthermore, there appears to be no additional (nontrivial) information which she could acquire about the series of bottles which would change her situation. This phenomenon is frequently described in terms of **indeterminacy** – that is, bottle #50 is neither determinately expensive nor determinately not expensive.

Under these conditions, we say that #50 is a borderline case. The knowledge speakers must possess to be competent fails to settle how borderline are to be classified. This goes observation beyond the previous one regarding what is required of speakers.

We can also make a stronger observation. The fact that a competent speaker is neither required to classify bottle #50 as expensive nor required to classify it as inexpensive does not by itself not settle how she is permitted to classify it. She might, after all, be required to make no classification. Yet indeterminacy appears to be also accompanied by permissiveness in use (for discussion, see e.g. Wright 1987: 244; Tappenden 1993: 553–561; Sainsbury 1996: §9; Fara 2000: 56; Shapiro 2006; Égré & Klinedinst 2010: 1; Gaifman 2010: 7, among others). Where #50 is borderline, in responding to the question 'Is bottle #50 expensive?' a competent speaker is permitted to answer affirmatively, permitted to answer negatively and permitted to decline to answer one way or the other. That is, speakers are at liberty to decide how borderline cases are to be classified if at all.

Tolerance

For every n: $1 \leqslant n \leqslant 100$, the corresponding instance of the schema in (1) appears hard to reject:

(1)   If bottle #n is expensive, then bottle #$n - 1$ is expensive.

The appeal of instances of (1) is attributable to the fact that 'expensive' is seemingly **tolerant** to minimal variation in price (Wright 1975: 333). That is, it seems that any bottle which differs only marginally in price from an expensive bottle will be expensive itself.

However, while the instances of (1) are compelling, they are each classically inconsistent with the seemingly equally compelling (2)–(3):

(2)   Bottle #100 is expensive.

(3)   Bottle #1 is not expensive.

From (2) – which says that a $100 bottle of wine is expensive – and the instantiation of (1) with 100, we can obtain the claim that bottle #99 is expensive via *modus ponens*. Repeated applications of this procedure, along with the transitivity of entailment and double negation introduction, will yield the denial of (3). Yet, since (3) says that a $1 bottle of wine is expensive, accepting its denial appears impermissible in any context.

Tolerance does not only manifest in judgments about conditionals like (1). Another product of tolerance is the apparent absence of sharp cutoffs. Instances of negated conjunctions, like (4), and disjunctions, like (5), also appear hard to reject:

(4)   It's not the case that: bottle #n is expensive but bottle #$n - 1$ is not.

(5)   Either bottle #n is not expensive or bottle #$n - 1$ is.

As above, the set of claims comprising the instantiations of (4) and the instantiations of (5) are each classically inconsistent with (2) and (3). That is, from the claim that bottle #100 is expensive and each of the instances of either (4) or (5), it is possible to classically derive the conclusion that bottle #1 is expensive, also.

The possibility of deriving a contradiction using classical resources makes unrestricted acceptance of the instances of (1), (4) and (5) controversial. Many theorists either claim that some instance involving borderline cases is false (e.g. Sorensen 1988, 2001; Williamson 1994; Fara 2000), or deny that any instance involving borderline cases is true (e.g. Fine 1975; Kamp 1975; Keefe 2000a, 2000b).

In contrast, it is uncontroversial that the instances of the converse schema should be accepted:

(6)   If bottle #$n - 1$ is expensive, then bottle #n is expensive.

The appeal of instances of (6) is attributable to what Fine (1975: 270) terms **penumbral connections**. Such connections correspond to constraints on the ways in which indeterminacy can be resolved. They manifest (in part) in the

existence of determinate complex expressions with indeterminate constituents.[1] For example, it may be indeterminate whether a 17-year-old is a child, but determinate that they are not both a child and an adult. It may be indeterminate whether a shade of chartreuse is green, but determinate that it is either green or yellow. In the present case, while it is indeterminate which bottles in the series are expensive, it is determinate that any bottle which costs more than an expensive bottle will be expensive itself.

The majority of work on vagueness in philosophy has concentrated on issues related to tolerance and indeterminacy (either separately or, less frequently, simultaneously). In contrast, work in linguistics has frequently focused on vagueness within particular lexical categories, including, e.g., gradable adjectives (Klein 1980; Kamp 1975, 1981b; Barker 2002, 2003, 2013; Kennedy 2001, 2007, 2010; Kennedy & McNally 2004; Sassoon 2013), nominals (Sassoon 2013; van Deemter 2010), hedges (Pinkal 1983; Lasersohn 1999; Barker 2002, 2003), and quantifiers (Ballweg 1983; Solt 2016). The topic of this chapter marks one area in which the two fields have converged, with fruitful results.

11.2   Discourse Dynamics and Vagueness

As discussed above, permissiveness accompanies indeterminacy. In most discourse contexts in which it is indeterminate whether bottle #50 is expensive, a speaker may classify it as expensive, may classify it as not expensive, or may decline to classify it one way or the other.[2, 3] However, the range of permissible uses of a vague expression is susceptible to change over the course of discourse. Using an expression can impose constraints on the way the same expression (or others related to it) can be employed in later, 'downstream' utterances.

This is most clearly revealed in the existence of discourses whose unacceptability cannot be attributed to the *prior* impermissibility of any particular constituent utterance. That is, we can identify sequences of utterances which are impermissible in context, despite the fact that each of their constituent

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[1] Note that not every determinate truth with indeterminate constituents need be the manifestation of a penumbral connection. The disjunction of any indeterminate sentence with a determinate truth is itself determinately true, and the conjunction with a determinate falsehood determinately false. Similarly, many theories of higher-order vagueness allow for the existence of sentences which are determinately indeterminate (though cf. Bobzien 2015) – however, it is far from obvious that such determinacy corresponds to a constraint on the resolution of (lower-order)-indeterminacy.

[2] At least for present purposes, we can assume that classifying bottle #n as (not) expensive involves nothing more than asserting the sentence ⌜ Bottle #n is expensive ⌝ (⌜ Bottle #n is not expensive ⌝).

[3] In virtue of the penumbral constraints in force, however, there will be no discourse context in which she may classify it as both expensive and not expensive.

utterances occurs in some sequence which would be permissible in the same context.

Recall that bottle #n in the sequence costs n dollars. There are many naturally occurring contexts in which a speaker could permissibly perform the sequence of utterances in (7) or, alternatively, permissibly perform the sequence of utterances in (8):

(7)   Bottle #50 is expensive... Bottle #51 is too.

(8)   Bottle #50 is not expensive... Bottle #51 isn't either.

However, in any such context, it would be impermissible for the speaker to perform the sequence of utterances in (9):

(9)   ?? Bottle #50 is expensive... Bottle #51 isn't, though.

Note that there is, at least initially, a permissible sequence (namely, (7)) in which #50 is classified as expensive, and a permissible sequence (namely, (8)) in which #51 is classified as not expensive. However, after #50 has been classified as expensive, it is no longer permissible for the speaker (or any other participant in a conversation in which the utterance has been mutually accepted) to classify #51 as not expensive.

Indeed we can, also, make a stronger observation: after #50 has been classified as expensive (and the utterance has been mutually accepted), participants in the conversation are required to classify #51 as expensive, should the question arise. That is, they are no longer permitted to decline to classify #51 one way or the other.

The impermissibility of (9) appears attributable to precisely the same source as the determinacy of the instances of (6). Classifying a bottle as expensive involves a (partial) resolution of indeterminacy. The penumbral connections associated with the expression require that any bottle which costs more than a bottle classified as expensive also be classified as expensive. Using the expression imposes constraints on future use, constraints which may preclude uses which were previously permissible.

Discourse-level effects do not only arise in virtue of penumbral connections, however. It also appears unacceptable for a speaker to perform the sequence of utterances in (10) in any context:

(10)   ?? Bottle #51 is expensive... Bottle #50 isn't, though.

Again, note that there is, at least initially, a permissible sequence containing each constituent utterance as a sequence. However, after #51 has been classified as expensive, it seems no longer permissible to classify its predecessor as not expensive.

The impermissibility of the second utterance is attributable to the same source as the impermissibility of rejecting instances of (5). Since 'expensive'

seems tolerant to minimal variation in price, it seems impermissible to classify as expensive any bottle which differs only marginally from a bottle classified as not expensive. To do so would be to commit to a sharp cutoff between the bottles which are expensive and the bottles which are not expensive – a cutoff of precisely the kind incompatible with tolerance.

Note, however, that the present case differs from it's predecessor in at least one respect. It is far from obvious that, after #51 has been classified as expensive, it would be impermissible to decline to classify #50 one way or the other. Instead, it appears coherent for an individual to answer the question of whether #51 is expensive positively, but nevertheless be incapable of coming to a decision regarding #50. Indeed this would seem to be precisely the situation of subjects in a so-called 'forced march' sorites series (Horgan 1994; Raffman 1994). After classifying a bottle as expensive, it remains indeterminate, it seems, whether bottles only marginally less expensive are not expensive – a positive answer is not required, despite a negative answer being prohibited.[4]

These observations combine to form a picture of the discourse dynamics of vague expressions. First, they suggest that features of the use of vague expressions are sensitive to context. The fact that there are contexts at which (7) would be permissible to utter but (9) would not (since it is unacceptable in every context) indicates that the permissibility of uttering a vague sentence can vary depending on the discourse context. In this case, the permissibility of classifying bottle #n as not expensive varies depending on the context resulting from the speaker's first utterance (i.e. whether #$n-1$ was classified as expensive or as not expensive). Second, they suggest that features of the context are sensitive to the use of vague expression. In particular, the fact that (10) is impermissible to utter in any context suggest that classifying bottle #n as expensive changes the discourse context so that for any $n' \geq n-k$, classifying bottle #n' as not expensive is impermissible (where k is positive and, presumably, vague itself) and for any $n'' \geq n$, classifying bottle #n'' as expensive is required. Putting this together, use of vague expressions exhibits the two-way interaction between utterance and context constitutive of discourse dynamics.

11.2.1   Definites

Discourse-level effects are not limited to predicative uses of vague expressions. They can also be observed in the behavior of definites with a vague nominal complement.

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[4] Note that, for this reason, it is not accurate to say that indeterminacy is sufficient for permissiveness in use. In a discourse context in which bottle #n has been classified as not expensive, it may be indeterminate whether #$n+1$ is expensive, but it will nevertheless not be permissible to classify it as expensive.

Suppose that all but two bottles are removed, leaving only bottle #40 (worth $40) and bottle #60 (worth $60). In a context in which neither is determinately expensive or determinately not expensive, (11) can be used to communicate that the more expensive bottle is from a French vineyard.

(11)   The expensive bottle is French.

That is, the definite DP unambiguously denotes the more expensive bottle, despite the fact that both were borderline cases of 'expensive' prior to the utterance (for discussion, see Kyburg & Morreau 2000; Fara 2000; Kennedy 2007, 2010; Syrett et al. 2010).

As Kyburg and Morreau note (2000: 581), it might be thought that this behavior could be explained away as referential use of the definite (Donnellan 1966; see also Kamp, this volume). However, two observations tell against this diagnosis. First, unlike with referential uses, the use of the definite in (11) does not require a singular intention. The speaker need not know that #60 is the more expensive of the pair – she could, for example, merely know that all of the bottles which were not removed are from French vineyards, while being ignorant of which bottles remain. Second, and more significantly, unlike referential uses of definites, the use of the definite in (11) has downstream effects on the discourse. After its utterance is accepted, it would be infelicitous to go on to deny that bottle #60 is expensive.[5]

Note that if adjacent bottles, like bottle #50 and bottle #51, are left instead, the same use of the definite is not available. That is, where the objects in the domain differ minimally, (11) cannot be used to communicate that bottle #51 is from a French vineyard (Kennedy 2010: 77–79, though cf. Barker 2013). As Kennedy notes, this is peculiar to the positive form of the vague adjective. Use of the comparative, as in (12), to communicate the same information is unmarked:

(12)   The more expensive bottle is French.

This contrast is, in one sense, easy to account for. The existence and uniqueness presuppositions of the definite conflict with the assumption that 'expensive' is tolerant. The latter entails that both #50 and #51 must be in the extension of 'expensive bottle' if either is, whereas the former requires that exactly one be in it. The comparative form, since it is not tolerant, generates no such conflict. However, the more fundamental challenge lies in accounting for the assumption that 'expensive' is tolerant.

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[5] In contrast, one can felicitously respond to an utterance of 'The man drinking the martini is interesting' with the response 'Yes, but it's not a martini, it's a glass of water'.

11.3   Explaining Discourse Dynamics

A minimally adequate account of the discourse dynamics of vagueness will be required to answer two questions: how is the use of vague expressions dependent upon discourse context? and how is discourse context-dependent use of vague expressions? As we'll see in this section, philosophers and linguists have provided a range of answers, which can be combined in a number of different ways.

11.3.1   How Is the Use of Vague Expressions Dependent upon Discourse Context?

Contextualism
A natural response to the context-sensitivity exhibited by vague terms is to attempt to assimilate them to an established class of context-sensitive expressions. **Indexical** variants of contextualism suggest that the content of vague expressions varies depending on some feature of the context of utterance (Soames 1998, 2002; Kennedy 2007, 2010, as well as, in places, Kamp [1981a: 242]). In this respect, it is proposed, they are comparable to, e.g., pronouns such as 'I', 'you', nouns such as 'local', 'today', or verbs such as 'come', 'go', etc. In contrast, **nonindexical** variants of contextualism deny that the content of vague expressions varies across contexts. Rather, they claim that the evaluation of the content of an utterance containing a vague expression (e.g. its truth value or assertability) varies depending on the context at which it is used (Fara 2000, and, arguably, Lewis 1979). In this respect, the treatment of vague expressions is comparable to prominent treatments of tense and modality (e.g. Lewis 1980; Kaplan 1989; Ludlow 2001; MacFarlane 2009).

Orthogonal to the indexical/nonindexical distinction, contextualist theories face a choice regarding the feature of context to which they take vague expressions to be sensitive. Some, such as Fara (2000) and Kennedy (2010), propose that vague expressions are sensitive to contextually determined purposes or interests. #50 might, for example, be correctly classified as expensive by a speaker with the purpose of buying a bottle for cooking, but as not expensive by a speaker with the purpose of buying a bottle as a wedding gift. Others, such as Lewis (1979), propose that the context of utterance fixes a standard of precision. Lewis takes the contextual standard of precision to determine whether the content of an utterance can be assessed 'true enough' for the purposes of assertion. However, we can also imagine an indexical variant, on which the content of vague expressions vary as a function of the standard of precision.

Comparison Class Variance
Prepositional modifiers can affect the extension of gradable adjectives such as 'expensive', as exemplified by (13) (cf. Wheeler 1972:

(13)   Bottle #50 is expensive *for one of the* [*first/central/final*] *60 bottles*.

Whereas #50 is determinately expensive for a bottle in the cheapest 60 bottles of the series, it is determinately not expensive for a bottle in most expensive 60 bottles. This observation has led a number authors to suggest that the extension of a vague expression is always dependent upon some comparison class of objects (Kamp 1975; Klein 1980; Deemter 1996; Raffman 2005b; Pagin 2010a, 2010b).

In (13), this comparison class is supplied overtly, by the complement of the *for*-PP.[6] Where there is no overt material to supply this class, it is supplied instead by an unarticulated constituents occurring at some level of representation in the sentence uttered.

Proponents of the view face a choice regarding the kind of unarticulated constituents they posit. One option is to posit a constituent which behaves like an unpronounced pronoun, the denotation of which is supplied by context (cf. Stanley 2000). This version of the view can reasonably be seen as a subspecies of contextualism, above.

An alternative is to posit that the unarticulated constituent is not itself context-sensitive. Rather, at some level of representation, the unmodified 'Bottle #50 is expensive', has the same constituent structure as (13). The only difference is that the PP in the former is phonetically null. The only contribution of context, on this variant of the view, is as a guide for listeners in disambiguating which of a range of phonetically indistinguishable sentences was produced by the speaker.

Lexical Underdetermination and Microlanguages

Another, contrasting, class of approaches take as their first component the idea that the lexical meaning of a noncomplex vague expression fails to fully determine its content in a context of utterance. A common way of expressing this position is to claim that the meaning assigned to an expression in the lexicon can be made more precise in multiple, potentially incompatible ways (Fine 1975; Kamp 1981a (in places); Bosch 1983; Pinkal 1983; Eikmeyer & Rieser 1983; Tappenden 1993, 1995; Shapiro 2006).

Some of proponents of the approach have characterized lexical underdetermination in terms of Putnam (1975)'s notion of **stereotypes**. These stereotypes are comprised of a constellation of properties which, rather than directly determining the content of expression, serve as a defeasible guide to its extension. For certain subclass of expressions (including many natural kind terms), content will be fully fixed by mind-independent factors. However,

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[6] It is often assumed that in attributive uses of gradable adjectives, a comparison class is fixed by the nominal complement (Wheeler 1972; Klein 1980, though cf. Kennedy 2007).

according to proponents of this approach, for a large portion of the language (namely, that portion which is vague) the combination of stereotype and mind-independent factors will be insufficient to determine precise content in context (Kamp 1981a: 131–132; Eikmeyer & Rieser 1983: 137). Others have appealed to the, perhaps related, notion of **open texture**, due to Waismann (1951). An expression exhibits open texture insofar as, no matter what stipulations are introduced to determine its content, the extension of the expression remains underdetermined by its conventionally associated meaning (Tappenden 1993, 1995; Shapiro 2006). Whereas appeal to stereotypes often functions of an explanation of the behavior of a vague term, appeal to open texture is better seen as a description of that behavior.

The second component which must be specified is the mechanism by which context can serve to reduce or modulate the imprecision arising from the lexical meanings of a vague expression. Here, many proponents of the approach have appealed to a view akin to that espoused in Ludlow (2001). Within a particular discourse, Ludlow suggests, interlocutors coordinate on more or less precise **microlanguages** – 'modulations' of the meanings of terms, which serve to resolve otherwise problematic indeterminacy. This coordination may be either explicit or tacit, and is assumed to occur continuously over the course of a conversation, in accordance with the needs of the speakers. Thus, vague expressions are taken to be sensitive to discourse context in virtue of the fact that their content will vary according to the particular microlanguage being spoken by the conversational participants at a given time.

11.3.2   How Is Discourse Context-Dependent on the Use of Vague Expressions?

Attention/Salience

A number of authors have proposed that the content of vague expressions in context shifts in response to changes in individuals attention or in what objects are salient in the conversation (Raffman 1994, 1996, 2005b; Fara 2000; Kennedy 2007, 2010). This shift in content could be attributed to a change in the salient comparison class (Raffman 2005b), a change in what is required to 'stand out' from that class (Kennedy 2007, 2010) or a change in the interests of speakers in response to shifts in salience (Fara 2000). On each alternative, however, the use of a vague expression shifts the discourse context only indirectly. Classifying, e.g., bottle #50 as expensive makes salient/draws attention to that bottle. This change in salience/attention, in turn, gives rise to a change in the discourse context. Yet it is only in virtue of the fact that utterances are liable to affect the attention of interlocutors that they can have a downstream effect on later use of vague expressions.

This form of approach is able to explain the appeal of instances of (1). Uttering an instance of the conditional draws attention to the relevant pair, resulting in a shift to a context at which both the antecedent and consequent have the same truth value. The appeal of quantified claims, like (14), is harder to explain, since it does not draw attention to any particular pair of bottles.

(14)   Any bottle $1 cheaper than an expensive bottle is expensive.

Proponents have tended to claim that agents accept the universal generalization in virtue of the fact that each of its instances *would* be true in context, if uttered.

The dynamic behavior of definites discussed in Section 11.2.1 is harder to explain. It is far from clear how an utterance of (11) could result in a change in attention/salience that ensured #60, but not #40, determinately belonged to the extension of 'expensive'. This worry is particularly acute given that the context shift triggered by (11) is insensitive to whether speakers are antecedently attending to the pair $\langle$#40, #60$\rangle$.

Acceptance/Accommodation

An alternative strategy is to assimilate the effect of vague language use on discourse to a more general mechanism. Adopting the terminology of Stalnaker, mutual **acceptance** of an utterance results in the addition of its content to the **common ground** – the set of propositions jointly recognized by participants to be established for the purposes of the conversation (Stalnaker 1970, 1973, 1974, 2002). This has an observable effect on the felicity of later uses of, e.g., presupposition triggers, modals, and discourse particles. A number of authors suggest that downstream effect of the use of vague expressions can be treated as a direct result of the acceptance of the utterance in which it occurs (Kamp 1981a; Soames 1998; Shapiro 2006). Once it has been accepted that, e.g., #50 is expensive, participants tacit commitment to the tolerance of 'expensive' requires them to refrain from classifying #51 as expensive. Notably, this approach can remain neutral regarding whether the adjective is in fact tolerant to minimal variation of the adjective.

A closely related approach claims that downstream effects of the use of vague expressions is a byproduct, rather than direct effect, of the acceptance of the utterance. The felicity of certain expressions, such as presuppositions triggers, imposes constraints on the common ground. Use of such expressions in a context which does not satisfy the relevant constraints can result in **accommodation** – the coercion of the common ground into one which conforms to the relevant constraints (Lewis 1979). If it is assumed that the felicitous use of vague expressions imposes constraints on the common ground, discourse effects can be explained as the product of accommodation (Lewis 1979; Klein 1980; Kamp 1981a; Bosch 1983; Kyburg & Morreau

2000). This approach has a particularly natural explanation of the behavior of vague definites. In virtue of its existence and uniqueness presuppositions, an utterance of (11) triggers accommodation of a common ground in which #60, but not #40, determinately belongs to the extension of 'expensive'.

Importantly, the two approaches are compatible. That is, it is possible to maintain that vague expressions have an effect on the discourse context via both the mechanism of acceptance and accommodation (this appears to be the position of, e.g., Kamp 1981a).

Metalinguistic Dispute

A third way of characterizing the effect of vague language use on discourse context is in terms of what Plunkett and Sundell refer to as **metalinguistic dispute** (Sundell 2011; Plunkett & Sundell 2013, 2014; Plunkett 2015). Speakers' use of an expression can sometimes communicate, in addition to information about the world, metalinguistic information about the meaning of the expression in context (Stalnaker 1978; Barker 2002). This can either take the form of information about the way the content of the expression is fixed in context, or information about its the context-invariant meaning. Crucially, Plunkett and Sundell contend, speakers frequently use words in this way to engage in tacit dispute "wherein the speakers' metalinguistic use of a term does not simply involve exchanging factual information about language, but rather negotiating its appropriate use" (Plunkett & Sundell 2013: 15).

If vague expressions are sensitive to context (as proposed by contextualists, both **indexical** and **nonindexical**) or open to modulation in the development of microlanguages (as proposed by Ludlow 2001), then they can be expected to be candidates for metalinguistic disputes. For example, in classifying #50 as expensive, a speaker may aim to communicate information about the cost of the bottle. Alternatively, they may be engaged in metalinguistic dispute, in which case they aim to tacitly coordinate with other speakers on a context or microlanguage in which #50 falls in the extension of 'expensive'.

This concludes our discussion of the possible mechanisms underlying the discourse dynamics of vague expressions. In the next section, I'll briefly propose some ways in which standard accounts of local context could combine with observations about the dynamics of vagueness to explain tolerance judgments like those discussed in Section 11.1.

11.4   Local Contexts and Vagueness

Discourse dynamics involve the two-way interaction between contexts and the expressions used in them. However, the context at which a constituent of a sentence is evaluated need not always coincide with the context at which the sentence itself is used. It is standard to distinguish between *global context*

(the context at which the sentence containing an expression is evaluated) and *local context* (the context at which the expression itself is evaluated) (Karttunen 1974; Heim 1982, 1983, 1990).

(15)   a. John stopped smoking.
         b. If John used to smoke, he stopped.

Presuppositions triggers, such as 'stop', are sensitive to context. For an expression containing a trigger to be licit, the trigger's presupposition must be satisfied in the context at which it is evaluated (Stalnaker 1973, 1974; Karttunen 1974; see also Abrusán, this volume). However, a discourse context which fails to license (15a) may nevertheless license (15b). This suggests that the local context at which expressions in the consequent of a conditional are evaluated is not the same as the global context at which the conditional is evaluated itself.

(16)   a. It^i is a spaniel.
         b. Mary owns a dog^i and it^i is a spaniel.

Pronouns are also sensitive to context. For an expression containing a pronoun to be licit, the pronoun must be associated with an appropriate discourse referent in the context at which it is evaluated (Karttunen 1976; Kamp 1981b; Heim 1982). However, a discourse context which fails to license (16a) may nevertheless license (16b). As with presupposition, this suggests that the local context at which expressions in the right-hand conjunct of a conjunction are evaluated is not the same as the global context at which the conjunction is evaluated itself.

Much work in linguistics and philosophy has focused on identifying how the local context of an expression is to be calculated from the global context along with its own syntactic environment. Such theories have two components. They must specify: (i) which constituents of an expression's syntactic environment are relevant to calculating its local context; and (ii) what the contribution of those constituents to the local context is.

Theories which build dynamic behavior into the semantics of the language have often been taken to be well-placed to offer a theory of local context (Heim 1982, 1992; Beaver 1992, 2001; Zeevat 1992; van Eijck 1993, 1994; for criticism of dynamic approaches, see Soames 1982; Schlenker 2008; Lewis 2014). While they must (arguably) give a stipulative response regarding the first issue (though see Rothschild 2011), dynamic approaches are able to offer an appealingly simple response to the second. The effects of clausal expressions on local context and on global context are calculated in exactly the same way. That is, on a dynamic approach, an expression's contribution in determining local context is simply its content: a function from one context to another.

The preceding discussion outlined a general picture of the discourse dynamics of vague expressions. According to this picture, classifying bottle #n as expensive resulted in a new discourse context in which, for any $n' \geq n - k$, classifying bottle #n' as not expensive is impermissible (and for any $n'' \geq n$, classifying bottle #n'' as expensive is required). It turns out that, when combined with an orthodox account of local context for logical connectives, we can use this picture to develop an appealing explanation of certain key tolerance phenomena (Section 11.1).

As first observed by van der Sandt (1989, 1992), local contexts for presupposition triggers and anaphoric pronouns appear to be calculated in the same way. Accordingly, we will consider both when giving examples of orthodoxy regarding local contexts for connectives and quantifiers.

(17)   a. If John used to smoke, he stopped.
           b. If Mary owns a dog^i, it^i is a spaniel.

As we saw above, in (17a)(=15b), the presupposition of 'stop' is satisfied in its local context, even if it remains unsatisfied in the global context. Similarly, in (17b), the indefinite in the antecedent can introduce a discourse referent on which the pronoun in the consequent is anaphoric. On this basis, the local context of the consequent of a conditional is generally assumed to be the local context of the conditional updated with the antecedent (Langendoen & Savin 1971; Karttunen 1973, 1974; Gazdar 1979).[7]

Turning to the case of vague expressions, the local context of the consequent of (18) (=(1)), is the global context updated with the claim that bottle #n is expensive.

(18)   If bottle #n is expensive, then bottle #$n - 1$ is expensive.

In the context resulting from the claim that bottle #n is expensive, it is impermissible to classify bottle #$n - 1$ as not expensive. So, at least on the assumption that we judge it impermissible to reject a conditional as long as it is impermissible to reject its consequent in its local context, this will explain why individuals are reluctant to reject any instance of (18).

Similar remarks extend to conjunction and disjunction:

(19)   a. John used to smoke and he stopped.
           b. Mary owns a dog^i and it^i is a spaniel.

(20)   a. Either John never smoked or he stopped.
           b. Either Mary doesn't own a dog^i or it^i is a spaniel.

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[7] Where the conditional is unembedded, its local context will coincide with the global context; where it is embedded, however, the two may come apart.

On the basis examples like (19a)–(19b), the local context of a right-hand conjunct is generally assumed to be the local context of the conjunction updated with its left-hand conjunct.[8] Similarly, on the basis examples like (20a)–(20b), the local context of a right-hand disjunct is generally assumed to be the local context of the disjunction updated with the negation of its left-hand disjunct. (NB: the case of anaphoric expressions in disjunction, first discussed by Partee, is a bit more complex. See, in particular Simons 1996 and Dekker 1999 for discussion.)

(21)   a. It's not the case that: bottle #n is expensive but bottle #$n − 1$ is not.
          b. Either bottle #n is not expensive or bottle #$n − 1$ is.

Accordingly, the local context of the right-hand conjunct of (21a) (=(4)), will be the global context updated with the claim that bottle #n is expensive. Given standard assumptions about negation, the same holds for the right-hand disjunct of (21b) (=5). Assuming a negated conjunction is judged permissible to reject only if it is permissible to accept each conjunct in its local context, we can explain our judgments about (21a). And, assuming a disjunction is judged permissible to reject only if it is permissible to reject each disjunct in its local context, we can equally explain our judgments about (21b).

By considering the local context of vague expressions, observations about tolerance at the level of discourse (exemplified in, e.g., (10)) can be extended to explain judgments at the sentential level, in cases involving conditionals, conjunction, and disjunction. This clearly falls far short of a complete theory of tolerance-related phenomena. In particular, absent an account of how discourse dynamics and local context should be reflected in the logic of a vague language, we still lack a solution to the sorites (and sorites-adjacent) puzzles. Nevertheless, we may hope that these kinds of issues can help to guide our choices developing in such an account. Authors such as Kamp (1981a), Bosch (1983), Ballweg (1983), Kyburg and Morreau (2000), Barker (2002), Shapiro (2006), and Gaifman (2010) serve as examples of the potential fruitfulness of this approach.

11.5   Conclusion

The discourse-level phenomena associated with vagueness raise a range of new questions. As I've aimed to show in this chapter, the process of answering these questions may bring with it the potential to address ostensibly independent, traditional questions about vagueness. Having introduced the key

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[8] It is also generally assumed that the local context of the left-hand conjunct coincides with the local context of the conjunction (for recent discussion, see Schlenker 2008; Chemla & Schlenker 2012; Mandelkern et al. 2017, 2020, amongst others).

phenomenon in Section 11.2, in Section 11.3 we looked at various approaches which could, in combination, account for the two-way interaction of vague utterances and context. Finally, in Section 11.4, I proposed one way to extend these considerations to the intersentential case, by appealing to features of local context.

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12 Alternatives

Matthijs Westera

12.0 Questions and Answers

(1) Why do you think both linguists and philosophers find alternatives interesting?

The ability to conceive of alternatives – alternative situations, actions, places, times, even universes – is sometimes listed among the core cognitive/linguistic abilities that appear to set us apart from most nonhuman animals (e.g. 'displacement' in Hockett & Hockett 1960).* Moreover, alternatives surface in accounts of a wide array of topics in philosophy and linguistics. This may reflect their centrality in language and cognition, or perhaps the fact that alternatives seem to make for a powerful 'Maslow's hammer'.

(2) What recent developments in linguistics and philosophy do you think are most exciting in thinking about alternatives?

One exciting development is the notion that introducing alternatives to a discourse is a type of communicative intention in its own right, and, crucially, one which is expressed not just by interrogative sentences – declarative sentences too can serve to introduce certain alternatives, alongside the primary assertion they express (e.g. Alonso-Ovalle 2006; Ciardelli et al. 2013; Westera 2017b). Another exciting development is the adoption of more data-driven, quantitative methods in the study of alternatives, for instance the probabilistic approach to alternatives of Rohde and Kurumada 2018, and the dataset of questions naturally evoked by text fragments of Westera et al. 2020.

(3) What do you consider to be the key ingredients in adequately analyzing alternatives?

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One key ingredient will be to discern and disentangle the various senses/roles in which 'alternative' is employed in linguistics, some of which are covered in this chapter. In addition, I think it is crucial that we try to ground the various notions of alternative in broader theories of cognition, as well as in quantitative empirical data.

(4)   What do you consider to be the outstanding questions pertaining to alternatives?

I think that many basic questions concerning the various notions of alternative – what exactly they signify, how they are supposed to interact – have not been sufficiently considered. This chapter will consider such basic questions concerning several types of alternatives, namely focus alternatives, the alternatives introduced by disjunction, alternatives in the characterization of discourse goals (questions under discussion) and alternatives in the semantics of interrogatives.

12.1   Introduction

Research in formal semantics and pragmatics often invokes a notion of alternatives. Consider the following example, picked for the wide range of notions of alternatives it involves (uppercase represents a focus accent):

(1)   Were TWO of your friends at the protest, or THREE? [final rising intonation]

Common analyses of similar examples in the literature reveal at least the following notions of alternative.

- The numerals "two" and "three" have other numerals as their lexical alternatives, forming what is commonly called a *Horn scale* (after Horn 1972): ⟨"one," "two," "three," "four," ...⟩ – similar scales would exist for, e.g., quantifiers such as ⟨"some," "many," "all"⟩ and for adjectives such as ⟨"warm," "hot"⟩.
- The strong focus accents on "two" and "three" lets each disjunct introduce focus alternatives into the semantics of the form "*N* of your friends were at the protest," again in a separate dimension of semantics (Rooth 1992).
- The focus alternatives result in a presupposition that the utterance addresses a *Question Under Discussion* (QUD) paraphrasable as "How many of your friends were at the protest?" (Roberts 1996; Beaver & Clark 2009), which can again be modeled as a set of alternatives, i.e. a set of propositions of the form "*N* of your friends were at the protest."
- The disjunction introduces its disjuncts into the semantics as alternatives, in a dimension of semantics separate from the ordinary, informational content (Alonso-Ovalle, 2006; Ciardelli et al., 2013).
- Because the sentence is an interrogative, its main semantic content would itself be a set of alternatives, containing (depending on one's analysis) at

least the two disjuncts, in some analyses also their joint negation ("neither"; Ciardelli et al. 2015).

- Besides the prior QUD addressed by the utterance, there is also the QUD which it sets up for the next speaker, which contains the two disjuncts along with, in some analyses, their joint negation ("neither"; Ciardelli et al. 2015) or, more correctly, some other alternative from the prior QUD, e.g. that three or perhaps even four of your friends were at the protest (Biezma & Rawlins 2012; Westera 2017b).

Are these various notions of alternative all the same? If not, can they at least be assumed to interact in direct, formally characterizable ways?

Work in formal semantics suggests an affirmative answer to the second question, and a somewhat opportunistic, pragmatic stance with regard to the first. For instance, Questions Under Discussion are often treated as, essentially, implicit interrogatives, suggesting that alternatives from either the prior or the posterior QUD of an interrogative could be conflated with the alternatives in its semantic content. Some work on the semantics of interrogatives assumes that focus alternatives can be picked up by a question operator Q, which would promote the focus alternatives to constitute the main semantic content of the interrogative. For an account of disjunctive interrogatives it has been proposed that the alternatives introduced by a disjunction undergo a similar treatment: a question operator Q would keep the alternatives introduced by disjunction as alternatives in the interrogative's semantic content, whereas in declaratives the disjunction-introduced alternatives would have no role to play. Moreover, it is tempting to use the same set of alternatives for genuine interrogatives and for embedded interrogative-like constructions (e.g. "John knows who was there.").

This somewhat opportunistic stance towards the interactions of various notions of alternative may reflect a lack of conceptual clarity about what the different notions are supposed to represent; and this may be in part to blame on formal semantics' tendency to rely on formalism for formalism's sake, without necessarily asking how our formally defined notions may be independently grounded, e.g. in a broader theory of cognition. Something along these lines has been pointed out before at least with regard to lexical alternatives (or Horn scales), for instance by Russell (2006) who notes that Horn scales don't really explain anything unless one explains why scales are the way they are; and by Geurts (2011) who notes that there is only very little explicit reflection on what scales are supposed to be, and ultimately dismisses them as unnecessarily indirect and somewhat misleading representations of something like QUDs instead. The conceptual relations and differences between QUD alternatives, focus alternatives, alternatives introduced by disjunction and question alternatives have likewise not received the level of attention that the frequency of theoretical appeals to these notions demands.

I hope that this short chapter will encourage some deeper reflection on what the various notions of alternatives really signify and how they can be assumed to interact. I will discuss focus alternatives, alternatives introduced by disjunction, alternatives as used in the specification of QUDs, and alternatives in the semantics of interrogatives. More precisely, I will criticize the conflation of the set of focus alternatives with the meaning of an interrogative, discuss two conceptions of the alternatives introduced by disjunction (algebraic and attention-based), and argue against the predominant view of QUDs as, essentially, linguistic questions that represent discourse goals. I will outline a subtly different understanding of QUDs, according to which they are not goals in and of themselves, but are mere ways of organizing more elementary goals. This invites a view on QUDs as being more fluid and dynamic, and encourages us to think not just about alternative responses to a given QUD, but also about alternative QUDs.

12.2 Focus Alternatives

An influential role of alternatives in semantics and pragmatics is in character-izations of the focus of an utterance, as marked for instance in English and many other languages by means of pitch accents, or by specific particles or syntactic positions. In this section, after a quick introduction to the notion of focus alternatives, I discuss two cases where a direct formal interaction between focus alternatives and compositional semantics have been assumed: focus-sensitive operators such as "only" (e.g. Rooth 1985) and the relation between focus alternatives and the semantics of questions (e.g. Beck 2006). I will argue (and review arguments from the literature) that assuming such an interaction may not be necessary or appropriate, and comes with certain risks.

The focus of an utterance is, intuitively, the part that matters most for advancing the conversation; for instance, it is the part that provides an answer to a preceding question:

(2)   How many of your friends went to the protest?
         TWO of them went to the protest.

The numeral "two" caries the most prominent prosodic accent in the sentence, because it is the crucial part of the sentence given the question; indeed, the rest of the answer could have been omitted: "Two." on its own would have communi-cated the same. Compare (ignoring the unnatural verbosity of the answer):

(3)   Where did two of your friends go?
         Two of them went to the PROTEST.

In each case, the focus is the part of the utterance that *would have been different* had the speaker believed a different answer to the same question. This

characterization naturally leads to defining focus formally in terms of the ways in which the utterance could have been different, i.e. a set of focus alternatives. For (2) this could be the set containing the proposition that one of them went, the proposition that two of them went, that three of them went, and so on. For (3) this could be the set containing the proposition that two of them went to the park, that two of them went to the protest, to the pool, home, to school, and so on.

Examples (2) and (3) illustrate the role of focus in determining question–answer congruence. This role can be explained, in outline, by assuming that the focus represents the pragmatically important part of an utterance, and noting that pragmatic importance depends crucially on what constitutes an answer to a contextual question. Under this view, focus alternatives would be merely a convenient way of formalizing 'pragmatic importance'. However, a more common view on focus alternatives affords them a kind of semantic reality, where other expressions are assumed to be able to qualify and quantify over the set of focus alternatives. This could in some cases illustrate the somewhat opportunistic reuse of formal notions of alternatives which I mentioned in the introduction. I will discuss two examples of this.

The Focus-Sensitivity of "Only"

One phenomenon where focus alternatives have been assumed to directly influence the main semantics is the class of apparently focus-sensitive words such as "only." The primary meaning of a sentence containing "only" changes with the placement of focus in its scope:

(4)   a. Two of my friends only went to the PROTEST together.
        b. Two of my friends only went TO the protest together.

Example (4a) implies that the two friends didn't go anywhere else together (the protest is the only place), whereas (4b) implies that the two friends were together on the way there but not on the way back. In the work of Rooth 1985, "only" is assumed to be directly sensitive to the focus alternatives: the set of focus alternatives is passed to the ordinary semantics of "only," allowing it to state that only one of those alternatives is the case. Focus alternatives would thus be accessible as semantic objects to the ordinary meaning composition channel.

A slightly different perspective is offered by Rooth (1992) and built upon by Beaver and Clark (2009), who argue that there is no such direct interaction between ordinary meaning and focus alternatives. Rather, focus alternatives reflect the structure of the QUD, and it is the QUD to which words such as "only" are directly sensitive: "only" means that only one proposition in the QUD is the case. For instance, in (4a) the QUD, constrained by focus on the location "the protest," might be phrased as "Where did two of my friends go?"; and in (4b) the QUD, constrained by focus on "to," might be phrased as

"Did two of your friends go to the protest together, and did they return together?" In both cases, "only" conveys that the answer given (i.e. that they went to the protest) is the only answer that is true, i.e. that they went nowhere else in (4a), and that they did not return together in (4b). This view on focus (for an accessible introduction see Beaver et al. 2017) makes it possible to conceive of focus alternatives as but a linguist's convenient tool for formally describing what it means for a constituent to be pragmatically important, i.e. to be the focus of the sentence, rather than as being semantically 'real' in the sense of allowing other parts of the semantics to operate on them.

Focus and Question Semantics

Another direct interaction between focus alternatives and ordinary meaning is assumed in the influential approach to question semantics of Beck 2006: the focus alternatives of an interrogative would be promoted to its ordinary meaning. For instance, for a "wh"-question, assuming focus on the "wh"-word, this amounts to the following:

(5)   WHO went to the protest?
        Focus alternatives: {John went there, Mary went, Sue went, Bob went, ... }
        ↓
        Ordinary meaning: {John went there, Mary went, Sue went, Bob went, ... }

This approach has also been applied to disjunctive questions with focus on the disjuncts (so-called "alternative questions," but see below), where a crucial assumption is that the focus alternatives of a disjunction are restricted to the disjuncts:

(6)   Did JOHN go to the protest, or MARY?
        Focus alternatives: {John went there, Mary went there }
        ↓
        Ordinary meaning: {John went there, Mary went there }

(Example (7) below will show that this restriction of the focus alternatives and QUD to only the disjuncts is not adequate; the QUD must be able to contain other alternatives too; but for now I will set this criticism aside.) If Rooth's (1985) analysis of "only" is assumed, which provides the ordinary meaning with direct access to focus alternatives, then the idea that interrogativity (or a supposed interrogative operator) takes the focus alternatives and promotes them to the main meaning does not represent a big leap; instead of quantifying over the focus alternatives (like, supposedly, "only"), interrogativity would simply adopt them unchanged. By contrast, under Beaver and Clark's view interrogativity would not be directly sensitive to focus alternatives, but only indirectly, via the QUD, which would be a more cautious approach to the possible interactions of different notions of alternative.

Now, let us explore this perspective on question semantics a bit further. This perspective just outlined would imply that the meaning of an interrogative is

equivalent to its QUD, which may *seem* like an attractive outcome: QUDs are often treated as, essentially, implicit interrogatives. However, in fact the meaning expressed by an interrogative utterance is not in general equivalent to its QUD. Just as declarative utterances may offer either a complete or a partial answer, so too may interrogative utterances specify the QUD either completely or only partially. To illustrate, consider again the example with which this chapter started, but now comparing a final rise to a final fall:

(7)   a. Were TWO of your friends at the protest, or THREE? [final rise]
       b. Were TWO of your friends at the protest, or THREE? [final fall]

   The rise in (7a) conveys that there may be other relevant possibilities (e.g. that there were even four or five, or perhaps none), whereas the fall in (7b) conveys the opposite: it's either two or three, nothing else. A straightforward analysis of this contrast treats the final intonation as indicating (non)exhaust-iveness with regard to the QUD, i.e. whether the propositions mentioned in the interrogative (the disjuncts) are the only possible propositions in the QUD (e.g. Biezma & Rawlins 2012; Westera 2017b). Crucially, for this sort of analysis to be possible, to even come to mind, it is crucial that we do not conflate the meanings of interrogatives with the QUDs they serve to address.

Summary

Summing up, in two cases where a direct formal interaction between focus alternatives and compositional semantics has been assumed, namely focus-sensitive operators such as "only" (e.g. Rooth 1985) and the relation between focus alternatives and the semantics of questions (e.g. Beck 2006), no such direct interaction may be necessary or warranted. In the case of questions, one reason for not conflating focus alternatives with question meanings is that, given the close relation between focus alternatives and QUDs, this would amount to conflating question meanings and QUDs. In Section 12.4 I will discuss in more detail what QUDs are, elaborating on the idea that, even though both QUDs and (the meanings of) interrogatives can be characterized in terms of alternatives, they represent very different notions, and we must be cautious when considering their possible interactions.

12.3   Alternatives Introduced by Disjunction

It is often assumed that disjunction can introduce its disjuncts as alternatives into the semantics/pragmatics (e.g. 'alternative semantics' for disjunction in Alonso-Ovalle 2006; 'inquisitive semantics' more recently, Ciardelli et al. 2013). But what are these alternatives? And why would a disjunction introduce its disjuncts as alternatives, but not, e.g., a conjunction its conjuncts? (Why, that is, besides the various empirical facts that seem to require this.) I will

consider two perspectives on this issue, one based on the notion of attention and another based on more formal, algebraic considerations. I argue that the former is ultimately more explanatory.

One perspective on introduced alternatives is the idea that (parts of) utterances can draw *attention* to the meanings of their constituents. For instance, in Aloni et al. 2003; Schulz and Van Rooij 2006, disjunction is assumed to introduce its disjuncts as *discourse referents* (Karttunen 1976), a notion closely related to attention. The notion of discourse referent stems from the literature on coreference, where it is assumed that noun phrases make the entities to which they refer attentionally salient in the discourse, thereby making them available as referents for subsequent anaphoric pronouns such as "he":

(8)   A man walks in the park. He whistles.

Proposals that a disjunction would introduce its disjuncts as discourse referents, as in Aloni et al. 2003; Schulz and Van Rooij 2006, can therefore be understood in attentional terms: a disjunction makes its disjuncts attentionally salient. This attentional perspective on the alternatives introduced by disjunction is made more explicit by Ciardelli et al. (2009), who propose an "attentional semantics" (equivalent in the relevant respects to 'alternative semantics' for disjunction in Alonso-Ovalle 2006). While intuitive, this attentional perspective on the alternatives introduced by disjunction fails to explain why disjunction but not conjunction would draw attention to its two coordinates. After all, surely a conjunction, too, draws attention to its conjuncts? I will offer an answer to this question further below, that allows us to maintain the attentional perspective on this notion of alternative. Before giving that answer, let me summarize an alternative perspective altogether, namely the *algebraic* motivation of 'inquisitive semantics' (Roelofsen 2013a).

An Algebraic Perspective

In a classical, information-only semantics, where meanings are propositions, i.e. sets of worlds, conjunction expresses the intersection operation on sets of worlds, and disjunction the union operation. If we enrich our notion of meaning to include alternatives, such that the meaning of an expression is now a *set* of propositions, and if we assume that each disjunct puts forward only a single proposition, i.e. denotes a singleton set, then taking the union of these singleton sets automatically yields a set containing both propositions, one for each disjunct:

(9)   John was at the protest, or Mary.
        information: $\{w \,|\, Pj \text{ is true in } w\} \cup \{w \,|\, Pm \text{ is true in } w\} =$
                                    $\{w \,|\, Pj \text{ is true in } w \text{ or } Pm \text{ is true in } w\}$
        alternatives: $\{\{w \,|\, Pj \text{ is true in } w\}\} \cup \{\{w \,|\, Pm \text{ is true in } w\}\} =$
                                    $\{\{w \,|\, Pj \text{ is true in } w\}, \{w \,|\, Pm \text{ is true in } w\}\}$

Thus, generalizing the treatment of disjunction as union to sets of alternatives immediately explains why disjunction ends up introducing multiple alternatives, typically one for each disjunct.

But this perspective is not completely satisfactory. For one, it is not obvious that the assumption should be granted that the informational and alternative-introducing contributions of parts of an utterance ought to compose according to the same operation. Although it may seem minimal and elegant, this subjective assessment may well point to wishful thinking rather than truth. But more severely, although the treatment of disjunction as union works well, the analogous treatment of conjunction as intersection requires a constraint on alternative sets, namely that they be *downward-closed* (Roelofsen 2013a): if the set contains a proposition, it should also contain all propositions that are logically stronger (i.e. all the propositions that entail it). The reason is that, although treating disjunction as union works well if each disjunct is associated with a singleton set, it will not work for conjunction, as the intersection of two distinct singleton sets is the empty set:

(10)   John was at the protest, and Mary (too).
         alternatives: $\{\{w \,|\, Pj \text{ is true in } w\}\} \cap \{\{w \,|\, Pm \text{ is true in } w\}\} = \emptyset$

Downward closure avoids this empty set: by adding all stronger propositions to the set on each side, and in particular the proposition that both John and Mary were at the protest, their intersection will contain at least this proposition (along with all stronger propositions). Downward closure has its own downside, however. If any stronger propositions are automatically among the alternatives, then the same set of alternatives is assigned to both of the following variants:

(11)   a. John was there, or Mary.
         b. John was there, or Mary, or both.

It is, I take it, highly counterintuitive that these two disjunctions would introduce the same alternatives; intuitively (11) has one more, namely the conjunction (and not just intuitively; see Westera 2017a for empirical consequences of this difference). I conclude that the algebraic perspective is not entirely satisfactory as an explanation for why disjunction but not conjunction can introduce alternatives. Instead, let us return to the attentional perspective with which this section began.

The Attentional Perspective

The challenge faced by the attentional approach was that, intuitively, conjunction draws attention to its conjuncts as much as a disjunction to its disjuncts, so why would only disjunction serve to introduce alternatives? I propose a pragmatic answer to this puzzle in Westera 2017b, by adopting the view in

Ciardelli et al. 2009 that drawing attention to introduce alternatives is not merely something that happens, but that happens intentionally, i.e. as a communicative intention, governed by pragmatic rules, or maxims. Crucially, one need not intend the side effects of one's intention (Bratman 1987). Hence, just as an utterance normally provides more information than what the speaker intended to convey, an utterance normally draws attention to many more things than just the alternatives which the speaker intended to introduce. Accordingly, although both disjunction and conjunction introduce alternatives semantically, in the sense of drawing attention to their disjuncts/conjuncts, perhaps we can explain why, in the pragmatics, only those introduced by means of a disjunction have any role to play.

To explain the latter, we need to make some pragmatic assumptions about what a reasonable speaker can cooperatively intend to draw attention to, i.e. a set of 'attentional' conversational maxims, alongside the usual Gricean ones. I develop such a theory, Attentional Pragmatics, in Westera 2017b, but the various principles on which it builds have been considered in the literature before:

- **Maxims:** A rational, cooperative speaker, addressing a certain QUD, should:
  - assert all and only propositions in the QUD which they consider true (roughly Grice 1975);
  - intend to draw attention to all and only propositions in the QUD which they consider possible.

The intuitive motivation for the second, attentional addition to Grice's original maxims should be clear: the propositions in the QUD being relevant, i.e. worth making common ground, it is generally rational to try to keep track of those propositions in the QUD which are possible, i.e. those immediate discourse goals which might be achievable. Moreover, similar constraints have been proposed in the literature. For instance, that propositions to which one draws attention should be considered possible corresponds in essence to "attentive sincerity" in Roelofsen 2013b (building on Ciardelli et al. 2009), "Genuineness" in Zimmermann 2000 (p. 270); and "Viability" in Biezma and Rawlins 2012 (p. 46). Biezma and Rawlins moreover assume that the alternatives one introduces (albeit with an interrogative) ought to be relevant to the QUD, Simons (2001) assumes a comparable "relatedness condition" on disjunctions, and in fact the same idea is found already in Grice 1989: that disjunction serves to specify possibilities "that relate in the same way to a given topic." For a more precise definition of the attentional maxims, more detailed motivation and a number of applications I refer to Westera 2017b.

What matters for present purposes is that the pragmatic requirements on attention, along with some other assumptions (e.g. that the QUD is closed

under intersection), entail that the asserted proposition must always be equivalent to the union of the set of propositions to which the speaker intended to draw attention. This is because, in a nutshell, if something weaker was asserted, they should have drawn attention to more or weaker things, and if something stronger was asserted, they should have drawn attention to fewer or more specific things. In any case, it follows from this fact that a disjunction can be used to draw attention to the disjuncts (because the disjuncts both lie within the information conveyed by the disjunction as a whole), but a conjunction cannot be used to draw attention to the conjuncts (which fall outside of the information conveyed by the conjunction as a whole). What this means is that, if attention-drawing is indeed a type of communicative intention constrained by the pragmatic considerations given above, then even if both disjunction and conjunction intuitively draw attention to their disjuncts/conjuncts, this can only be intentional in the case of disjunctions; in the case of conjunctions, the attention drawn to the conjuncts must be considered a mere side effect. Pragmatics thus provides a possible explanation for why a disjunction but not conjunction has been perceived in the literature as introducing its coordinates as alternatives.[1] I will end this section on the nature of the alternatives introduced by disjunction by highlighting an interesting consequence of attentional, pragmatics-mediated conception of introduced alternatives outlined above: it immediately predicts that the ability of disjunction to introduce alternatives depends on focus intonation. That is, when each disjunct bears focus (now indicated by square brackets) these disjuncts are introduced as alternatives, otherwise only the disjunction as a whole is introduced (e.g. Roelofsen & Van Gool 2010; Pruitt & Roelofsen 2011; Biezma & Rawlins 2012):

(12)   a. $[ALPH]_F$ or $[BETH]_F$ attended the conference.
        b. $[Alph$ or $BETH]_F$ attended the conference.

This theoretically postulated difference in introduced alternatives is thought to correlate for instance with the robustness of a "not both" inference (in (12a) but not (12b)) and with the naturalness of certain responses. Drawing inspiration from Beaver and Clark 2009, who explain the apparent focus-sensitivity of "only" as a side effect of its more direct sensitivity to the Question Under Discussion (QUD), a partially isomorphic explanation can be found for the

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[1] What exactly is the nature (or thrust) of this kind of explanation? A radical 'pragmaticist' interpretation could be that the notion of introducing alternatives is indeed purely pragmatic, i.e. that there is no semantics of alternatives beyond the minimal fact that attention is drawn to basically any constituent. A more 'semanticist' interpretation could be that these findings reveal a possible account of the historical pragmatic origins of a notion that has by now fossilized into semantics. Either way, it can provide a satisfactory explanation of where the alternative-introducing behavior of disjunction comes from.

apparent focus-sensitivity of the alternative-introducing behavior of disjunction. The standard view on focus (Roberts 1996; Beaver & Clark 2009, building on Rooth 1992 and before) is compatible with two kinds of QUDs for the example in (12a): a single-wh QUD to which each disjunct provides a possible answer ("Who attended the conference?"), or a disjunctive multi-wh QUD ("Who attended the conference or who attended the conference?"). Although the latter can occur in the right sort of context (e.g. with different implicit domain restrictions on the two wh-words), it is very odd out of the blue, so I will be assuming the former QUD for (12a), (i.e. "Who attended the conference?"). For (12b) we can assume that the QUD contains the disjunction as a whole but not the individual disjuncts, given the lack of a contrastive accent on "Alph." Given this, from the different QUDs it follows directly that (12a) can and should be used to draw attention to each disjunct, while (12b) can be used to draw attention to the disjunction as a whole but not to the individual disjuncts (which are irrelevant).

Summary
Summing up, I discussed two conceptions of the alternatives introduced by disjunction. The first, the algebraic perspective, puts this behavior centrally into the semantics, but the explanatory value of the algebraic perspective itself is not entirely clear, and it comes with the downside of imposing downward closure on alternative sets, rendering disjuncts such as "or both" semantically vacuous. The second perspective is based on the more minimal (uninformed) assumption that sentences can drawn attention to basically any of their constituents, while relying on pragmatics to explain why disjunction but not conjunction can be used to intentionally introduce alternatives. The choice between the two perspectives concerns the nature of a particular notion of alternative (one of many), namely the alternatives introduced by disjunction, and has implications for the way in which this notion can be assumed to interact (or be conflated) with others. For instance, the attentional-pragmatic perspective is less conducive to treating the alternatives introduced by disjunction as directly available to the compositional semantics.

12.4   QUDs as Ways of Organizing Discourse Goals

A fruitful and influential perspective on discourse and pragmatics has been to conceive of discourse as being organized around the raising and resolution of Questions Under Discussion (QUD; e.g. Carlson 1983; Van Kuppevelt 1995; Ginzburg 1996; Roberts 1996), where QUDs are commonly represented as sets of alternatives: sets of relevant propositions. As we saw before, accounts of focus rely on a notion of QUD, as did the attentional perspective on the alternatives introduced by disjunction outlined in the previous section. It is,

Q_0: {What is the way things are?}

A_0: Max had a lovely evening.

$Q_{0.1}$: What did Max do on that lovely evening?

$A_{0.1'}$: He had a great meal. $A_{0.1''}$: He won a dancing competition.

$Q_{0.1.1}$: {What did Max eat during his meal?}

$A_{0.1.1'}$: He ate salmon. $A_{0.1.1''}$: He devoured cheese.
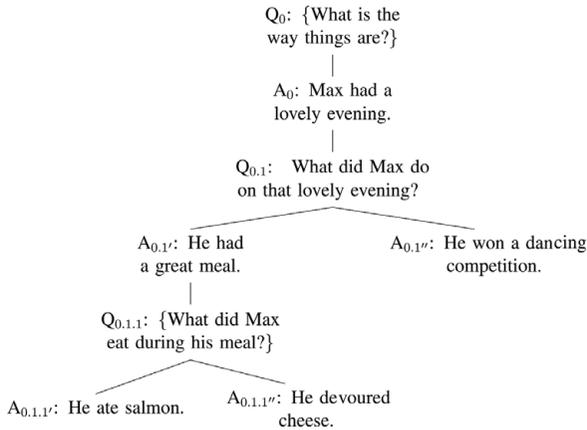
Figure 12.1 A possible QUD structure for (13) (slightly modified from Figure 3 in Riester 2019)

therefore, important to be clear about what QUDs are. As in the previous section, I summarize an existing perspective (the predominant one), and a more novel perspective, and present some arguments in favor of the second.

The Predominant Perspective: Linguistic Questions as Discourse Goals

QUDs are often talked about as if they are questions in a linguistic sense, i.e. interrogative sentences (Carlson 1983; Büring 2003) or the kinds of speech acts or semantic objects typically expressed by means of such sentences (Van Kuppevelt 1995; Roberts 1996). This tendency is apparent, for instance, in the way in which QUD annotation typically mixes explicit linguistic questions and supposed implicit QUDs in a single representation. Consider the following constructed example (modified from (1) in Riester 2019), with a possible QUD analysis shown as a discourse tree (Büring 2003) in Figure 12.1.[2]

(13)   A: Max had a lovely evening.
         B: What did he do?
         A: He had a great meal. He ate salmon. He devoured cheese. He won a dancing competition.

In the figure, following Riester 2019, questions in curly braces are implicit entities whereas the unbraced question ($Q_{0.1}$) was explicit in the original

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[2] This is a classic example from Asher and Lascarides 2003. See also Hunter and Thompson (this volume) for an alternative, discourse coherence-based (as opposed to QUD-based) analysis of discourse structure.

discourse – thus, explicit and implicit questions are assumed to occupy the same kinds of nodes in a discourse tree.

This kind of terminological and perhaps conceptual conflation of discourse goals and linguistic questions is risky, as it may cause us to overlook the fact that discourse goals and the speech acts directed at them are, in principle, very different kinds of things. For instance, in Section 12.2 I argued, illustrated by (7), that the meaning of an interrogative should not be assumed to be equivalent to its QUD: just as declaratives can provide only a partial answer to their QUD, so too can interrogatives highlight only part of their QUD, as indicated for instance by final rising intonation as a marker of nonexhaustivity. Although linguistic questions are a prime instrument for setting discourse goals, we should not conflate the instrument with the goal.

Another characteristic of the predominant perspective on QUDs, besides the aforementioned linguistic stance on QUDs, is that it tends to regard the QUDs themselves, not the propositions they contain, as the ultimate discourse goals. That is, the goal of a given stretch of discourse is identified with the resolution of a particular question, not the making common ground of certain pieces of information. This view on QUDs is in principle independent from the tendency to regard them as linguistic questions, but they fit together nicely: linguistic questions are a prime instrument for setting new discourse goals, so a close relation between linguistic questions and discourse goals seems desirable. Nevertheless, I think that regarding QUDs as discourse goals, rather than the propositions they contain, is conducive to a view on QUDs that does insufficient justice to their dynamicity, i.e. to the ability of speakers to shift from one QUD to another, as I will explain after outlining an alternative perspective.

QUDs as *Ways of Organizing* Discourse Goals

I propose to conceive of the making common ground of any individual piece of information as a goal in itself, that is, if n pieces of information are worth sharing, let that count as there being n distinguishable conversational goals. QUDs then enter the picture by assuming that a given utterance can potentially serve a number of these goals simultaneously, by providing or requesting several pieces of information at once. Of course, not just any arbitrary set of goals is a suitable combination of goals for a single utterance to serve. The subset of goals that a single utterance can be reasonably aimed at must be chosen on the basis of, among other things, subject matter (goals for a single utterance must be topically related), general importance (important goals first), and orderly discourse (e.g. sets of goals shouldn't be too big or too mixed, and resolving one should naturally lead to the next). We can think of QUDs as sets of goals in this sense, that are grouped together in accordance with certain organizational principles.

Regarding QUDs as ways of organizing goals, instead of regarding the resolution of questions itself as a goal, has a number of advantages. First, it

is conducive to a more dynamic view of QUDs, where changing the QUD does not entail changing the discourse goals: the same discourse goals can be organized and reorganized in various ways throughout a conversation. I return to this in the next section.

Second, the proposed perspective makes certain limitations of the QUD-based approach easier to recognize and formulate. One such limitation is that a set of propositions – the typical representation of a QUD – cannot model dependencies between the goals these propositions represent, i.e. the goals of making them common ground. I think so-called *mention-some* contexts are an example where this matters:

(14)   A: Where can I buy an Italian newspaper?
          B: In the kiosk around the corner.

If I am looking for a place to buy a newspaper, I may want to know if I can buy one in the kiosk around the corner, and also if I can buy one in the equally nearby bookstore, but I don't need to know both – after achieving one of these goals I will no longer pursue the other. We cannot easily represent such dependencies between the individual pieces of information in the QUD if we only regard the resolution of the entire QUD as the discourse goal, represented as a set of propositions. Accordingly, a QUD approach is prone to conflate this kind of mention-some context with a *mention-all context*, e.g. where one is compiling an exhaustive list of nearby places that sell newspapers. If, instead, we conceive of QUDs as mere ways of organizing the more elementary goals, i.e. the individual propositions, we are less prone to overlook that these elementary goals can have a life of their own, with interdependencies that cannot be represented at the QUD level.

Third, regarding QUDs as ways of organizing discourse goals, as opposed to treating QUDs themselves as discourse goals, can help decouple the notion of QUD from linguistic notions of question, i.e. one of the characteristics of the predominant approach mentioned above. This is because there is nothing essentially linguistic about organizing our goals in sensible ways: we would organize our goals also when, say, fixing a bike, based in part on something like subject matter; we would perhaps first pursue all goals related to the chain and gears, then everything related to the position of the cyclist (saddle, handlebars), and so on. Indeed, our assumptions about the organization of discourse goals into QUDs should be, as much as possible, grounded in extralinguistic cognition/behavior, as opposed to, say, a semantics of interrogative sentences.

Summary
Whereas the predominant view of QUDs treats them as linguistic questions and regards them as discourse goals in their own right, I have proposed a view

of QUDs as mere ways of organizing the more elementary goals, i.e. single propositions that ought to be made common ground. This helps decouple the notion of QUD from the linguistic notion of question, lets us acknowledge that the more elementary discourse goals can have a life of their own (e.g. dependencies between goals), and invites a more dynamic view of QUDs. I return to the latter in the next section.

12.5   Alternative QUDs

The view on QUDs described above favors a view of QUDs as being more fluid and dynamic. It is the underlying discourse goals, i.e. the pieces of information worth making common ground, that are relatively stable from one discourse move to the next, while their organization into QUDs can more easily change. Although it is generally acknowledged that QUDs can be strategically decomposed into sub-QUDs in a systematic way (Roberts 2012), I think that this is only one of many permissible QUD-maneuvers, and that the amount of freedom speakers have in changing the QUD tends to be underestimated. I will give three examples of this tendency. Altogether, this section will emphasize that, when theorizing about a given discourse move, we should consider not just the alternative things a speaker might have said given a certain QUD, but also the *alternative QUDs* the speaker might have chosen to address.

Example 1 The Symmetry Problem

It has been argued that, if some proposition is relevant, then so is its negation – closure of relevance under negation. I do not think that all arguments for closure of relevance under negation are equally applicable to natural language, but an argument that I have made for closure of relevance (in a broad sense) under negation (Westera 2017c) is the following.[3] If some proposition is relevant, this means establishing it is a conversational goal, and since it is important to keep the discourse focused on those goals which are still achievable, establishing the negation of that proposition will automatically be relevant as well, albeit for discourse-internal reasons. Establishing the negation of a relevant proposition helps to keep the goal set tidy. Besides this reason, there will also be contexts where positive and negative information is genuinely equally relevant, say, if one is compiling an exhaustive list of people that were *and* people that were not at the protest.

   Crucially, that relevance in a broad sense is closed under negation for discourse-internal reasons, or that it sometimes is for discourse-external reasons, does not entail

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[3] For instance, Chierchia et al. (2012) cite an argument which assumes that people in conversation can be modeled as agents testing a hypothesis, and a given proposition and its negation change the probability of the hypothesis being true in opposite directions but in equal measures. However, in reality we do not usually care about raw probabilities, but about whether a probability is sufficiently high or low as to warrant a certain action, and this does not exhibit the same symmetry.

that individual QUDs are in such cases closed under negation too. After all, nothing prevents a speaker from dividing the set of all relevant pieces of information, which is arguably closed under negation, into separate QUDs that are not. That is, just as complex QUDs are split up into simpler ones in the discourse strategies of Roberts 2012, a speaker can split a symmetrical set of relevant propositions into a positive and a negative QUD. For instance, even if one cares both about who was at the protest and (therefore, a bit) about who wasn't, one may still decide to split this up into two QUDs paraphrasable as "Who was at the protest?" and "Who wasn't at the protest?" and choose to address only one – or one explicitly and the other implicitly.[4]

This realization is important; for instance, it helps neutralize an influential argument that has been made against pragmatic approaches to exhaustivity implicature. To illustrate, consider the exhaustivity implicature "not four" in example (7), repeated here:

(15)   Were TWO of your friends at the protest, or THREE?

⇝ not four.

If exhaustivity is the exclusion of relevant alternatives, and relevance is closed under negation, then one has to explain why only the positive alternatives end up being excluded, not the negative ones. That is, why does (15) implicate "not four," not "not *not* four," i.e. "definitely four"? This question, or rather the presumption that it cannot be answered and hence that pragmatic approaches to exhaustivity are problematic, is known as the Symmetry Problem (Chierchia et al. 2012). Since what matters for exhaustivity is not whatever is broadly relevant but (uncontroversially) only the QUD at hand, a sufficiently dynamic perspective on QUDs unlocks a simple solution: even if the set of broadly relevant propositions is symmetrical, speakers may choose to organize a symmetrical set of relevant propositions into a positive and a negative QUD. Indeed, this maneuver offers an important advantage of brevity and clarity, precisely because it enables exhaustivity implicature: it enables the negative part of the answer to be communicated implicitly (Westera, 2017c).

Example 2 Potentially Irrelevant Answers

Underestimating the freedom speakers have in choosing their QUD may lead one to unnecessarily give up or relax certain pragmatic constraints. To illustrate, consider the following example, with the intended reading of B's answer being a mere suggestion, e.g. "maybe this is relevant?":

(16)   A: Who came to class yesterday?
          B: It was raining... [fall-rise intonation]

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[4] Here I am presupposing that QUDs themselves need not be closed under negation, contrary to approaches that treat QUDs as linguistic questions, and linguistic questions in turn as semantic partitions on the set of worlds (Groenendijk & Stokhof 1984), a type of structure which in turn entails (something like) closure under negation. But I have already argued against conflating QUDs and linguistic questions, and, moreover, the logico-philosophical arguments given for a partition semantics of interrogatives have recently been shown to be formally inconclusive anyway (Ciardelli 2014).

That is, the intended reading is one where B's response implies that B is not sure about who came to class, but, since it was raining, considers it probable that not many came. There are at least two possible analyses of potential indirect partial answers such as this.

The first treats speaker B as addressing the QUD that is introduced by A's interrogative, namely, the question of who came to class. In order to explain why this discourse is coherent, one would need to assume that speaker B's intent – that it was raining – somehow complies with the maxim of Relation relative to the original QUD about class attendance, i.e. that the Maxim of Relation is permissive in principle of 'plausible indirect partial answers' such as B's response. A maxim of Relation this liberal is not necessarily implausible or counterintuitive, but allowing such potential nonanswers does amount to weakening the maxim of Relation, a core pragmatic constraint, which may in turn weaken the predictions of other accounts relying on it.

The second possible analysis involves a shift in QUD: it seems plausible that speaker B in (16), given their inability to directly address A's question, can choose to implicitly shift the QUD to something like "Which facts could have some bearing on A's question?". Assuming such a QUD shift enables one to maintain a stricter maxim of Relation, one which permits only definite, direct answers to the QUD, because B's assertion does provide such an answer to the new QUD, even if it falls short relative to the original QUD.

The two possible analyses just sketched differ in where they put the necessary flexibility: in the relation between the QUD a speaker decides to pursue and the communicative intention by means of which they choose to do so – a relation governed by the maxim of Relation – or in the relation between how one speaker selects and organizes their goals into QUDs and how the next speaker decides to do it. Where to put the pragmatic flexibility to handle potential nonanswers is strictly speaking a theory-internal matter, as the auxiliary notions (e.g. meaning, goal, QUD, relevance) do not yield direct empirical predictions, and cannot be assumed to be directly intuitively accessible. Arguing for one resolution of this choice over the other is outside the present scope; what I mean to argue here primarily is that there is such a choice, and that this is easily overlooked if we underestimate the freedom speakers have in choosing their own QUDs.[5]

Nevertheless, for the sake of concreteness, let me try to make a case for the second type of analysis, i.e. one based on a QUD shift. In Westera 2019 I proposed, for independent reasons, that fall-rise intonation, which is a natural option for (16), is a marker of the presence of two QUDs, with some conversational maxim not being complied with in relation to the main QUD (as indicated by the final rise) while a different, focus-congruent QUD is addressed in full compliance with the maxims (as indicated by the pre-final fall). Thus, for (16) the intonation would convey the following:

(17)   B: It was raining. . . [fall-rise intonation]
      a. Pre-final fall: I have complied with the maxims relative to the focus-congruent QUD of "Which evidence may bear on the main QUD?"
      b. Final rise: I have not complied with the maxims relative to the main QUD of "Who was at the protest?"

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[5] On a more personal note, in my work I have often relied on a rather strict maxim of Relation, one which permits only direct answers to the QUD. With very few exceptions my reviewers mentioned indirect answers as a counterexample.

The second meaning component of fall-rise intonation, according to this account, fits exactly the type of QUD shift mandated by maintaining a strict maxim of Relation. Again, my point here is not to argue in favor of this particular analysis, but only to illustrate that we should not overlook the possibility of a shift to an alternative QUD.

Example 3 'Yes', 'No', and the Semantics of Interrogatives

Underestimating the fluidity of QUDs can also explain, at least in part, our tendency of drawing conclusions about the semantic contents of interrogatives from what are intuitively their basic responses. Two basic responses to a simple interrogative with final rising intonation are "yes" and "no":

(18)   Were your friends at the protest?
         Yes / No.

Accordingly, common treatments of such interrogatives in the literature would assign to this interrogative, as its semantic content, the set containing the two propositions corresponding to "yes" and "no," namely, the proposition explicitly mentioned by the interrogative and its negation: that the relevant friends were there, and that they weren't. But note that "yes" and "no" are natural responses also to a declarative:

(19)   A: Your friends were at the protest.
         B: Yes / No.

And yet, no one (to my awareness) has proposed to put the "no"-proposition inside the meaning of the declarative in the same way. The reason for the latter is that we do not need to: we can explain why "no" is a basic response to a declarative, without hard-wiring this into its semantics, by noting the importance of preventing false information from appearing to enter the common ground. Put differently, speakers can always shift to the QUD "is the asserted information actually false?", and this explains why they can respond with "no" in (19), which in the given context conveys exactly that the asserted information is actually false, i.e. a direct answer to the new QUD. Similarly, we can explain why "no" is a basic response to an interrogative in terms of the importance of signaling that the conversational goal highlighted by the interrogative is not achievable: a speaker who is unable to affirm any of the propositions in the main QUD is free to shift to a QUD containing their negations. Generalizing: just because a given response to an interrogative is natural (or to a declarative for that matter), it does not mean that the proposition expressed by the response must have been an element of its semantic content or its QUD (this insight is not new of course; e.g. Groenendijk & Stokhof 1984).

The realization that the naturalness of a "no" response to a simple interrogative is easily explained pragmatically, in terms of a shift to a QUD that serves to keep the set of goals tidy, opens a door towards a *singleton* treatment of such interrogatives, i.e. as semantically expressing (a set containing) only the proposition explicitly mentioned, as opposed to the more common 'doubleton' treatment involving both that proposition and its negation.

(20)   Were your friends at the protest?
         Singleton: {your friends were at the protest}
         Doubleton: {your friends were at the protest, your friends were not at the protest}

I believe the singleton treatment has certain advantages. For instance, it introduces a tighter parallelism between declaratives and the corresponding interrogatives, which is desirable empirically (e.g. prosody works essentially the same way on both). Moreover, the singleton treatment is easier to reconcile with cases where it is clear that the negated proposition is not relevant to the same extent as the proposition expressed. In fact, proponents of a doubleton treatment of simple interrogatives still acknowledge that the proposition that is explicitly mentioned by the interrogative has a more privileged status; e.g. it would be 'highlighted' (Roelofsen & Van Gool 2010). But the point here is not to argue decisively in favor of a singleton treatment; the point is merely that the fluidity of QUDs means that intuitively 'basic' responses do not need to be put into the semantics, making the singleton treatment of simple questions a real possibility. In the remainder of this section I will, however, counter one intuitive argument against a singleton treatment, because it bears directly on the question of how QUDs and interrogatives relate.

Besides the intuitive force of basic responses, what may also be preventing acceptance of the singleton treatment of simple interrogatives is a combination of two ideas. The first idea is that questions would have to be partitions on logical space, or at least sets containing multiple propositions. (I will not say much about this, other than that I am skeptical.) This is not true; by analogy: the main semantic content of your sentence does not need to *be* an assertion in order for it to serve to *make* an assertion; in fact the semantic content often does not even need to be a complete proposition in order for it to serve to assert one – just expressing something close to it often suffices.[6] Semantic contents are merely the instruments for achieving various pragmatic effects, and need not be equivalent to those pragmatic effects in order to be suitable instruments. Returning to the examples at hand: even if you assume that singleton sets cannot *be* proper questions, that does not mean they cannot be suitable instruments for *raising* questions. Raising a question is a matter of flagging a QUD and leaving it at least in part unresolved, and this can be done in various ways, for instance by drawing attention to all of its propositions, or by mentioning only one and relying on prosodic focus to indicate the structure of the QUD – and both ways are available for declaratives and interrogatives alike.

Summary

This section illustrated the importance of reasoning about alternative QUDs, i.e. of the freedom speakers have in choosing their QUDs. Conceiving of QUDs as more dynamic and fluid than the underlying discourse goals prevents applying perceived constraints on relevance (such as symmetry) directly to QUDs, lets one maintain a strict maxim of Relation (e.g. in the face of indirect answers), and enables a singleton treatment of yes/no questions.

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[6] A more far-fetched analogy: you don't need to put actual pancakes in your mixing bowl in order to bake one.

12.6   Conclusion

I started by distinguishing two perspectives on focus alternatives, criticizing the conflation of the set of focus alternatives with the meaning of an interrogative. I also discussed two conceptions of the alternatives introduced by disjunction, favoring an explanation in terms of intentional attention-drawing, which predicts that disjunction can (depending on focus) but conjunction cannot serve to introduce alternatives. All of this relied crucially on the notion of QUD, which are predominantly regarded as, essentially, linguistic questions that represent discourse goals. Departing slightly from this predominant perspective, I proposed to regard QUDs as ways of organizing more primitive discourse goals, namely, single propositions, arguing that this perspective has several advantages: it helps decouple the notion of QUD from the linguistic notion of question, lets us acknowledge that the more elementary discourse goals can have a life of their own (e.g. dependencies between goals), and invites a more dynamic view of QUDs. This more dynamic view requires that we reason not just about alternative utterances aimed at a given QUD, but also about alternative QUDs. I illustrated this with the symmetry problem, indirect answers and yes/no questions.

Altogether, I hope that this chapter encourages us to reflect more deeply on what various notions of alternatives really signify and how they can be assumed to interact, and proceed cautiously when making assumptions about the specific set of alternatives for a given example – what notion of alternatives is being used, and, given how that notion is grounded, are these assumptions really justified?

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Part VII

Arguing and Rejecting

13 The Semantics and Pragmatics of Argumentation

Carlotta Pavese

13.0 Questions and Answers

(1) Why do you think both linguists and philosophers find the semantics and pragmatics of argumentation interesting?

Arguments have been the object of philosophical interest for a long time. Logicians and philosophers have studied the formal properties of arguments at least since Aristotle and have long discussed the logical sense of arguments as sets of premises and conclusions (Hamblin 1970; Walton 1990; Parsons 1996; Rumfitt 2015). The structure of arguments has been investigated by epistemologists (e.g. Pollock 1987, 1991a, 1991b, 2010), and has given rise to formal argumentation theory, which has developed into a branch of computer science in its own right (e.g. Dung 1995; Wan et al. 2009; Prakken 2010). Philosophers of mind have contemplated the nature of reasoning and inference as mental acts and theorize about the relation between those mental acts and doxastic states, such as beliefs and credences (e.g. Longino 1978; Broome 2013; Neta 2013; Boghossian 2014). By contrast, comparatively little attention has been paid to arguments as a distinctive kind of *discourse*, with its own semantics and pragmatics. Most work on speech act theory fails to discuss arguments as a kind of speech act (cf. Austin 1975; Searle 1969; Searle & Vanderveken 1985). Even recent discussions of speech acts tend to focus primarily on assertions, orders, imperatives, and interrogatives (cf. Murray & Starr 2018, 2020; Fogal et al. 2018). Though arguments have not been widely studied *qua* linguistic constructions, they are central to linguistic theory and to philosophy (Dutilh Novaes 2021). Just like we use language for exchanging information, for raising questions, for issuing orders, for making suppositions, etc., we also use language to give arguments, as when we argue on behalf of a certain conclusion and when we share our reasonings. Indeed, giving arguments is one of philosophers' favorite speech acts; and it is quite remarkably widespread outside the philosophy classroom.

(2) What recent developments in linguistics and philosophy do you think are most exciting in thinking about the semantics and pragmatics of argumentation?

Recent developments in linguistics provide ample new resources for providing a semantics and pragmatics argumentation. We make arguments through constructions of the form:

(1)   a. $P_1, \ldots, P_n$. Therefore/thus/hence/so C;
       b. Suppose $P_1, \ldots, P_n$. Then C.

These constructions are sets of sentences – or *discourses*. It is therefore natural to study these constructions by looking at semantic approaches that take discourses rather than sentences to be the main unit of semantic analysis. Because of this, dynamic approaches to the semantics of arguments will be at the center of my discussion. In particular, I will discuss the resources that discourse coherence approaches (Hobbs 1985; Asher 1993; Asher & Lascarides 2003; Kehler 2002) as well as dynamic semantic approaches to the study of language (Veltman 1985, 1996; Beaver 2001; Kaufmann 2000; Brasoveanu 2007; Gillies 2009; Murray 2014; Willer 2013; Starr 2014a, 2014b; Pavese 2017, 2021; Kocurek & Pavese 2021) have to understand the semantics and dynamics of arguments.

(3)   What do you consider to be the key ingredients in adequately analyzing the semantics and pragmatics of argumentation?

Speech acts tend to be conventionally associated with certain linguistic features. For example, assertions are associated with the declarative mood of sentences; suppositions with the subjunctive mood, orders with the imperative mood, questions with interrogative features, etc. Like other speech acts, giving an argument is conventionally associated with certain grammatical constructions of the form as (1a) and (1b) above. In order to study the speech act of giving an argument, I will therefore look at the semantics and pragmatics of words such as 'therefore', 'thus', 'so', 'hence', and 'then' – argument connectives, as Beaver (2001: 209) calls them – which are used in natural languages to signal the presence of arguments and to express relations between premises and conclusions. These argument connectives exhibit a distinctive *anaphoric behavior*. Their anaphoric component enables arguments to make use of multiple bodies of information at once. They often consist of multiple suppositions (as in proof by cases), suppositions within suppositions (as in conditional proofs), and so on. As we will see, in order to model these anaphoric relations, discourses have to be thought not simply as a sequences of sentences, but as sequences of labeled sentences – which can track different information states as different sets of premises and suppositions. It also requires thinking of contexts as more structured as usually required in dynamic semantics – not simply as information states or sets of possible worlds, but as having a distinctive *layered* (indeed, tree-like) structure (Kocurek & Pavese 2021).

(4)   What do you consider to be the outstanding questions pertaining to the semantics and pragmatics of argumentation?

Here are a few outstanding questions pertaining the semantics and pragmatics of argumentations: what does the speech act of arguing and making an argument amount to? In particular, how does it affect the context set? What relations do argument connectives express (if any) between premises and conclusions? In virtue of what mechanisms (i.e. presupposition, implicature, etc.) do they get to express those relations? How does the semantics of these words compare to their counterparts in formal languages? How are we to think of the syntax of argumentative discourses and how are we to model contexts in order to model the dynamics of argumentative discourses? Can a unified semantics of argument connectives be provided across their deductive, practical, causal, and inductive usages? How are we to think of the syntax of argumentative discourses and how are we to model contexts in order to model the dynamics of argumentative discourses? What do argument connectives such as 'therefore' contribute to the arguments where it occurs? What is the nature of the support relation tested by argument connectives? How are we to model the subtle differences between argument connectives – between 'therefore', 'then', 'so', 'thus', and 'hence'? What makes a discourse an argument, rather than an *explanation*? How are we to characterize the distinctive utterance force of arguments versus explanations? Are there such things as zero-premises arguments in natural languages? How do deductive arguments in natural language differ, if at all, from proofs in natural deduction systems – such as Fitch's proofs?

13.1   Introduction

This chapter overviews recent work on the semantics and pragmatics of arguments. In natural languages, arguments are conventionally associated with particular grammatical constructions, such as:

(2)   a. $P_1, \ldots, P_n$. Therefore, C;
        b.   Suppose $P_1, \ldots, P_n$. Then, C.

These constructions involve argument words such as 'therefore', 'thus', 'so, 'hence' and 'then' – *entailment words* (cf. Brasoveanu 2007) or, as I will call them, following Beaver (2001: 209), *argument connectives* – which are used in natural languages to signal the presence of arguments. It is, therefore, natural to study the speech act of giving an argument by looking at semantics and pragmatics of argument connectives.[1]

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[1] Even recent discussions of speech acts tend to focus primarily on assertions, orders, imperatives, and interrogatives (cf. Fogal et al. 2018). Some discussion of argumentation can be found in van

The first six sections of this chapter look at the semantics of argument connectives. Because arguments typically stretch through discourse, and argument connectives are kinds of discourse connectives, it is natural to start with semantic approaches that take discourses rather than sentences to be the main unit of semantic analysis. Recent developments in linguistics provide ample new resources for a semantics of argumentation. In particular, I will discuss the resources that discourse coherence approaches as well as dynamic approaches to the study of language have to understand the semantics of argument connectives. Section 13.2 compares argument connectives in English to their formal counterparts in proof theory. Section 13.3 explores thinking of argument connectives as expressing *discourse coherence relations* (e.g. Asher 1993; Asher & Lascarides 2003; Bras et al. 2001a, 2001b; Le Draoulec & Bras 2007; Bras et al. 2009; Jasinskaja & Karagjosova 2020). Section 13.4 discusses Grice's view according to which argument connectives come with an associated conventional implicature and compares it to the competing analysis on which 'therefore' is a presupposition trigger (Pavese 2017, 2021; Stokke 2017). Section 13.5 discusses Brasoveanu (2007)'s proposal that semantically 'therefore' works as a modal, akin to epistemic 'must'. Section 13.6 examines dynamic analyses of argument connectives (Pavese 2017; Kocurek & Pavese 2021), with an eye to highlight the scope and the advantages of these sorts of analyses. Section 13.7 looks at the pragmatics of argument connectives and at the difference between arguments and explanations. Section 13.8 concludes.

13.2   Arguments in Logic and in Natural Languages

Consider **Argument Schema**, with the horizontal line taking a list of premises and a conclusion into an argument:

Argument Schema

$$\frac{\phi_1, \ldots, \phi_n}{\psi}$$

Eemeren and Grootendorst 1982, 2004, who investigate arguments and argumentation, but primarily as a tool to overcome dialectical conflict and in Mercier and Sperber (2011), who use arguments and argumentation theory for a philosophical theory of reasoning, and in Koralus and Mascarenhas (2013), who draw an interesting parallel between reasoning as a psychological process and arguments in natural languages and highlight the question-sensitivity of both. There is some discussion of argument connectives such as 'therefore' in *discourse coherence theory* (e.g. Hobbs 1985; Asher 1993; Asher & Lascarides 2003; Asher & Gillies 2003; Kehler 2002; Stojnić 2022), though these discussions fall well short of giving a systematic semantics for 'therefore' in all of its uses.

Now, compare **Argument Schema** to the following arguments in English:

(3)   a. There is no on going epidemic crisis. Therefore, there is no need for vaccines.
       b. It is raining. Therefore, the streets are wet.
       c. I am smelling gas in the kitchen. Therefore, there is a gas leak.
       d. This substance turns litmus paper red. Therefore, this substance is an acid.

These arguments all have the form "Φ, Therefore ψ" where Φ is the ordered set of premises $\phi_1, \ldots, \phi_n$ and ψ is the conclusion. Because of the syntactic resemblance of **Argument Schema** and (3a)–(3d), it is tempting to think of 'therefore' and other argument connectives such as 'thus', 'so, 'hence' and 'then' as having the same meaning as the horizontal line (e.g. Rumfitt 2015: 53).

However, **Argument Schema** is not perfectly translated by the construction "Φ. Therefore/ Thus/ Hence/ Then ψ"; nor is the horizontal line perfectly translated by the argument connectives available in English. First of all, the horizontal line does not require *premises*, for it tolerates conclusions without premises, as in the case of theorems:

Theorem

$$\overline{\psi \lor \neg\psi}$$

By contrast, 'therefore', 'thus', 'so', 'hence', 'then', etc. do require explicit premises:[2]

(4)   a. ?? Therefore/hence, we should leave (looking at one's partner's uncomfortable face).
       b. ?? Therefore/hence, the streets are wet (looking at the rain pouring outside).
       c. ?? Therefore/hence, either it is raining or it is not raining.

A plausible explanation for this contrast is that 'therefore', 'thus', 'so', 'hence', and 'then' differ from the horizontal line in that they contain an anaphoric element (cf. Brasoveanu 2007: 296; Kocurek & Pavese 2021). Like anaphors, argument connectives require not just an antecedent but its *explicit* occurrence.[3]

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[2] As Pauline Jacobson has pointed out to me (p.c.), the use of 'so' strikingly differs from the use of 'therefore' in this regard, in that 'so' can also be used without premises, as in "So, you have arrived!". On the other hand, 'so' can also be used anaphorically, in nonargumentative use, as when we say 'I think so'. See Needham (2012) for a discussion of theses uses of 'so' and Krifka (2013), Elswyk (2019) for a more general discussion of propositional anaphora. Hence, 'so' seems to have a *deictic* use as well as an anaphoric use. By contrast, 'therefore' seems to privilege an anaphoric use. (However, see Neta 2013: 399–406 for the claim that 'therefore' is a deictic expression.) For a more careful comparison of the subtle differences between argument connectives, see Kocurek and Pavese (2021).

[3] There is not to say that premise-less arguments cannot be made in natural languages. Natural languages seem to resort to other devices to express premise-less arguments, – i.e. locutions such as 'by logic'. Cf. Pavese (2021) for a discussion of these issues. Moreover, not every argument connective attaches to conclusions in the same way 'therefore' and 'so' do. For example, 'since' is an argument connective in (5):

(5)   Since it is raining, streets will be wet.

But here it attaches to 'it is raining', which is intuitively the premise of the argument.

That is the first difference between 'therefore' and the horizontal line. Here is a second difference (cf. Pavese 2017: 95–96; 2021). In **Argument Schema**, the premises can be supposed, rather than asserted. By contrast, 'therefore' (and 'hence', 'thus', 'so') is not always allowed in the context of a supposition:

(6)   a. It is raining. Therefore/so/hence, the streets are wet.
       b. ?? Suppose it is raining; therefore/so/hence the streets are wet.
       c. If it is raining, therefore/so/hence the streets are wet.
       d. ??? If Mary is English, therefore/so/hence she is brave.
       e. ??? Suppose Mark is an Englishman. Therefore/so/hence, he is brave.

Under supposition, connectives like 'then' are much preferred to 'therefore':

(7)   a. Suppose Φ; then, Ψ.
       b. Suppose it is raining. Then, the streets are wet.
       c. If it is raining, then the streets are wet.
       d. If Mary is English, then she is brave.
       e. Suppose Mark is an Englishman. Then, he is brave.

For this reason, Pavese (2017) speculates that the slight infelicity of (6b) may indicate that 'therefore' is more similar to the square – i.e. '□' – that ends proofs than to the horizontal line in **Argument Schema**:

Proof of Theorem
    Theorem . . . □

Just like '□', 'therefore' would require its premises having been discharged and not conditionally dependent on other premises.

However, the data are more complex than Pavese (2017) recognizes and should be assessed with caution. 'Therefore' can be licensed in the context of supposition. For example, consider:

(8)   a. If it were raining, the streets would, therefore, be wet.
       b. Suppose it were raining; the streets would, therefore, be wet.
       c. If Mary were English, she would, therefore, be brave.
       d. Suppose Mark were anEnglishman. He would, therefore, be brave.

'Therefore' is licensed in this construction, where the mood of the linguistic environment is subjunctive. In this respect, 'therefore', 'thus', 'so', and 'hence' differ from 'then', for 'then' is permitted within the scope of a supposition whether or not the mood is indicative:[4]

(9)   a. Suppose it were raining. Then, the streets would be wet.
       b. If it were raining, then the streets would be wet.
       c. If Mary were English, then she would brave.
       d. Suppose Mark were an Englishman. Then, he would be brave.

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[4] Indeed, in these and other respects, 'then' and 'therefore' seem to be in complementary distribution. See Kocurek and Pavese (2021) for more discussion of this point.

Moreover, 'therefore' is at least tolerated with so-called 'advertising conditionals' – interrogatives that play a role in discourse similar to that of antecedents of conditionals:

(10)   a. Single? (Then) You have not visited Match.com. (Starr 2014a: 4)
        b. Single? Therefore, you have not visited Match.com.
        c. Still looking for a good pizzeria? Therefore you have not tried Franco's yet.

This suggests that at least under certain conditions, 'therefore' can appear in suppositional contexts (cf. Pavese 2021).

Another respect under which argument connectives in English differ from the horizontal line in **Argument Schema** is that while their premises have to be declarative, their conclusion does not need to be.[5] Several philosophers have observed that imperatives can appear as conclusions of arguments (e.g. Parsons 2011, 2013; Charlow 2014; Starr 2020):

(11)   If May arrives late tonight, you should go to the store. As a matter of fact, Mary is arriving late. Therefore, go to the store!

In addition to allowing imperative conclusions, argument connectives can also have *interrogative* conclusions:

(12)   The doctor and the lawyer were the two main and only suspects. But then the detective found a stethoscope near the location of the murder. Therefore, who is the chief suspect now?

The final important observation is that argument connectives in English differ from the horizontal line in that they can also appear in nondeductive arguments, both in inductive arguments such as (13a)–(13c), in abductive arguments such as (13c)(13d), in causal arguments as in (14a)–(14d), as well as practical arguments, such as (14e):

(13)   a. It happened, therefore it can happen again: this is the core of what we have to say. It can happen, and it can happen everywhere. (from Primo Levi, *The Drowned and the Saved*, Vintage: New York, 1989, p. 199). [INDUCTIVE ARGUMENT]
        b. Almost every raven is black, and the animal that we are about to observe is a raven. Therefore, it will be black too. [INDUCTIVE ARGUMENT]
        c. Mark owns a Bentley. Therefore, he must be rich (Douven et al. 2013) [ABDUCTIVE ARGUMENT]
        d. The victim has been killed with a screwdriver. Therefore, it must have been the carpenter. [ABDUCTIVE ARGUMENT]

(14)   a. John pushed Max. Therefore, Max fell. [CAUSAL ARGUMENT]
        b. John was desperate for financial reasons. Therefore, he killed himself. [CAUSAL ARGUMENT]

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[5] I will be assuming throughout that arguments cannot have imperatives or interrogatives as premises but even here the data is rather subtle. See Kocurek and Pavese (2021) for some discussion.

    c. Mary qualified for the exam. Therefore, she could enroll. [CAUSAL ARGUMENT]
    d. Reviewers are usually people who would have been poets, historians, biographers, etc., if they could; they have tried their talents at one or the other, and have failed; therefore they turn into critics. (Samuel Taylor Coleridge, *Lectures on Shakespeare and Milton*) [CAUSAL ARGUMENT]
    e. We cannot put the face of a person on a stamp unless said person is deceased. My suggestion, therefore, is that you drop dead (attributed to J. Edward Day; letter, never mailed, to a petitioner who wanted himself portrayed on a postage stamp). (Brasoveanu 2007: 279) [PRACTICAL ARGUMENT]

To sum up, there are at least four dimensions along which argument connectives differ from the horizontal line in deductive logic. First, they differ in that they have an *anaphoric component*; second, they are *mood-sensitive*, in that whether they allow embedding under supposition and subarguments might depend on the mood of the linguistic environment. Thirdly, argument connectives can allow for *nondeclarative conclusions* and, fourthly, they can occur with logical, causal and practical flavors, as well as in inductive and abductive arguments.

13.3   Argument Connectives within Discourse Coherence Theory

Giving an argument is a speech act that stretches through a discourse – i.e. from its premises to its conclusion. It is therefore natural to start an analysis of arguments by looking at the resources provided by *discourse coherence analysis* – an approach to the study of language and communication that aims at interpreting discourses by uncovering coherence relations between their segments (Asher 1993; Asher & Lascarides 2003). The crucial question behind a coherence discourse theoretic approach to the meaning of argument connectives is, then, *what kind* of coherence relation they express. The most notable discourse relations studied by discourse coherence theorists are NARRATION, ELABORATION, BACKGROUND, CONTINUATION, RESULT, CONTRAST, and EXPLANATION.

Although this literature has focused much more on *temporal* discourse connectives than on argument connectives, the general tendency in this literature is to assimilate the meaning of 'therefore' to the meaning of 'then' in its temporal uses and to its French counterpart 'alors' (cf. Bras et al. 2001a, 2001b, 2009). According to the prevailing analysis, 'therefore' would then introduce RESULT (Hobbs 1985; Asher 1993; Asher & Lascarides 2003; Asher & Gillies 2003; Kehler 2002).[6] If the relation of RESULT is a causal relation: if it holds between two constituents, then the former causes the latter.

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[6] I am grateful to Nick Asher for correspondence here.

While this account captures well causal uses of 'therefore' as in (14a)–(14c), not every use of 'therefore' is plausibly causal in this fashion. For example, in the following arguments, the truth of the premises does not cause the truth of the conclusion:[7]

(15)   a. All the girls have arrived. Therefore, Mary has also arrived.
        b. Mary has arrived. Therefore, somebody has arrived.
        c. 2 is even. Therefore either 2 is even or 3 is.

In order to extend their discourse coherence analysis to uses of 'therefore' that are recalcitrant to the causal analysis, Bras et al. (2009) proposes we appeal to INFERENTIAL RESULT – i.e. a relation holding between two events or propositions just in case the latter is a logical consequence of the former (K_α indicates a constituent's way of describing an event α and the arrow stands for the material conditional):

$$\text{INFERENTIAL RESULT}(\alpha, \beta) \text{ iff } \Box\big(K_\alpha \to K_\beta\big).$$

However, not every nonnarrative use of argument connectives can be analyzed in terms of INFERENTIAL RESULT. For example, consider the use of 'therefore' in inductive, abductive, or practical arguments, as in (13c)–(14e). None of these arguments plausibly express INFERENTIAL RESULT. Even if we restrict INFERENTIAL RESULT to the deductive uses of argument connectives, the problem remains that this approach would result in a rather disunified theory of the meaning of argument connectives. We are told that sometimes discourses involving 'therefore' express the causal relation of RESULT, sometimes they express a different discourse relation altogether – i.e. INFERENTIAL RESULT or classical entailment in deductive uses, and maybe some other discourse relations in practical and inductive uses.

Here is a unifying proposal, one that preserves the discourse coherence theorists' important insight that 'therefore' is a discourse connector expressing some or other discourse relation. Suppose we understand RESULT in terms of a *restricted* notion of entailment. For example, we might understand RESULT in terms of nomological entailment – entailment given the laws of nature – or default entailment, as in Asher and Morreau (1990) and Morreau (1992) (cf. Meyer & van der Hoek 1993; Weydert 1995; Veltman 1996). Quite independently of the consideration of argument connectives, Altshuler (2016) has proposed that we understand RESULT in terms of *enthymematic nomological entailment*.[8]

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[7] For example, (15b) violates counterfactual dependence that is plausibly necessary for a causal relation, for if Mary had not have arrived, somebody might still have arrived. Or consider a mathematical inference, such as (15c), for which the counterfactual "If 2 were not even, it would be false that either 2 is even or 3 is" is a useless counterpossible.

[8] See also Kehler (2002: section 3.1).

ϕ enthymematically entails the proposition ψ, if and only if there is a nonempty set of propositions Φ such that $\Phi \cup \{\phi\}$ logically entails ψ. For example, consider again (14a). While John's having pushed Max does not entail that Max fell, Altshuler (2016: 70–71) proposes John's having pushed Max might enthymematically entail that Max fell, for John's having pushed Max in conjunction with an appropriate set of background propositions might entail that Max fell.[9]

Following and extending this proposal, we might then take argument connectives in their deductive uses to express a nonrestricted form of entailment – i.e. classical (or relevantist) entailment; by contrast, in their causal uses, they express *nomological entailment* and in their practical uses *practical entailment* – entailment given the prudential/ practical/ moral laws. Inductive uses might be understood in terms of a restricted form of entailment as well, where the restriction comes from the general principle of uniformity of nature or a specific version thereof (cf. Kocurek & Pavese 2021 for this unifying idea). On this proposal, every use of argument connectives expresses some more or less general relation of entailment. We thereby reach unification across uses of argument connectives while preserving the differences.

In conclusion, discourse coherence theory provides us with the resources to study the semantics and pragmatics of arguments from the correct methodological standpoint: because arguments are discourses, this approach analyzes argument connectives as discourse connectors and thus as expressing discourse relations. From our discussion, however, it emerges that argument connectives appear with a variety of different flavors (narrative, causal, inferential, etc.), and so the question arises of what unified discourse relation they express. In order to capture what is common to all of these uses, it seems promising to think of the relevant discourse relations in terms of more or less restricted relations of entailment.

13.4   Conventional Implicature or Presupposition?

In "Logic and Conversation," Grice (1975: 44–45) uses the case of 'therefore' to illustrate the notion of a *conventional implicature*. Grice observes that in an argument such as (16a) and in a sentence such as (16b), 'therefore' contributes

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[9] When we interpret (14a), we might assume that in normal circumstances, if one is pushed sufficiently strongly, then one will fall and that Josh must have pushed Max sufficiently strongly. As Altshuler (2016) observes, these background propositions may come from a wide variety of sources, from shared knowledge or from the discourse itself. In the case of RESULT, Altshuler proposes that we might understand the relation between two constituents as a form of entailment – i.e. *nomological entailment*. This discourse relation between a constituent σ_1 and a constituent σ_2 holds just in case σ_1 entails σ_2, together with the relevant laws L as well as the other relevant background propositions.

the content that the premise entails the conclusion – in other words, it contributes *Target Content*:

(16)   a. Jill is English. Therefore, she is brave. (*'therefore'-argument*)
       b. Jill is English and she is, therefore, brave. (*'therefore'-sentence*)
       c. Jill is English and she is brave.
       d. Her being brave follows from her being English. (*Target Content*)

Grice points out that in an argument such as (16a) or in a sentence such as (16b), *Target Content* is communicated without being asserted, for by saying (16b), one commits to *Target Content*'s being true but whether *Target Content* is true does not contribute to what is said by (16b). Grice took this to indicate that *Target Content* is only conventionally implicated by 'therefore', for he further thought that (16b) would not be false if *Target Content* were false. It is customary for linguists and philosophers to follow Grice here. For example, Potts (2007: 2) tells us that the content associated with 'therefore' is a relatively uncontroversial example of a conventional implicature (see also Neta 2013 and Wayne 2014: section 2). Whether the conventional implicature analysis of 'therefore' best models the behavior of 'therefore' is, however, questionable. Some have argued that several considerations suggest that the explanatory category of *presuppositions*, rather than that of conventional implicatures, might actually better capture the status of the sort of content that is conveyed by argument connectives (see Pavese 2017, 2021; Stokke 2017).

The first kind of evidence for this claim is that 'therefore' satisfies the usual tests for presupposition triggers: *Projectability* and *Not-At-Issuedness*. Start with *Projectability*. Like standard presupposition triggers, *Target Content* projects out of embeddings – i.e. out of negation (17a), out of questions (17b), in the antecedents of conditionals (17c), out of possibility modals (17d) and out of evidential modal and probability adverbs (17e), as can be seen from the fact that all of the following sentences still convey that Mary's braveness follows from her being English:

(17)   a. It is not the case that Mary is English and, therefore, brave. (*Negation*)
       b. Is Mary English and, therefore, brave? (*Question*)
       c. If Mary is English and, therefore, brave, she will act as such. (*Antecedent of a conditional*)
       d. It might be that Mary is English and, therefore, brave. (*Possibility Modal*)
       e. Presumably Mary is English and therefore brave. (*Evidential modal, probability adverb*)

Some speakers also hear a nonprojective reading for *Negation* (17a). On this projective reading, we are not simply denying that Mary is English. We are denying that her braveness follows from her being English. However, the claim that 'therefore' works as a presupposition trigger in (17a) is compatible with (17a) also having a nonprojective reading. For example, consider (18):

(18)   The tarts were not stolen by the knave: there is no knave.

Clearly, the definite article in "the knave" must have a nonprojective reading in "The tarts were not stolen by the knave," for else (18) would have to be infelicitous. Presumably, whatever explains the nonprojective reading in (18) can explain the nonprojective reading in (17a) (cf. Abrusán 2016, 2022). The standard explanations for nonprojective readings under negation are available here: maybe we are dealing with two different kinds of negation (metalinguistic negation *versus* negation *simpliciter* (cf. Horn 1972, 1985); or we might be dealing with an example of local accommodation (cf. Heim 1983); or we might appeal to Bochvar (1939)'s A operator (cf. Beaver 1985; Beaver & Krahmer 2001).

Hence, *Target Content* is projectable to the extent to which presuppositions are usually taken to be projectable. Moreover, *Target Content* satisfies the second standard set of tests for spotting presupposition triggers – i.e. the *not-at-issuedness* tests. *Target Content* also cannot be directly challenged – i.e. (19a) and (19b) – in striking contrast to when it is instead made explicit – i.e. (19c)–(19d):

(19)   a.   Jill is English and, therefore, she is brave.
               *That is false/That is not true.
        b.   Jill is English. Therefore, she is brave.
               *That is false/That is not true.
        c.   Jill is English and from that it follows that she is brave.
               That is false/That is not true.
        d.   Jill is English. It follows from that that she is brave.
               That is false/That is not true.
        e.   Jill is English and, therefore, she is brave. Hey, wait a minute! Not all English people are brave!
        f.   Jill is English. Therefore, she is brave. What? Not all English people are brave!

While the *Target Content* cannot be directly challenged, it can be *indirectly* challenged, by taking some distance from the utterance, as evidenced by (19e) and (19f), through locutions such as 'wait a minute!' and 'what?'. Note that this phenomenon is not just observable for inferential uses of 'therefore'. The same pattern is observable for narrative uses of 'therefore' too:

(20)   a.   John was desperate for financial reasons. Therefore, he killed himself.
        b.   *That is false/*That is not true. He did not kill himself for financial reasons.
        c.   Wait a moment!!! He did not kill himself for financial reasons.
        d.   What?? He did not kill himself for financial reasons.

That suggests that whether the relation expressed by 'therefore' is classical entailment (in inferential uses of 'therefore') or some restricted notion of

entailment (as in narrative uses of 'therefore'), such relation is backgrounded in the way presuppositions are.

Like presuppositions, *Target Content* also cannot be cancelled when unembedded, on pain of Moorean paradoxicality:

(21)   a. ?? Jill is English. Therefore, she is brave. But her braveness does not follow from her being English.
        b. ?? Jill is English. Therefore, she is brave. But I do not believe/know that her being brave follows from her being English.

And like other strong presupposition triggers, which cannot felicitously follow retraction (cf, Pearson 2010), 'therefore' cannot follow retraction either, as evidenced by (22a) and (22b)

(22)   a. ?? Well, I do not know if her braveness follows from her being English. But Mary is English. And therefore, she is brave.
        b. ?? Well, I do not know if her being from the North follows from her being progressive. But Mary is a progressive. And therefore, she is from the North.

Finally, just like presuppositions issued by strong presupposition triggers *Target Content* cannot even be suspended, as evidenced by (23c) (Abrusán 2016, 2022):

(23)   ?? I have no idea whether all English people are brave. ?? But if Mary is English and therefore brave, she will act as such.

Do these tests suffice to show that 'therefore' is a presupposition trigger? Now, the boundaries between conventional implicatures and presuppositions are notoriously hard to draw. And many supposed examples of conventional implicatures also satisfy many of the aforementioned tests. However, there are some additional considerations that suggest that the presuppositional analysis is more explanatory of the behavior of argument connectives. Conventional implicatures project *even more massively* than presuppositions (Potts 2015: 31). For example, additive articles such as 'too' and 'also' project out of standard plugs such as attitude reports (cf. Karttunen 1973). By contrast, the presupposition associated with 'therefore' can be plugged by belief reports:

(24)   George believes that Mary is English and, therefore, brave.

(Belief operator)

Also under epistemic modals and negation, not-projective readings are sometimes available for 'therefore' (cf. Pavese 2021; Kocurek & Pavese 2021 for discussion).

Moreover, it seems a necessary condition for presuppositions that a sentence *s* presupposes *p* only if *s* does not warrant an inference to *p* when *s* is in an entailment-cancelling environment and when *p* is locally entailed

(cf Mandelkern 2016). This condition is satisfied also by discourses featuring 'therefore'. For example, the following conditionals do not entail *Target Content*:

(25)   a. If being brave follows from being English, Mary is English and, therefore, brave.
        b. If liking the Steelers follows from being from Pittsburgh, then Mary likes the Steelers and, therefore, she is from Pittsburgh.

In conclusion, the presuppositional analysis seems to capture the projective behavior associated with 'therefore' better than the conventional implicature analysis.[10] I take it, however, that the real interesting question – and the one I will focus on going forward – is not how to label 'therefore' (whether as a presuppositional trigger or as a conventional implicature trigger) but rather how best to formally model its projective and nonprojective behavior. It is to this question which I turn next.

13.5   'Therefore' as a Modal

Another important observation about the meaning of 'therefore' is that it closely resembles that of necessity modals. For example, (26) is very close in meaning to the modalized conditional (27):

(26)   a. Sarah saw a puppy. Therefore, she petted it.
        b. If Sarah saw a puppy, she (obviously/necessarily/must have) petted it.

provided that we add to (26b) the premise (27):

(27)   Sarah saw a puppy.

Moreover, as we have seen in (13a)–(14e), 'therefore' comes in different flavors (logical, causal, practical, inductive, abductive). So in this respect too it resembles modals (cf. Kratzer 1977, 2002). On these bases, following Kratzer's analysis of modals, Brasoveanu (2007) proposes we understand different flavors of 'therefore' as resulting from a restriction of the corresponding 'modal base'. A modal base is a variable function from a world to a set of propositions, modeling the nature of the contextual assumptions – whether causal, practical, or epistemic. Its intersection returns the set of possible words

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[10] Vaassen and Sandgren (2021) argue that 'therefore' is not a presupposition trigger on the grounds that nonprojective readings are available for 'therefore' under epistemic modals, negation, and interrogatives. But the mere availability of nonprojective readings is only evidence against the conventional implicature analysis and is compatible with 'therefore' being a presupposition trigger, since its being a presupposition trigger does *not* entail that its content always projects (cf. e.g. Karttunen 1974). See both Pavese (2021) and Kocurek and Pavese (2021) for discussion. As observed by Kocurek and Pavese (2021), a dynamic semantics for 'therefore' as a presuppositional trigger can capture both projective and nonprojective readings.

in which all the propositions in the modal base are true. The logical consequence flavor of 'therefore' derives from an empty modal base, whose intersection is the universe. This formally captures the fact that logical consequence is the unrestricted flavor of 'therefore'.

This approach captures both the similarity between 'therefore' and 'must' and several possible flavors with which 'therefore' is used. However, it is unclear that this approach resorting to modal bases can effectively model inductive and abductive uses of 'therefore'. Inductive arguments are notoriously nonmonotonic. For example, consider:

(28) a. The sun has risen every day in the past. Therefore, the sun will rise again tomorrow.
      b. The sun has risen every day in the past. And today is the end of the world. ??Therefore, the sun will rise again tomorrow.

If we apply the modal base approach to (28a), we get that in any context where (28a) is felicitious, (28b) should be, too. For suppose in our current state s, when we update s with the premises in (28a), each world in the resulting state s' is assigned by the modal base a set of propositions whose intersection supports the conclusion. Let s'' be the result of updating s with the premises in (28-b). Since every world in s'' is a world in s', when we apply the modal base to a world in s'', it also supports the conclusion. One way Brasoveanu's approach could be extended to model the nonmonotonicity of inductive arguments is by appeal to some context shift. But it is difficult to see how the sort of context shifts needed could be motivated. This observation does not undermine the important similarity between 'therefore' and 'must' observed by Brasoveanu (2007), for 'must' seems to be amenable to inductive uses too, as in:

(29)   All swans observed so far have been white. The next must be white too.

However, it does raise the issue of how to model inductive and abductive uses of both 'therefore' and modals. (For promising work in this respect, see Del Pinal 2021).

13.6   Dynamic Treatments of Argument Connectives

13.6.1   A Simple Semantics

So far, we have observed that argument connectives appear to behave as presupposition triggers and that they also resembles modals. Any semantic analysis ought to capture these two sets of data. Pavese (2017) suggests that dynamic semantics offers the tools to develop an analysis that meets this desiderata. Kocurek and Pavese (2021) improve on Pavese (2017)'s analysis

and develop this proposal in some detail. Here, I review some of the most important aspects of these dynamic analyses.

In dynamic semantics, a test is an expression whose role is to check that the context satisfies certain constraints, as Veltman (1996)'s 'might' or von Fintel and Gillies (2007)'s 'must'. These expressions check that the context supports their prejacent: so "It might be raining" checks that the context supports the sentence that it is raining.

Define an INFORMATION STATE as a set $s \subseteq W$ of worlds. We define the update effect of a sentence on an information state recursively, as follows:

$$s[p] = \{w \in s \mid w(p) = 1\}$$
$$s[\neg\phi] = s - s[\phi]$$
$$s[\phi \wedge \psi] = s[\phi][\psi]$$
$$s[\phi \vee \psi] = s[\phi] \cup s[\psi]$$
$$s[\Box\phi] = \{w \in s \mid s[\phi] = s\}$$
$$s[\Diamond\phi] = \{w \in s \mid s[\phi] \neq \emptyset\}$$
$$s[\phi \rightarrow \psi] = \{w \in s \mid s[\phi][\psi] = s[\phi]\}.$$
$$s[\therefore \phi] = \begin{cases} s & \text{if } s[\phi] = s \\ \text{undefined} & \text{otherwise} \end{cases}$$

In the above definition, $\Box, \Diamond, \rightarrow \therefore$ are all tests. $\Diamond$ (corresponding to Veltman 1996's 'might') tests whether the context is compatible with its prejacent; if not, it returns the empty set. $\Box$ (corresponding to von Fintel & Gillies 2007 and von Fintel & Gillies 2010's 'must') tests that the context supports its prejacent – i.e. that $s[\phi] = s$. If not, it returns the empty set. Notice that $\therefore$ (corresponding to our 'therefore') is similar to $\Box$ — like $\Box$ it checks that the current context (augmented with '$\therefore$'s antecedents) supports the conclusion. $\therefore$ also closely resembles $\rightarrow$ (corresponding to Veltman 1985's conditional): the latter tests whether the context augmented with the antecedent supports the consequent; $\therefore$ tests whether the context augmented with the premises support the conclusion. One respect in which discourses containing 'therefore' differ from Veltman (1985)'s conditional is that Veltman (1985) conditionals return the initial context after the test. But intuitively, an argument updates the context with the premises. For example, an argument with assertoric premises P after the checking must return the context updated with P. To see why this must be so, consider:

(30)   Paolo is from Turin$_i$. Therefore$_i$ he is from Piedmont$_j$. And, therefore$_j$ he is from Italy.

If in (30), 'therefore$_i$ he is from Piedmont$_j$' returned the context antecedent to the update with 'Paolo is in Turin$_i$', the output context might not support the

proposition that Paolo is from Italy. So we cannot explain why (30) is a good argument. This observation motivates taking the entry for ∴. to model this feature of 'therefore': ∴. takes the current context (already updated with its antecedents) and returns that context if the test is positive. This explains why successive 'therefore' can test the context so updated with the earlier premises (see Kocurek & Pavese 2021 for a proposal on which the conditional test also returns the context updated with the antecedents, motivated by the need to model modal subordination under conditionals).

These entries allow to capture the similarities between necessity modals such as 'must' and 'necessarily' and 'therefore' that we have observed in the previous section. On this proposal, one notable difference between 'therefore' and 'must' that is relevant for our purposes is that if the test fails, the former returns an undefined value rather than the empty set. This feature is needed to account for the different projective behavior of 'therefore', 'must' and the conditional. Conditionals and 'must' are not plausibly presupposition triggers. 'Must'-sentences, and in general sentences containing modals, do not need to presuppose that the context supports their prejacent. Consider:

(31)   a. It is not the case that Mark is a progressive and must be from the North.
        b. Is Mark a progressive and must be from the North?
        c. If Mark is a progressive and must be from the North, he will not vote for Trump.
        d. It might be that Mark is a progressive and must be from the North.

None of these convey that Mark's being from the North follows in any way from him being a progressive. Conditionals also do not project out when embedded in antecedent:

(32)   If Jen gets angry if irritated, you should not mock her.

(32) does not presuppose that Jen will get angry follows from her being irritated. 'Therefore' seems to differ from other tests such as conditionals and 'must' in that the checking is done by the presupposition triggered by 'therefore'.

'Therefore'-discourses are infelicitous if the checking is not positive, like in the case of 'must'-sentences and Veltman (1985)'s conditional. But in the case of 'therefore', the infelicity is due to *presupposition failure*. Because of its behavior as a presupposition trigger, it is more accurate to give 'therefore' a semantic entry similar to the one that Beaver (2001: 156–162) assigns to the presuppositional operator δ:

$$s[\delta\phi] = \begin{cases} s & \text{if } s[\phi] = s \\ \text{undefined} & \text{otherwise} \end{cases}$$

Compare $\square$ on one hand and δ and ∴. on the other. They only differ in that the former returns the empty set if the context does not support ϕ, whereas the

latter returns an undefined value. The difference between these two 'fail' values – undefinedness *versus* the empty set – is important. A semantic entry that returns the empty set receives a nonfail value under negation. But in order to account for the projection of the presupposition from a sentence containing 'therefore' to its negation, the negation of that sentence must also receive a fail value if the sentence does. Choosing 'undefined', rather than the empty set, gives the desired result here – i.e. that the negation of the sentence containing 'therefore' will also be undefined.

This analysis can be illustrated with the following example. Consider:

(33)   It's not the case that Mark is progressive and, therefore, from the North.

$$\neg(p \wedge \therefore n)$$

Compositionally, we get that the meaning of (33) is the following function:

$$
\begin{aligned}
s[\neg(p \wedge \therefore n)] &= s - s[p \wedge \therefore n] \\
&= s - s[p][\therefore n] \\
&= \begin{cases} s - s[p] & \text{if } s[p][n] = s[p] \\ \text{undefined} & \text{otherwise} \end{cases}
\end{aligned}
$$

13.6.2   *Refining the Analysis: Supposition, Parenthetical, and Subarguments*

While this analysis might be a good starting point, it is oversimplified in several ways. One way in which it is oversimplified is that it says nothing about how to model arguments that have not premises but other arguments as antecedents, such as conditional proofs:

(34)   Suppose Paolo is from Turin, Then he is from Piedmont. Therefore, if Paolo is from Turin he is from Piedmont.

Moreover, argumentative discourses seem to have a layered structure: suppositions introduce new states of information, at a different level from categorical states of information, and suppositions can be embedded to add further levels. For example, consider:

(35)   Paolo is either from Turin or from Madrid. Suppose$_1$, on the one hand, that he is from Turin. Then$_1$ either he did his PhD there or he did it in the US. Suppose$_{1.1}$ he did his PhD in Turin. Then$_{1.1}$, he studied Umberto Eco's work. Suppose$_{1.2}$ instead he did his PhD in the US. Then$_{1.2}$ he studied linguistics. Therefore$_1$, he either did continental philosophy or philosophy of language. Now on the other hand, suppose$_2$ he is from Madrid. Then$_2$ he definitely did his PhD in the US. Therefore$_2$, he studied linguistics. Either way, therefore, he did either continental philosophy or philosophy of language.

As the indexes indicate, in (35), supposition$_1$ introduces a new layer, over and above the categorical context where 'Paolo is either from Turin or from Madrid'. Moreover, suppositions can be embedded one after the other (as supposition 1 and supposition 1.1) or might be independent (as supposition 1 and supposition 2). 'therefore' and 'then' might test the context introduced by the most recent premises or suppositions (as 'then$_2$' and 'therefore$_2$') or refer back to suppositions introduced earlier (as 'therefore$_1$'). Finally, after a supposition, parentheticals can be used to add information to the categorical level and to every level above. For example, consider:

(36)   Suppose Mary went to the grocery store this morning. [Have you been? It's a great store with great fruit.] She bought some fruit. Therefore, she can make a fruit salad.

To model the discourse in (36), we need to be able to exit the suppositional context, update the categorical context, and then return back to that suppositional context. In (36), however, the information added by the parenthetical to the categorical content seems to percolate up to the suppositional context too. Ideally, a theory of argumentative discourse ought to be able to account for these complexities. It seems that in order to model discourses such as (36), we need to refine Pavese (2017)'s analysis in some important ways.

Kocurek and Pavese (2021) propose we can model these data by adding structure both to the syntax of discourses as well as to the contexts used to interpret them. In order to capture the syntax of argumentative discourses such as the above, they propose we take discourses not just as sequences of sentences but rather as sequences of *labeled sentences*. A labeled sentence is a pair of the form $\langle n, \phi \rangle$, which we write as $n : \phi$ for short (Throughout, we use $\emptyset$ to stand for the empty tuple $\langle \rangle$). So parts of discourses are labeled sentences. Here, n is a label, which is a sequence of numbers (where, for shorthand, we write $\langle n_1, \ldots, n_k \rangle$ as $n_1.n_2.\ldots.n_k$) that represents which suppositions are active, and ϕ is a sentence. Labels enable to keep track of which suppositions are active when and to model the function of parentheticals of going back to the categorical contexts. So for example, the following is a representation of (36) with labeled sentences (where m = 'Mary went to the grocery this morning'; g = 'Have you been? It's a great store with great fruit'; b = 'She bought some fruit'; f = 'She can make a fruit salad').

$$1 : m, \quad \emptyset : g, \quad 1 : b, \quad 1 : \therefore f$$

The second move is to distinguish between the meaning of a sentence and the meaning of a part of a discourse – or labeled sentence. The meaning of a sentence is simply its update effect on information states – i.e. a function from information states to information states, as outlined in Section 13.6.1. This semantics would suffice if argumentative discourse did not have the layered

structure we have seen it does have and if argument connectives did not license different anaphoric relations towards their antecedents. This further information is captured by parts of discourses or labeled sentences. So, in order to capture suppositional reasoning as well as the anaphoric relations that argument connectives establish in discourse, we ought to interpret labeled sentences as well. While the meaning of sentences is a function from information states to information states, the meaning of parts of discourses is its update effects on a context. Instead of modeling contexts as information states, Kocurek and Pavese (2021) model contexts rather as *labeled trees* – i.e. a tree where each node is an information state which is given its own label. Labeled trees contain much more structure than simple information states. They also contain more structure than stacks of information states of the sort proposed by Kaufmann (2000) to model suppositional reasoning. Labeled trees differ from stacks of information states in that (1) they allow nonlinear branching, so that independent suppositions can be modeled at the same "level" as well as at different levels and (2) can model anaphoric relations, which will allow us to temporarily exit a suppositional context and later to return to that context. This also allows us to capture the distinctive ability of 'therefore' to be anaphoric on different suppositional contexts. A CONTEXT is a partial function $c : \mathbb{N}^{<\omega} \to \wp W$ from labels (i.e. sequences of numbers) to information states, where:

- $\emptyset \in \mathrm{dom}(c)$ (i.e. the categorical state is always defined);
- if $\langle n_1, \ldots, n_{k+1} \rangle \in \mathrm{dom}(c)$, then $\langle n_1, \ldots, n_k \rangle \in \mathrm{dom}(c)$ (i.e. a subsuppositional state is defined only when its parent suppositional state is defined).

The value of a context applied to the empty sequence is the CATEGORICAL STATE, denoted by $c_\emptyset$. The value of a context applied to a nonempty sequence is a SUPPOSITIONAL STATE. So for example, $n : \phi$ will tell us to update c_n with ϕ. However, when we introduce a new supposition in a discourse, we don't simply update the current information state with that supposition (suppositions are not just assertions). Rather, we *create* a new information state updated with that supposition so that subsequent updates concern this new state as opposed to (say) the categorical state. The new supposition effectively copies the information state of its parent and then updates that state with the supposition.

Formalizing, where $n = \langle n_1, \ldots, n_{k+1} \rangle$ is a label, let $n^- = \langle n_1, \ldots, n_k \rangle$ ($\emptyset^-$ is undefined). This will allow us to keep track of which information state gets copied when a new supposition is introduced. For labels n and k, we write $n \sqsubseteq k$ just in case n is an initial segment of k and $n \sqsubset k$ just in case n is a proper initial segment of k (i.e. k is "above" n in the labeled tree). Where c is a context, let $c \uparrow_n \phi$ be the result of replacing c_k with $c_k[\phi]$ for each $k \in \mathrm{dom}(c)$ such that $k \sqsupseteq n$ (i.e. $c \uparrow_n \phi$ updates c_n and all information states "above" c_n in the tree with ϕ). Finally, where s is an information state, let $c[n \mapsto s]$ be just like c except that $c_n = s$:

$$c[n : \phi] = \begin{cases} c \uparrow_n \phi & \text{if } c_n \text{ is defined} \\ c[n \mapsto c_{n^-}[\phi]] & \text{if } c_n \text{ is not defined but } c_{n^-} \text{ is defined} \\ \text{undefined} & \text{otherwise} \end{cases}$$

Unpacking this semantic clause: If c_n is defined, we update c_n and all subsequent states above it with ϕ. If $n = \emptyset$ (the categorical state), then every state that's currently defined is updated with ϕ. If $n = \langle n_1, \ldots, n_k \rangle$, then we only update states assigned to a label that starts with $n_1, \ldots, n_k$. If c_n is undefined, that means we're creating a new suppositional state:

- First, find the state whose label is right below n (so, e.g. if $n = \langle 1 \rangle$, then the label right below n is $\langle \rangle$, i.e. the label of the categorical state).
- Next, copy the state with that label and assign n to that state. Finally, update that copied state with ϕ.

This semantics for parts of discourses can be illustrated by considering two examples. Under a plausible interpretation, the following discourse is represented as the following sequence of labeled sentences:

(37)   Either it is raining or not. Suppose it's raining. Then better to take the umbrella. Suppose it is not raining. Then, taking the umbrella will do no harm. Therefore, you should take the umbrella.

$$\emptyset : (r \lor \neg r), \quad 1 : r, \quad 1 : \therefore u, \quad 2 : \neg r, \quad 2 : \therefore u, \quad \emptyset : \therefore u$$

The dynamics of this discourse can be summarized as follows: First, we update the categorical state s with the trivial disjunction $r \lor \neg r$ (so no change). Next, $1 : r$ requires setting $c_1 = s[r]$. Then $1 : \therefore u$ tests $s[r][u] = s[r]$. If it passes, it returns $s[r]$ as c_1. Otherwise, the context is undefined. Assuming $s[r]$ passes the test, $2 : \neg r$ requires defining a new information state $c_2 = s[\neg r]$. Then $2 : \therefore u$ tests $s[\neg r][u] = s[\neg r]$. If it passes, it returns $s[\neg r]$ as c_2. Otherwise, the context is undefined. Assuming $s[\neg r]$ passes the test, $\therefore u$ tests $s[u] = s$. Since $s[r]$ and $s[\neg r]$ have passed this test, s will, too. Or consider the following example with a parenthetical:

(38)   Suppose Mary went to the grocery store this morning. [Have you been? It's a great store.] Then she bought some fruit. Therefore, she can make a fruit salad.

This is represented as:

$$1 : m, \quad \emptyset : g, \quad 1 : \therefore b, \quad 1 : \therefore f$$

First, we introduce a suppositional context c_1 by copying s and updating it with $s[m]$. Next, $\emptyset : g$ updates both the categorical context s and the suppositional context $s[m]$ with g. Then $1 : \therefore b$ tests $s[m][g][b] = s[m][g]$. If it passes, it returns $s[m][g]$ as c_1. Otherwise, the context crashes. Likewise for $1 : \therefore f$.

13.6.3   *Further Issues*

The semantics for argumentative discourses outlined above can be extended to model modal subordination effects (see Kocurek & Pavese 2021) as well as subjective arguments, though I do not have space to discuss these extensions. Let me conclude this discussion of the semantics of arguments by looking at some further open issues.

The dynamic analysis of argument connectives presented in the previous two sections takes argument connectives to be 'presuppositional' tests. On this analysis, a categorical argument is a matter of first asserting the premises and then drawing a conclusion from the premises, by presupposing that the conclusion follows from the premises. It might therefore seem as if arguments can never be informative. However, this conclusion is not correct, for presuppositions *can* be informative. Suppose it is not known in the context that Pittsburgh is in Pennsylvania. The presupposition triggered by (39) is most likely to be accommodated in this context and this accommodation will result in restricting the context set, by ruling out possibilities where Pittsburgh is located in a state other than Pennsylvania:

(39)   John is in Pittsburgh. Therefore, John is in Pennsylvania.

Hence, although the presupposition associated with 'therefore' generally works as a test checking that the context satisfies certain constraints, just like other kinds of presuppositions, it can sometimes be informative (cf. Pavese 2021 for discussion of these issues and how they relate to the problem of deduction and Kocurek and Pavese 2021 for yet a different way to account for informative uses of 'therefore').

Arguments such as (39) sound weird to common speakers and so do arguments such as the following:

(40)   a. Paris is in France. Therefore, either it is raining in Ecuador now or it is not.
        b. Paris is in France. Therefore, if today is Wednesday then today is Wednesday.
        c. Paris is in France. Therefore, if today is Wednesday, then Paris is in France.

Because they are all classically valid, and also sound, the current semantics cannot predict their infelicity. One might blame it on the pragmatics and allege that their weirdness has to do with their conclusions not being relevant to the premises. An alternative thought is, nonetheless, worth exploring. Notoriously, the weirdness of these patterns of inferences has motivated relevance logic (MacColl 1908; Belnap 1960; Anderson et al. 2017). Argument connectives might test for relevantist, rather than classical, support.

As we have seen in Section 13.2, arguments can have nondeclarative conclusions too. These kinds of arguments suggest that drawing a conclusion from certain premises can be a matter of checking that the context supports the conclusion even if the conclusion is not declarative.[11] Start with arguments with imperative conclusions, as in "Ψ; therefore, Φ!". If imperatives express propositions, as on a propositionalist semantics of imperatives (e.g. Lewis 1972; Aloni 2007; Schwager 2006), modeling arguments with imperatival conclusions just amounts to testing that the context augmented with the premises supports the proposition expressed by the imperative. On an expressivist semantics for imperatives, instead, things are not so simple and modeling imperatival conclusions requiring thinking of information states as having more structure than just sets of possible worlds. For example, on a Starr (2020)'s preference semantics, context ought to be modeled as involving a set of preferences. On this semantics, testing for support of an imperative by the context amounts to testing that the preferences expressed by the imperatives are already in the context. Finally, consider how to model uses of 'therefore' that embed interrogatives, such as (12). Kocurek and Pavese (2021) propose we piggyback on recent dynamic theories, which take the change effect potential of interrogatives to be that of raising issues. Following Groenendijk et al. (2003) and Aloni et al. (2007), we can model

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[11] It might be helpful to draw again a comparison with epistemic modals like 'must' and 'might'. Although not every use of these epistemic modals in the scope of questions is always felicitous (cf. Dorr & Hawthorne 2013), many have observed that some uses of these modals are acceptable in questions. For example, Papafragou (2006: 1692) observes that the following exchange is felicitous:

(41)   a.   If it might rain tomorrow, people should take their umbrella.
       b.   But may it rain tomorrow?

Along similar lines, Hacquard and Wellwood (2012: 7) observe that the following interrogatives also have a distinctively epistemic interpretation:

(42)   a.   With the owners and the players on opposite sides philosophically and
            economically, what might they talk about at the next bargaining session?
       b.   Might he be blackballed by all institutions of higher learning?

In this respect, then, 'therefore,' 'hence,' and 'so' resemble standard tests. There is an important difference between 'must' and 'might', on one hand, and 'therefore', 'hence', 'so', on the other. As we have seen, argument connectives can also tolerate imperative conclusions, whereas neither 'might' nor 'must' can occur in imperatives (although the reason for this infelicity might be syntactic):

(43)   a.   ?? Might go to the store!
       b.   ?? Must go to the store!

As Julien Schlöder pointed out to me (p.c.), "Maybe go to the store" is instead perfectly fine. See Incurvati and Schlöder (2019) for a helpful discussion of the differences between 'might', on one hand, and 'maybe' and 'perhaps' on the other. This sentence does have an acceptable reading, on which 'must' receives a deontic interpretation.

this idea by thinking of an information state not as a set of possible worlds, but rather as a partition on possible worlds – i.e. as a set of mutually disjoint but jointly exhaustive sets, or *cells*. An interrogative might refine the partition by dividing current cells into smaller subsets. So effectively, when using 'therefore' with an interrogative conclusion, we are testing that adding $?\phi$ would not further refine the partition.

13.7   The Pragmatics of Arguments

So much for the semantics of arguments. Onto the pragmatics. How are we to model the speech act of giving an argument? To begin, compare the following two discourses:

(44)   a. It is raining. I conclude that the streets are wet.
        b. It is raining. Therefore, the streets are wet.

Prima facie, these two discourses are equivalent. The locution "I conclude that . . ." seems to mark the speech act of concluding. It is tempting, then, to assimilate the meaning of 'therefore' to the meaning of "I conclude that . . .". On this analysis, argument connectives such as 'therefore' work as a *speech act modifier* – taking pairs of sentence types, into a distinctive kind of speech act – i.e. the speech act of giving an argument for a certain conclusion.[12]

One issue with this analysis is that argument connectives are not always used to make arguments. Consider again (45a)–(45d) from Section 13.2:

(45)   a. John pushed Max. Therefore, Max fell.
        b. John was desperate for financial reasons. Therefore, he killed himself.
        c. Mary qualified for the exam. Therefore, she enrolled.
        d. Max passed his A-levels. Therefore, he could go to the university.

While superficially, these discourses have the *same form* of an argument, they can be used to make other speech acts too. For example, one may utter, say, (45a) without arguing for the conclusion that Max fell. In fact, the most common use of (45a) is simply to explain what happened when John pushed Max (suppose (45a) is used in the process of reporting what happened yesterday). In this use, the discourse does not necessarily have argumentative force. Rather, it uses 'therefore' *narratively* or *explanatorily*. Similarly for (45b). Arguments and explanations are different kinds of speech acts. That can be seen simply by observing that while an explanation might presuppose the truth of its explanandum, an argument cannot presuppose the truth of its conclusion,

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[12] For example, some take epistemic modals such as 'might' to be speech act modifiers in that they 'modulate' assertoric force. See for example, Westmoreland (1998) and Yalcin (2005: 251). Others argue that intonation is a speech act modifier. See Heim et al. (2016).

on pain of being question-begging. For example, one might use (45a) in the course of an explanation of how Max fell, in a context where it is already common ground that Max fell. As used in this explanation, (45a) is not the same as an argument.

It is also tempting to think that the causal uses are explanatory and not argumentative whereas the logical uses are argumentative but not explanatory. However, this cannot be correct, as there are causal and *yet* argumentative uses of 'therefore'. For example, consider **TRIAL**:

TRIAL In a trial where John is accused of murdering his wife, the prosecutor argues for his conviction, as follows:

(46)   John was financially desperate, ruthless, and knew about his wife's savings. Therefore, he killed his wife to get her money.

The discourse (46) in **TRIAL** can undeniably be used in an argument – for example, an argument aiming to convince the jury of the fact that John has killed his wife. And yet the relation expressed by this use of 'therefore' is causal, if anything is.

There are also deductive uses of 'therefore' in *explanations*. For example, consider the following (Hempel 1962; Railton 1978):

 (i) Whenever knees impact tables on which an inkwell sits and further conditions K are met (where K specifies that the impact is sufficiently forceful, etc.), the inkwell will tip over. (Reference to K is necessary since the impact of knees on table with inkwells does not always result in tipping.)
(ii) My knee impacted a table on which an inkwell sits and further conditions K are met.

Explanandum Therefore, the inkwell tipped over.

In this explanation of why the inkwell tipped over, that the inkwell tipped over deductively follows from the premises. In this sense, there are logical uses of 'therefore' in explanations too.

The conclusion is that the distinction between argumentative uses of 'therefore' and explanatory uses of 'therefore' cuts across the distinction between causal and logical meaning of 'therefore'. How are we to capture this distinction between argumentative uses of 'therefore' and explanatory uses of 'therefore'? This distinction might have to be captured not at the level of the semantics of arguments but rather at the level of the *pragmatics* of arguments. Chierchia and McConnell-Ginet (2000) have introduced an important distinction (then defended and elaborated by Murray & Starr 2018, 2020) between CONVENTIONAL FORCE and UTTERANCE FORCE. The CONVENTIONAL FORCE of a sentence type consists in the distinctive ways different sentence types are used to change the context – e.g. declaratives are used to change the common ground, by adding a proposition to the common ground (Stalnaker 1978);

interrogatives affect the questions under discussion (e.g. Groenendijk & Stokhof 1982; Roberts 1996) and imperatives the to do list (e.g. Portner 2004, 2007; Starr 2020; Roberts 1996). UTTERANCE FORCE, by contrast, consists in the distinctive ways *utterance types* change the context. This is the *total force* of an utterance, while the conventional force is the way a sentence's meaning constrains utterance force. Crucially, as Murray and Starr (2020) argue, conventional force underdetermines utterance force. For example, assertions are conventionally associated with declarative sentences. However, declarative sentences can also be used to make conjectures, to lie, to pretend, etc. So, while the conventional force of a speech act is conventionalized and can be modeled by looking at its invariant conversational effects on a public scoreboard, the utterance force of a speech act might vary depending on the effects of the speech act on the private mental states of the participants to the conversations as well as on the mental state of the utterer.

Suppose we apply this distinction between conventional force and utterance force to the case of argument connectives and discourses that feature them. The proposal then is that across all of its uses – causal, explanatory, as well as practical, inductive, deductive – argument connectives have the same conventional force. As we have seen, following Kocurek and Pavese (2021), the core meaning of argument connectives might be dynamic across the board: all uses of 'therefore' express that the premises in the context (logically, causally, nomologically, probabilistically) support the conclusion. However, in addition to argument connectives' having this dynamic meaning, uses of discourses with argument connectives come with a distinctive utterance force – in some cases with the force of an argument, in others with the force of an explanation. If that is correct, then the distinctive force of arguing *versus* explaining can be recovered at the level of argument connectives' utterance force.

13.8   Conclusions

This chapter has overviewed recent studies on the semantics and pragmatics of arguments. From this discussion several issues emerge for further research. These include: How are we to think of the syntax of argumentative discourses and how are we to model contexts in order to model the dynamics of argumentative discourses? What consequences does the presuppositional nature of 'therefore' have on how to think of arguments? What is the nature of the support relation tested by argument connectives? How do we define entailment for arguments understood as sequences of labeled sentences? What makes a discourse an argument, rather than an explanation? At which level of linguistic analysis lies the difference between arguments and explanations? How are we to characterize the utterance force distinctive of arguments? Are there such things as zero-premises arguments in natural languages? How do deductive

arguments in natural language differ, if at all, from proofs in natural deduction systems – such as Fitch's proofs? Although many of the issues pertaining the semantics and pragmatics of argumentation are left open for further research, I hope to have made a plausible case that they deserve attention since foundational questions concerning the nature of context and discourse, as well as their dynamics, turn on them.

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14   Assertion and Rejection

Julian J. Schlöder

14.0   Questions and Answers

(1)   Why do you think both linguists and philosophers find assertion and rejection interesting?

Rejection, as a speech act, is in some sense a foil to assertion. As such, the study of assertion – an early mainstay in both philosophy and semantics – should take seriously the role of rejection.* However, ever since Frege's (1919) influential paper *Die Verneinung*, many linguists and philosophers have supposed that rejection is just a chimera created by negation: proper analysis, such as Frege's, reveals rejection to be nothing more than negative assertion. The last 20 years saw the rise of an opposition to this view, united under Timothy Smiley's slogan that 'assertion and rejection [are] distinct activities on all fours with one another.' Logicians should take heed of the fact that in a systematic inquiry, one might assert some hypotheses only to later reject some of them – which seems to call for logics of assertion and rejection. In addition, the recent rise of disagreement data in semantics and philosophy similarly calls for rigorous analyses that make sense of rejection alongside assertion.

(2)   What recent developments in linguistics and philosophy do you think are most exciting in thinking about assertion and rejection?

One key result in the study of assertion and rejection is the observation that rejection is neither reducible to negative assertion, nor equivalent to negative assertion. On the one hand, this observation has helped sharpen the debate on the nature of assertion (as understood in interplay with rejection). On the other hand, recent work in semantics and philosophy of language has seen an

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increase of interest in *disagreement data* in such wide-ranging areas as norms of assertion, epistemic modals (cf. Mandelkern, this volume), negation, predicates of personal taste (cf. Anand & Toosarvandani, this volume; Borg, this volume), imperative semantics, discourse (cf. Pavese, this volume), aesthetics and metaethics. A crucial consequence of considering rejection for the study of assertion is that it appears to be mistaken to characterize the effect of assertion as *immediately* updating a context. This has led some dynamic semanticists to adopt commitment slate models that allow one to treat context updates as pending until accepted or rejected.

(3)   What do you consider to be the key ingredients in adequately analyzing assertion and rejection?

I contend – and will defend here at some length – that one needs both assertion and rejection as primitives in one's semantics and one's logic. This, in turn, entails that one needs formal models that respect the fact that assertions may be rejected; prominent examples include the various kinds of commitment semantics (see above) or bilateral logics (Smiley 1996; Rumfitt 2000).

(4)   What do you consider to be the outstanding questions pertaining to assertion and rejection?

The Big Question is how exactly rejection relates to assertion. This question can be cashed out in terms of various smaller questions, such as how some formal semantics need to be adjusted to make room for rejection, or how any given account of assertion can make room for – and is improved by – an account of rejection. For instance, one might ask if knowledge is the norm of assertion, what is the norm of rejection? I will outline some possible answers to such questions, with a particular focus on the last one.

14.1   Introduction

> [N]egative judgments . . . are regarded as the jealous enemies of our
> unceasing endeavour to extend our knowledge, and it almost requires an
> apology to win for them even tolerance, not to say favour and high repute.
> (Immanuel Kant, *Critique of Pure Reason*)

Speech acts can be *correct* or *incorrect* in that they adhere to or violate some normative component of the conventions surrounding their use. A lot hinges on which assertions are correct. If assertions are presentations of truth-apt contents, then we can draw conclusions about truth-functional semantics from which sentences can be correctly asserted in which circumstances; if, as Frege (1879) suggested, logic tells us which conclusions we may correctly assert given previously asserted premises, the study of correct assertion elucidates what logic is (Dummett 1991); and if correct assertion is intimately connected

to knowledge, we can draw conclusions about the nature of knowledge from the nature of assertion (Williamson 2000).

None of these analyses of correct assertion, or their purported import, are uncontroversial. But few doubt that an analysis of correct assertion plays a pivotal role in both linguistics and philosophy. I contend that it is equally important to provide an analysis of *rejection* to say something about which sentences can be *correctly rejected*.[1] As a case in point, consider how *disagreement data* like in (1) and (2) can elucidate the semantics of epistemic modals.

(1)   a. A: The keys might be in the car.
        b. B: (No,) you're wrong! I checked the car.

(2)   a. A: For all I know, the keys are in the car.
     ??b. B: (No,) you're wrong! I checked the car.

The contrast in (1)/(2) suggests that epistemic *might* cannot be paraphrased as *for all I know*, since (1a) is correctly rejectable by (1b), whereas (2a) is not (von Fintel & Gillies 2007). Arguably, (1a) and (2b) are correctly assertible in the same contexts, so do not differ in their assertibility conditions. However, they apparently differ in their rejectability conditions. Considering rejections reveals something that would be lost if we had only considered assertibility. Similar observations can be made in other domains, e.g. disagreement about taste, morals, or aesthetics.[2]

The jury is still out on what precisely we learn from such data. Surely, however, the jury will benefit from studying what it means to correctly reject something. Yet, the speech act of rejection has been somewhat neglected (particularly when compared to assertion). This is one of Frege's many legacies. In his *Die Verneinung*, he argued that it is useless to consider rejection on its own terms, as the job of rejection is done by negative assertion. On this view, rejection is a shadow thrown by assertion – to not reduce it to negative assertion would be a 'futile complication' that 'cometh of evil'[3] (Geach 1965: 455). I will argue that this view is mistaken.

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[1] In my terminology, *assertion* and *rejection* are speech acts that correspond to the acts of positive and negative judgment and/or the attitudes of *assent* and *dissent*, respectively. Some say that *rejection* is the attitude corresponding to the speech act of *denial*, but such differences are merely terminological.

[2] This chapter is focussed on rejections of assertions, but data about the correct rejectability of nonassertoric speech acts is similarly important. For example, one rejects imperatives most naturally by responding *I will not*, which appears to reveal something about imperatives that cannot be read from their surface form (Geach 1958; Kaufmann 2012; von Fintel & Iatridou 2017; Portner 2018a).

[3] An allusion to Matthew 5:37: 'Let what you say be simply "Yes" or "No"; anything more than this comes from evil' (ESV). See Geach and Black (1952: 125, note A).

Beyond addressing the Fregean point, the focus of this chapter will be on the notion of *correctness*. Following Williamson (1996, 2000), it has become popular to *characterize* speech acts *by* the norms that are essential for their correct performance. (But many of those who do not accept that such norms *characterize* speech acts still accept that there *are* norms governing speech acts.) I am sympathetic to this and in Section 14.4 will spell out in some more detail to what this view amounts and respond to some of its critics.

However, the speech act of rejection seems to catch this *normative conception of speech acts* in a dilemma. The argument, in brief, goes as follows. On the one hand, rejection is clearly also a norm-governed act and thus should also be characterized by a norm.[4] But on the other hand, rejection appears to be the device *by which one registers* that some other speech act is in violation of its norm. Such a device is needed in order to even start telling a story about how discourse is a norm-governed activity.

Thus, we need to stipulate rejection as a primitive that is not itself definable by a norm. I argue that the following characterization of rejection will get the normative conception off the ground.

(Mistake). To reject is to register that a speech act has violated a rule of the conversation game.

Much of the appeal of the normative conception of assertion stems from the fact that it allows one to characterize assertion without having to complete the sentence "to assert is to ...". However, one nevertheless has to characterize rejection by completing "to reject is to ..." as in (Mistake). While this may appear to be a *reductio* of the normative conception, I argue that it is not.

Indeed, some version of the problem that requires the adoption of (Mistake) will likely afflict *any* proposal to define what assertion is. In brief, the problem of the normative conception is that we expect a norm-governed activity to *come with* a mechanism *à la* (Mistake) for registering rule violations. Hence talk of norms requires talk of rejection, so rejection is not itself characterized by a norm. Other conceptions of assertion likewise explain what assertions are by appealing to certain in-place frameworks (e.g. related to context updates or the undertakings of commitments). Such frameworks, I argue, must likewise include rejection as a primitive, so one cannot give an explanation of rejection itself from within the framework.

This chapter is structured as follows. In the next section, I argue that the study of rejection must free itself from Frege's grasp because *rejections can be weak*, i.e. there are rejecting speech acts that are not reducible to assertions of negatives. Afterwards, in Section 14.3, I argue that rejections cannot be

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[4] For further useful discussion on what such a norm could be, see Bussière (n.d.).

reduced to assertions *at all*. The discussion there suggests an account of rejection as pointing out *norm violations*. To investigate this further, I elaborate in Section 14.4 a story about how speech acts can be characterized by their essential norms by comparing discourse to another rule-governed activity: the game of chess. With these preliminaries in place, I further investigate in Section 14.5 what the normative conception would have to say about rejection. I argue that rejection is subject to some essential norm, but cannot be *defined* solely by that norm, instead requiring the principle (Mistake). I conclude with some further commentary in Section 14.6.

14.2   Rejection and Negative Assertion

The seminal work on rejection is Frege's *Die Verneinung* (1919). In what is today known as the *Frege–Geach Argument* (Geach 1965; Schroeder 2008), Frege considers valid inferences like (3) and two possible analyses in (4) and (5).

(3)   a. If the accused was not in Berlin, he did not commit the murder.
       b. The accused was not in Berlin.
    ∴ c. He did not commit the murder.

(4)   a. Assert: If not *p*, then not *q*.
       b. Assert: Not *p*.
    ∴ c. Assert: Not *q*.

(5)   a. Assert: If not *p*, then not *q*.
       b. Reject: *p*.
    ∴ c. Reject: *q*.

The analysis (4) straightforwardly explains the validity of (3) as an application of *modus ponens*. The analysis (5) however is less straightforward. Frege stresses that the *embedded* use of *not* in (3a) cannot be an expression of a negative judgment (i.e. a rejection) but must be a *operator* that modifies a sentence, not express a judgment about it. But this means that if we analyse (3) as (5), we need a lot of machinery to explain the validity of (3) – machinery that was not needed to explain (3) as (4). At least we will need some principle that establishes a connection between rejection and the embeddable negation operator.

Frege does not deny that such principles can be found. He merely thinks it would be unparsimonious to have *three* primitives (assertion, rejection, and negation) where two would do (assertion and negation). By reducing rejection to negative assertion, Frege does away with the third primitive and, he contends, when we can make do with fewer primitives, 'we must' (1919: 154).[5]

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[5] An early response to this argument is due to Kent Bendall (1979). Frege burdens the defender of a distinct speech act for rejection with *three* basic operations – rejection, assertion, and an

There is, however, an ambiguity in Frege's argument. He assumes that rejections are linguistically realized by negatively answering polar questions (p. 153), but there are two possible ways to do so. To wit, one can answer with a sentence containing a negation as in (6a) and by using a polarity particle as in (6b).

(6)   Is it the case that *p*?
      a. It is not the case that *p*.
      b. No.

The ambiguity exists in the original German; the word *Verneinung* (lit. 'no-ing') can denote both the act of responding with *no* (German, *nein*) and the negation operator in the logician's sense. In *Die Verneinung*, Frege appears to use the forms in (6) interchangably, but in the later *Gedankengefüge* (1923: 34ff.) he is explicit that (6b) is a *Verneinung* of *p*. In fact, the form (6b) is more congenial to Frege's discussion. When analyzing (3), an important part of Frege's argument was that rejections cannot embed in the antecedent of a conditional. And indeed, negative answers to self-posed polar questions do not embed like this: *if is it the case that p? No, then ...* is incomprehensible, as noted by Ian Rumfitt (2000).

If one performs a rejection of some proposition *p* by putting the polar question *is it the case that p?* to oneself and answering negatively with *No!*, then it makes sense to say that one performs an assertion by answering positively with *Yes!* (Smiley 1996). This is already observed by Ludwig Wittgenstein in the *Investigations*, paragraph 22.

We could very well write each assertion in the form of a question with an affirmative placed after it; for example 'Is it raining? Yes!'[6]

Thus, we may analyse assertions of *p* by considering utterances of the form in (7a); rejections of *p* by considering utterances of the form in (7b); and negative assertions by considering utterances of the form in (7c). This gives us a linguistic grip on investigating the relationship between rejection and negative assertion.

(7)   a. Is it the case that *p*? Yes!
      b. Is it the case that *p*? No!
      c. Is it the case that not *p*? Yes!

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embeddable operator *not*. As one only needs assertion and negation, Frege concludes, rejection should be dropped on grounds of parsimony. But Bendall shows that one can give a classical propositional calculus in which there are no embedded negations; hence one only needs to assume rejection and assertion; so parsimony does not decide between assertion + negation and assertion + rejection.

[6] My translation. Original German: 'Wir könnten sehr gut auch jede Behauptung in der Form einer Frage mit nachgesetzter Bejahung schreiben; etwa: Regnet es? Ja!'

There is an imprecision. Here, one uses the polarity particles *yes* and *no* to respond to *self*-posed questions to perform assertions and rejections. But we typically think of these particles as responding to *other speakers'* speech acts – and we also frequently think of rejections as responding to other speakers. This points towards another important distinction we need to untangle. On the one hand, we can do *logic* by asserting and rejecting some propositions to ourselves and investigating what follows from this. This is Frege's concern. But on the other hand, we can also use the same speech acts in dialogue to, in particular, accept or reject another speaker's contribution. Expressing a rejection by negatively responding to a self-posed question is not *per se* unsuitable for this second purpose. It is clumsy, but not incorrect, to reject (8a) with (8b).

(8)   a. A: The accused was in Berlin.
       b. B: Was the accused in Berlin? No!

There is more to say about the difference between rejections in solipsistic deliberation and rejections *in dialogue*. I return to this in Section 14.5.

Frege claims that rejections are just negative assertions, i.e. that (7b) is to be analyzed as (7c). However, as incisively argued by Smiley (1996), Frege only succeeds in showing that *not* is not an indicator for rejection, due to the fact that *not* embeds. That is, Smiley concedes that (5) is not the correct analysis of (3). But, he continues, one may now ask whether (5) is the correct analysis of (9).

(9)   a. If the accused was not in Berlin, he did not commit the murder.
       b. Was the accused in Berlin? No!
    ∴ c. Did he commit the murder? No!

As before, this appears to be a valid inference and we should be able to give some explanation of its validity. Frege could insist that for reasons of parsimony the two forms of *Verneinung* in (6) are to be analyzed the same, their divergent embedding behavior notwithstanding. Thus, he could insist that it is most parsimonious to analyse (9) as (4) as well.

Smiley counters that there is nothing unparsimonious about introducing additional primitives (such as a conception of rejection distinct from negative assertion) if it accounts for additional data. Smiley appears to think that differences in embedding behavior suffice to establish that (9) is new data, distinct from (3), that Frege leaves unexplained. But this could be seen as begging the question against Frege. The difference between (3) and (9) is acknowledged by Frege and it is precisely this difference that he seeks to analyse away.

There is, however, additional data that gives succor to Smiley. Say that a rejection of some proposition *p* is *strong* if it is equivalent to the assertion of *not p*, i.e. if instead of rejecting *p* one had asserted *not p* nothing else would

have been different. Call a rejection *weak* if it is not strong. Many accounts of rejection have it that all rejections are strong. For example, according to Frege (1919), all rejections of any proposition *p* are strong because they simply *are* assertions of *not p*; according to Rumfitt (2000), from a rejection of *p* one can infer exactly what one can infer from the assertion of *not p* (in the same context);[7] according to Smiley (1996), rejecting *p* is correct if and only if asserting *not p* is correct.

Enter Imogen Dickie (2010), who argues that some rejections are weak. Some of her examples are in (10).

(10)   a. Did Homer write the *Iliad*? No! Actually Homer did not exist.
         b. Was Homer a unicorn? No! There is no such property as the property of being a unicorn.

Dickie argues that such rejections cannot be strong, as, for example, if (10a) is interpreted as a strong rejection, the speaker has performed a speech act that is equivalent to the assertion of *Homer did not write the Iliad*. But this is not the case, as she would reject *Homer did not write the Iliad* on the same grounds that led her to reject *Homer wrote the Iliad*. The same goes for (10b). Such data seem to doom the Fregean project of reducing rejection to assertion – but they equally trouble Smiley (1996) and Rumfitt (2000), who still insist that all rejections are strong.

The Fregean has some room to maneuver. In a sentence like *Homer did not write the Iliad because Homer did not exist*, it appears that the speaker *does* assert that *Homer did not write the Iliad*, but the use of negation here is metalinguistic (see Horn 1989). Thus, perhaps the Fregean can resist Dickie's argument from (10) by claiming that such rejections *are* reducible to assertions of negatives, if the latter includes assertions of metalinguistic negatives. Thus, we might say that the rejections in (10) are *metalinguistically strong* in that they are equivalent to an assertion containing a metalinguistic negation.[8]

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[7] Rumfitt (2000) seems to assume that his account includes the possibility that rejections are weak; but Rumfitt (2014) concedes that this was mistaken.

[8] Calling such rejections/negations 'metalinguistic' is arguably a misnomer (although a frequently repeated one; see Schlöder & Fernández 2015). Compare the following paradigm cases of metalinguistic rejections (adapted from Carston 1996) with Dickie's examples.

(11)   a. Did we eat tom-ah-toes? No! We bought tom-ay-toes.
         b. Did we see hippopotamuses? No! We saw hippopotami.
         c. Jane isn't hardworking or brilliant; she's both.

The speaker of such utterances takes issue with the *form* of the prejacent, but agrees with its (material, first-order) *content*: that they ate the fruit of *solanum lycopersicum*, saw more than one hippopotamus, that Jane is hardworking or brilliant. This means in particular that they would not reject a rephrasing – an alternative form – of the same contents. This is not so in the cases in (10). There are no rephrasings of *Did Homer write the Iliad?* or *Was Homer a unicorn?* that have the same content, but to which the speaker would respond *Yes!*.

But this will not do. Incurvati and Schlöder (2017) claim that one can reject out of ignorance, which suggests to them the existence of *bona fide* weak rejections. The following are cases in point.[9]

(12)   a. Is it the case that X will win the election? No! Z might win!
        b. This ticket has a one in a million chance to win. Will it lose? No! I don't know that.
        c. All I know is that the streets are wet. Is it raining? No! This doesn't follow.

If we were to read the *No!* in (12a) as expressing strong rejection (in the nonmetalinguistic sense), it would follow that the speaker asserts *X will not win*. But the speaker claims something *weaker* than this. Namely, that this *might* be the case (see Bledin & Rawlins 2016 and Mandelkern this volume for additional discussion and data related to how epistemic modals occur in disagreements). In (12b) and (12c), the speaker rejects a proposition since they are not in the position to assert the proposition in question; but they are clearly not in a position to assert its (nonmetalinguistic) negation either.

It seems far fetched to read such examples as 'metalinguistically strong'. The following utterances sound odd.

(13)   a. It is not the case that X will win the election (because Z might win).
        b. This ticket has a one in a million chance to win. It will not lose (because I don't know that it will).
        c. All I know is that the streets are wet. It is not raining (because this doesn't follow).

It is difficult to read (or even coerce) a metalinguistic interpretation of the negations in these examples. Intuitively, none of (13a, b, c) have the same meaning as, respectively, (12a, b, c).

Hence, rejections such as in (12) are weak – they cannot be explained as being reducible or equivalent to negative assertion. As these cases are not to be explained away by sorting them as metalinguistic, we cannot give an account of the phenomenon of rejection that would reduce rejection to negative assertion.

Incurvati and Schlöder (2017) conclude that the most parsimonious explanation of *all* the data is to accept a primitive operation for rejection that encompasses both weak and strong instances of answering *No!* to a self-posed polar question. They characterize this as the speech act that expresses that one *refrains from accepting* some content and suggest that this is the fundamental function of all rejections. Strong rejections, they claim, arise as a pragmatic strengthening of this more basic function. A related proposal by Manfred Krifka (2013, 2015) and colleagues (Cohen & Krifka 2014; Meijer

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[9] Example (12a) is derived from an example by Grice (1991) and has previously been discussed in Incurvati and Schlöder (2019); example (12b) is adapted from an example by Williamson (1996).

et al. 2015) is that responding *no* to an assertion is to foreclose continuing the conversation in a way where the assertion would have been accepted (which need not mean to continue the conversation in a way where a negative was accepted). They call this *denegating* the assertion.

Be that as it may. Negation and rejection have sometimes been recognized as multi-category phenomena (Geurts 1998; Schlöder & Fernández 2019) and arguments from parsimony do not have the last word in this debate. An analysis of rejection in terms of assertion and two or more embeddable operators to cover the various weak cases has not been ruled out. However, in the next section I expand on an argument by Huw Price (1990) to argue that we *must* admit a primitive operation for rejection, since rejection fulfills a *need* that cannot be fulfilled by any assertoric speech act.

14.3   Rejections Fulfill a Need

Price (1990) argued that the negation operator *not* is to be explained by appealing to a primitive speech act of rejection (Price calls it *denial*, but this is a mere terminological difference). The purpose of this speech act, Price argues, is that it is a means of "registering ... a perceived incompatibility."

To see this need, imagine that we are members of a speech community that does not possess such a means. Then we could find ourselves in the following unfortunate situation. You might point to some berries, proclaim that *these are edible* and make motions to begin consuming some of them. I, however, see that the berries are lilac and know that all lilac food is highly poisonous. Your death would greatly trouble me, but I am not able to physically stop you – so I have a need to *linguistically* inform you of the mistake you are making. What sort of recourse do I have? I could tell you *these are lilac!* but you might not realize that *edible* and *lilac* are incompatible. Then all I have achieved is that you now believe that *these berries are edible and lilac*. Clearly, me telling you *these are poisonous* is equally hopeless, as you may not realize the incompatibility between *edible* and *poisonous* either.[10]

As Price points out, even if you and I have a shared understanding of the truth-conditional semantics of negation (e.g. by knowing the truth-table for negation), I could not point out your mistake by uttering *these berries are not edible*, since you might not realize the incompatibility of truth and falsity (despite being a competent user of the language) and believe *these berries are edible and not edible*.[11] It does not suffice for there to *be* an incompatibility

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[10] This example is inspired by Price (1998).
[11] Tangentially, this is why paraconsistent logicans, who accept the truth table for negation, but do not accept that truth and falsity are incompatible, are also wont to stipulate a speech act of rejection (Priest 2006).

(such as between truth and falsity), I also need to be able to *inform* you of it. Evidently, without you having an understanding of some relevant incompatibility, there is no assertion I could make that would make you realize that you are *mistaken* to believe that *these berries are edible*.

Of course, in our *actual* linguistic practices, competent speakers understand the incompatibility of *edible* and *not edible*, so that I can point out such mistakes by asserting *these are not edible!*. Thus, actual competent use of negation goes beyond the truth-table for negation: it *includes* an understanding of the fact that the use of *not* is registering an incompatibility (Price 1990). Price claims that the act of registering an incompatibility is rejection and claims that *not* is the expression of rejection. Taken literally, his suggestion of letting *not* directly express rejection falls prey to Frege–Geach problem discussed in the previous section. The problem can be resolved by assuming a primitive speech act for rejection and stating the meaning of *not* in *terms of* this speech act instead of the *direct* expression of that speech act (Smiley 1996; Rumfitt 2000; Incurvati & Schlöder 2017, 2019).

Either way, the thought experiment suggests that we need to stipulate a distinct expression of incompatibility. Although suggestive, such thought experiments may not be ultimately compelling. The need for a primitive mechanism for rejection can also be appreciated by probing into analyses of assertion, such as Stalnaker's (1978). On his account, the essential effect of an assertion of *p* is to *propose* to expand the common ground by adding *p* – and such proposals can be *rejected*. Sometimes, Stalnaker is misunderstood to claim that an assertion immediately updates the common ground.[12] But this is a strawman. Stalnaker is explicit that not all assertions result in a common ground update, since they can be rejected.

> It should be made clear that to reject an assertion is not to assert or assent to the contradictory of the assertion, but only to refuse to accept the assertion. If an assertion is rejected, the context [JJS: common ground] remains the same as it was. (Stalnaker 1978: 87 n. 9)

Thus, an assertion does not expand the common ground immediately, but does so only in the *absence of rejection*. Put differently, asserting that *p proposes* to make *p* common ground and *making* it common ground is a further process that needs to be negotiated by the interlocutors (also see Clark 1996).

Some have tried to prop up the strawman. Notably, Seth Yalcin (2018)

> favor[s] dropping the 'proposal' talk entirely, holding instead that assertions simply always change the state of the conversation . . . Rejections of assertions do not stop the relevant changes . . . rather, they undo a change that has taken place.

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[12] For example, Sarah Murray (2009: 324) attributes to Stalnaker the view that 'an assertion updates the common ground' and contrasts this with other views on which 'an assertion is a proposal to update the common ground'.

His reason is that characterizing assertion by appealing to a speech act of proposing is just to 'pass the buck to the question what proposing is.' But any serious account of speech acts must face the question of what proposing is (and of how proposals are rejected) anyway. Consider the speech act of *betting*. It is clearly mistaken to say that a bet is automatically accepted – that is, the context is changed so that speakers are obliged to adhere to the rules of the bet – and that to reject it is to undo these changes. This is mistaken, because rejecting a bet – that is, not accepting it – is distinct from undoing a bet. Rejecting a bet is something I can do unilaterally, but to undo a bet that both sides have agreed on usually requires both speakers to agree to this.[13]

Thus, if we want to make sense of betting, we need to make sense of a mechanism by which context changes are proposed and then either accepted or rejected. We can use the same mechanism to give the Stalnakerian account of assertion as proposing context updates. This is not passing the buck, but simplifying and unifying. Yalcin's suggestion might simplify things if one is *only* interested in explaining assertion (which may indeed be Yalcin's ambition), but as soon as other speech acts come into play, it becomes a needless complication to make assertion function *differently* from speech acts whose rejection and undoing are distinct activities.

The occurrence of the word "reject" here does not immediately entail that Stalnaker's account must contain a primitive for rejection alongside assertion. Intuitively, one can reject by making a *counterproposal*. That is, if you have asserted that p, I may respond by asserting that q, where q is inconsistent with p. As the common ground must be consistent, p and q cannot simultaneously be in the common ground. Hence, a story might go, my assertion is rejecting yours. But this story is confused, as Price's observations apply here as well. There *being* an incompatibility does not exempt us from needing a mechanism to register it. That is, one may not always realize that a proposal is a *counter*proposal.

Reducing rejection to counterproposing faces another problem. To explain a rejection of a proposal to update the common ground as *another* proposal to update the common ground may lead to a regress with proposals stacking up and not being resolved. There must be a mechanism to halt the regress. That is, there is a need for a response to an assertion is *not* itself an update proposal. This operation should register that one is *rejecting* an update proposal.[14]

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[13] It seems to me that the same can be said about assertion. If you assert p I can unilaterally reject it. But once we both agreed to p, it takes *cooperative* effort to remove p from the common ground. But I will not press this point here.

[14] Alternatively, a mechanism to accept a proposal that is not itself an update proposal. Either way, another primitive is required.

There are different ways of spelling out this operation. Price (1990) argues that rejection signals an incompatibility between truth and falsity; so roughly, rejection would be the speech act that signals *I am not accepting your assertion of p because p is false*. But this fails to capture the data on weak rejection discussed in the previous section. If the incompatibility between *X will win* and *no, Z might win* is the incompatibility of truth and falsity, it would follow that *no, Z might win* means that *X will not win*, which it does not. By adopting the Stalnakerian picture, one can fix this issue: rejection registers that I do not wish some *p* to be in the common ground. I may have different reasons for this. I might not want *p* to be in the common ground because *p* is malformed, has an unmet presupposition, there is insufficient evidence for *p*, or indeed because *p* is false. This or a similar conception of rejection is available to the gamut of accounts that characterize speech acts by their context-update potential (e.g. Roberts 2012; Portner 2018b; Murray & Starr 2018).

There is another option to spell out a sufficiently broad notion of rejection, not requiring a context-update framework. As said in the Introduction, not all assertions or rejections are *correct*. Some are *incorrect* in that they are violating some convention associated with these speech acts. A good explanation of how speech acts can be correct or incorrect is that they are, in some sense, governed by certain *norms* or *rules*. (This can be said while leaving open whether or not these norms are *essential* to linguistic activity or not; but see Williamson 1996, 2000 and below.) Roughly following Brandom (1983, 1994), one may think of these norms as being enforced by a social order in which violating these norms makes one liable to *social sanction*. The relevant sanctions are social consequences such one's partial exclusion from the practice of assertion; e.g. the boy who cried wolf is sanctioned for his misdeeds in that nobody heeds his assertions (Brandom 1994: 180).

This leads to an understanding of rejection as the device by which one informs one's interlocutor that they have made themselves liable to sanction. Supposing that truth is a norm of assertion, if you assert that *the berries are edible* and I know they are not, I judge your speech act as violating a norm. By rejecting your claim, I inform you that you are liable to sanction (and, tangentially, death). On such a conception, instead of saying that rejection is registering *incompatibilities*, it is more apt to say that it registers *mistakes*.

Brandom himself does not consider the rules related to sanction to constitute the meaning of assertion and rejection. Rather, the rules and sanctions surrounding linguistic behavior constitute a framework in which speakers keep track of each other's *commitments* to certain contents, from which certain permissions and obligations derive. Brandom then suggests to explain the act of asserting as the undertaking of a commitment to the asserted content. This suggestion is taken up by Asher and Lascarides (2003), Farkas and Bruce (2010), and Krifka (2015), among many others. Aside from Krifka's

denegations, however, not much has been said about the role of rejection in such a framework with a perspective towards rejections being possibly weak.

Recall that Price's (1990) original argument was based on the puzzle of how we can inform someone that they are *mistaken*. The normative story outlined above would suggest that a mistake is a violation of a norm and thus we may take rejection to register norm violations. This seems to hit the target. Price pointed out that speakers may not realize certain incompatibilities, so we need a device to explicitly point out an incompatibility. But we might equally wonder what would be required to point out a norm violation to someone who does not realize the appropriate norm. (I will continue this line of thought in Section 14.5.)

I will now turn my attention on the *normative conception* of speech acts according to which speech acts are characterized by the norms that *essentially* apply to them. Compared to Brandom, such an account cuts out the middle man: instead of characterizing commitment by norms and sanctions and then assertion in terms of commitment, we may characterize assertion directly in terms of norms. I first elaborate my preferred understanding of the normative conception of speech acts. Afterwards, I investigate the prospects of conceiving of the essential function of rejections as registering mistakes.

14.4   The Normative Conception

It has become popular to characterize speech acts by stating the *norms* (or *rules*) that essentially apply to them in the *conversation game*. A particular focus of recent debate are accounts of assertion that seek to characterize it by identifying the constitutive *norm of assertion* – the fundamental rule that governs assertions (conceived of as moves in the conversation game). One such rule is the *knowledge norm of assertion* (KNA), proposed by Williamson (1996, 2000).

(KNA). One may assert that p only if one knows that p.

Other putative norms of assertion have been proposed (e.g. Lackey 2007; Weiner 2007), but it is not the purpose of this chapter to adjudicate between them. Aside from the vibrant debate on *which* putative norm is the essential norm of assertion, there is the attendant debate on *whether* a normative analysis of assertion is possible. Invariably, defenders of the normative conception draw a *prima facie* convincing analogy to games such as chess, rugby or baseball. But the dialectic suffers from there being insufficient clarity on *how exactly* the activity of asserting is like a game. In what follows, I elaborate my preferred understanding of how conversation is like playing chess. I use chess purely for familiarity. It should be easy to see how analogous arguments using any other game can be constructed.

It makes sense to say that the game of chess is *made up* by a number of rules: when we are asked to explain what chess is, we explain that it is a game subject to a particular set of rules. One of them may be written as (Rook).

(Rook). One may move a rook from square *x* to square *y* only if *x* and *y* are on the same rank or file and no intermediate squares are occupied.

It seems that the question *What are moves of a rook (in chess?)* has no more satisfactory answer than identifying among the rules of chess those rule(s) that *specifically* or *essentially* govern the movements of rooks. Namely, a move of a rook is a move that is subject to (Rook).[15] Then, analogously, the question *What are assertions?* has no more satisfactory answer than identifying those rule(s) among the rules of conversation that essentially govern assertion. To wit, an assertion is a speech act subject to the norm of assertion (be it the knowledge norm or another one).

This analysis of assertion is not troubled by the fact that there are further rules of conversation that govern assertion, but are not *essential* to assertion. For example, assertion – like any speech act – seems to be bound by general rules of relevance and informativeness (to name just two). Likewise, the movement of rooks – like other moves in chess – is bound by further rules as well. For instance, the rule (Check) applies to all pieces in chess.

(Check). One may move a piece only if one's king is not in check afterwards.

But (Check) is not part of our understanding of *rook moves*. If someone knows the rule (Rook) without knowing (Check) we would still attribute to them the knowledge of *what rook moves are*. Say, if we are teaching chess to someone, we would be satisfied that *they understood what rook moves are* if they understood (Rook), even if we haven't yet explained (Check). In this sense, (Rook) is *essential* to the understanding of *moving rooks*, whereas (Check) is not.

Again analogously, a proponent of a norm account of assertion claims that it is only the specific *norm of assertion* that constitutes the knowledge of what assertions are, regardless of other putative rules of the conversation game that are less intimately related to assertion. Such rules stand to the norm of assertion as (Check) stands to (Rook). Furthermore, there are broader behavioral rules that apply to assertion (such as politeness or general morals), just as there are broader rules of sporting behavior that apply in chess (e.g. that opponents shake hands). As the latter do not seem to contribute to our understanding of *rook moves*, we should not think of the former as contributing to our understanding of *asserting*.

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[15] We may also characterize the *rook piece* as the piece whose movement is subject to (Rook).

However, there are some doubts about the true extent of such an analogy between conversation and everyday games and about how useful any such analogy is in characterizing a speech act (Hindriks 2007; Maitra 2011; MacFarlane 2011). One salient criticism is that a rule like (KNA) might tell us under which conditions one may assert, but tells us nothing about *how* to assert, i.e. about how to complete the sentence "to assert is to ...". Consider, for instance, the following rules that seem to define the move of *short castling* in chess.

(Short Castling 1) One may short castle only if (i) the king has not moved; (ii) the king's rook has not moved; (iii) the squares between the king and the rook are empty and not attacked; (iv) the king is not in check.

(Short Castling 2) To short castle is to move one's king two squares in direction of the king's rook, and the king's rook two squares in direction of the king.

The rule (Short Castling 1) alone is not sufficient for us to know how to short castle. We need to know (Short Castling 2) as well. Now, it may appear as though (KNA) has the same form as (Short Castling 1). Thus, one may be inclined to conclude, (KNA) alone is insufficient to characterize assertion, just as (Short Castling 1) is insufficient to characterize short castling (MacFarlane 2011). It appears we require another rule of the form *to assert is to (...)*. But appearances mislead here. There are many possible assertions and many possible rook moves, but there is only *one* move called 'short castling' (namely, what is stated in Short Castling 2). The phrase *short castling* is a mere abbreviation for this one move. Unabbreviating leads to the following rule for (Short Castling), which is properly analogous to (KNA).

(Short Castling) One may move one's king two squares in direction of the king's rook, and the king's rook two squares in direction of the king only if the king has not moved; etc.

Nothing more than knowledge of (Short Castling) is required to understand how to perform the move in chess that is known as short castling. If one knows (Short Castling), but not (Short Castling 1+2), one does not know that the move is *called* 'short castling'. But such knowledge – knowledge of the *names* of certain moves or pieces – is not required to play a game of chess. Likewise, one need not know that assertions are called 'assertions' to partake in the conversation game (and few people use the term regularly).

But this does not fully address the objection that on the normative account one cannot complete the sentence "to assert is to ...". We have now seen that one can state the rule for short castling without completing the sentence "to short castle is to ...", but the rule (Short Castling) still contains an unanalyzed primitive: *move*. So, in explaining *short castling* by appealing to (Short Castling), one presupposes an understanding of *move in chess*; and in

explaining *assertion* by appealing to a norm of assertion, one presupposes an understanding of *move in conversation*, i.e. of *making a speech act*. Shouldn't we demand explanations like *to move a piece in chess is to (. . .)* and *to make a speech act is to (. . .)*?

There is a straightforward answer to this. We have no reason to suppose that there is any better explanation of *move (in chess)* than (Chess Move).

(Chess Move). To make a move in chess is to perform an act that is understood to be subject to the rules of chess.

It appears to be hopeless to explain *moves in chess* by spelling out the *form* of an act that moves a piece. These forms vary vastly: one can make moves by physically moving pieces, by declaration ("E2 to E4"), by sending a letter, or even by entirely mental acts (some can play a full game of chess in their head). Moreover, one can perform any act that has the *form* of a move without playing a game of chess. I can, for example, idly move pieces on a board and by sheer circumstance happen to follow the rules of chess, but these idle moves are not moves in a game of chess. (Such observations about intentionality are of course familiar from the literature on speech acts.) What does and does not count as a move in chess is a *social* phenomenon. A move in chess is a sort of act that occurs in a particular setting that is understood by everyone in it to be subject to the rules of chess. That is, (Chess Move).

Then, we may explain what it means to move a rook as (Rook Move).

(Rook Move). To move the rook in chess is to perform an act that is understood to be subject to the (general) rules of chess and (in particular) to the rule (Rook), but not subject to other piece-specific rules.

If we are happy with (Chess Move) and (Rook Move) characterizing what it means to make moves in chess, then we should be equally happy with (Speech Act) and (Assertion) being the explanations of what it means to assert and make speech acts.[16]

(Speech Act). To make a speech act is to perform a (linguistic) act that is understood to be subject to the rules of the conversation game.

(Assertion). To assert is to perform a (linguistic) act that is understood to be subject to the rules of the conversation game and in particular to the norm of assertion (and not to other specific norms).

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[16] It is well known that to explain assertions by their *form* – e.g. by describing what kind of sentences are used to perform assertions – is hopeless (Cappelen 2011). The possible forms of assertions are too manifold to be easily subsumed under a single description and one can go through the motions of any possible form without asserting. This is analogous to why it is hopeless to try to describe moves in chess by their form.

Finally, another salient and frequent objection to the normative conception of assertion attacks the claim that a norm of assertion is *constitutive* of assertion. Defenders of the normative conception countenance that an assertion that violates the norm still counts as an assertion; e.g. Williamson (1996), who defends the knowledge norm, explicitly allows that one can assert that *p* without knowing that *p*. This would be an incorrect assertion, but an assertion nonetheless. Some think that this is nonsense: according to Searle's (1969) definition of constitutive rules, if a rule *R* is constitutive of an activity *A*, then one ceases to *A* when one violates *R*.

Ishani Maitra (2011) offers the useful clarification that only *flagrant* violations of *R* result in a cessation of *A*, but argues further that this does not resolve the complaint, as there are speech acts that appear to be assertions despite *flagrantly* violating a norm of assertion (e.g. a defendant asserting their innocence in the face of definitive condemning evidence). The claim that any putative norm of assertion is constitutive of the speech act of assertion is apparently incompatible with the claim that speech acts that flagrantly violate that norm can still count as assertions (Hindriks 2007).

The complaint has bite if we understand *constitutive* like Searle does. But this is not the definition that defenders of the normative conception have in mind. Williamson (1996: 491) remarks that '[w]hen one breaks a rule of a game, one does not thereby cease to be playing that game.' In (Assertion), I suggest to define assertions as those linguistic acts that are understood to be subject to some rules. This dovetails with Williamson's argument. Certainly, an act can be *understood* to be subject to some rules despite violating them.

As a matter of fact, this is the case in chess. Plainly, one can speak of *illegal moves* in chess; the FIDE Laws of Chess do so in Article 7.4. Thus, if we agree that the notion of *move in chess* is defined by a set of rules, we must accept that there *are* acts that can be called *moves in chess* albeit violating one or more of these rules. Otherwise, the very term *illegal move* would be unintelligible. Making an illegal move does not end a game. Rather, if and once the violation becomes apparent, one would be requested to undo the move. (Which appears to be analogous to the request to retract an assertion made in violation of a norm of assertion.) Thus, if (Rook) is a constitutive rule, constitutive rules are violable.

Some have denied the antecedent of this conditional: Hindriks (2007), for instance, claims that the rules that define the legal moves of chess, like (Rook), are merely regulative. But now, the debate has shifted to the semantics of *constitutive*. Plainly, a rule like (Rook) is part of the rules that define the game of chess – that *make up* the game. If we are playing a game that is not subject to (Rook), but instead subject to, say, (Rook'), we are not playing chess.

(Rook'). One may move a rook from square *x* to square *y* only if there is exactly one square in between *x* and *y*.

We may insist on a particular, technical understanding of the term *constitutive* according to which rules like (Rook) are not constitutive of chess. But this would not change the fact that (Rook) is one of the rules that *define what the game of chess is*. Whether or not one is inclined to *call* such rules "constitutive" is besides the point. One also may want to say that it is constitutive of chess that (Rook) is a regulative rule. I wouldn't object to this, though it strikes me as spurious.

In any case, there is no objection against the normative conception to be found in the observation that one can make assertions violating a norm of assertion. This is because, as shown by the example of chess, violable rules like (Rook) can have the status of definitions. But, as I will argue next, the fact that there are such violable rules entails that rejection has a central place within the normative conception.

14.5   Rejection in the Normative Conception

The dialectic in this section, in brief, is as follows. If you accept that conversation is a rule-governed activity like chess, you have to acknowledge the existence of illegal moves (as argued towards the end of the last section). That is, moves that are part of an activity (performing them does not end the activity), but are violating some of the rules that define the activity. But this means that such an activity must *also* have rules that determine what happens in such a situation – rules that govern how to proceed when an illegal move has been made. Based on the discussion in Section 14.3, this includes, at the very least, a device to *register* that an illegal move has been made: that device is rejection. However, I will argue, such a device cannot itself be characterized by a norm.

The need for rejection is particularly visible in learning scenarios. If the norms of the language game are part of the fabric of our social lives, newcomers to our community should learn them. Suppose that assertion is properly characterized by (KNA).[17] Some language learner might assert that p, i.e. make an act that is understood to be subject to certain social norms (even though the learner has not fully grasped these norms), but a competent speaker does not believe that the learner knows that p. She might point that out by saying *you don't know that p*. If rejections do not register norm violations, nothing would stop the learner from assuming that they properly asserted that p and that, in addition, they do not know that p. To make her realize her mistake, a mistake must be registered by the rejection.[18] It does not matter whether one

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[17] Any other norm would allow analogous arguments.

[18] One may attempt to make her realize her mistake by saying that *you shouldn't say that!* but this is hardly instructive – it does not tell the learner what her mistake was. Utterances like *you shouldn't say that because you don't know it* might to the trick, but they hardly seem like the kind of data a language learner is routinely exposed to.

performs the rejection verbally or by intonation or body language etc. The point is just that this registering signal, however it is sent, is not explainable by appealing to an account of assertion.

Now, someone endorsing the normative conception of speech acts wants to characterize speech acts by their essential norms, e.g. characterizing assertion by the (KNA). Can this be done for rejection? Based on what we have seen about rejection so far, the following norm appears to be a good candidate.

(Rejection). One may reject a speech act *s* only if the performance of *s* violated a norm.

There is a lot to like about (Rejection). Conceivably, asserting *p* is in violation of some norm if: some presupposition of *p* is not met (as in example (10a)); or *p* involves nondenoting properties (as in example (10b)); or the speaker has insufficient evidence for *p* (as in example (12)). Thus, (Rejection) appears to be broad enough to capture the data from Section 14.2.[19]

The norm (Rejection) also accounts for the puzzle discussed in Section 14.3. The puzzle was that if you assert *these berries are edible* and I respond *no, they are lilac*, you may not realize that *edible* and *lilac* are incompatible, thus forming the belief that *the berries are edible and lilac* and proceed with consuming them. The solution was to say that rejection registers that what I said is incompatible with what you said. This incompatibility is in particular registered if we conceive of rejections as being governed by (Rejection). For then your claim that *these berries are edible* and my claim that *no, they are lilac* cannot *both* be correctly performed. Either your assertion was correct, in which case my rejection violated (Rejection). Or my rejection was correct, in which case your assertion violated the norm of assertion. But we cannot both be right, so you have no reason to believe that *the berries are edible and lilac*.

The norm (Rejection) also accounts for the fact that nonassertoric speech acts can be rejected as well. Supposedly, these speech acts are also explained by the norm that is essential to their correct performance. For example, supposing that it is (part of) the norm of questions that one may not ask questions to which one knows the answer, I may reject a question by *You know that!*. In general, then, (Rejection) entails that a speech act *s* and a speech act rejecting *s* can not be both correct. This is as it should be.

A particularly interesting case is to reject another rejection. If you perform some speech act and I reject it, you need not give in. You can reject my rejection (Schlöder et al. 2017). The norm (Rejection) accounts for that fact.

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[19] If you want to capture metalinguistic rejections like (11) – those objecting to form, not to content – under the umbrella of the norm of rejection, mispronunciations *etc* will count as mistakes as well. Whether this is the case depends on how the general norms of the language game are spelled out.

If I reject your speech act, then my rejection was correct if you violated a norm. But of course, if you think that you did not violate any norms, you may reject my rejection. According to (Rejection), your rejection of my rejection is correct if and only if your initial speech act was correct. This is also as it should be.

Finally, although we naturally think of rejections was being in response to other speech acts, there is a coherent notion of *rejecting a proposition* that is not in response to anything (see Section 14.2). We can extract the correct norm for these rejections from (Rejection). To wit, we may think of rejections of propositions as governed by (P-Rejection).[20]

(P-Rejection). One may reject p only if asserting p would violate a norm.

Note that there is an asymmetry here. I can properly P-reject those propositions that *I* cannot properly assert; but I can properly reject your assertion of a proposition if *you* cannot properly assert them. This means that there are cases where you can properly assert a proposition p that I can properly P-reject. This is also as it should be, since you may have more information than I do. If you know p but I do not, I can correctly P-reject p. But, if you assert p, me rejecting this assertion would be incorrect. Moreover, your assertion grants me license to assert p to others based on your authority (Brandom 1983); thus after you properly assert p to me, I am no longer able to properly P-reject p.

All of this sounds good. And yet, if you accept the normative conception of speech acts elaborated in Section 14.4, you should not endorse (Rejection) as defining the speech act of rejection. I argued that rejection – as the device that points out mistakes – is required for language learners to acquire the right norms. I need to be able to register a norm violation even if you do not realize the norms of the speech acts we are using. This is analogous to Price's story in which I need to be able to register an incompatibility even if you do not realize any incompatibilities. Saying that rejection is the speech act governed by (Rejection) does not fulfill this purpose, since if you do not yet understand (Rejection), and this is the norm that characterizes rejection, my rejections would fail to register with you that there was a mistake.

Hence, having an understanding of rejection as a mistake-registering device is *prior* to characterizing speech acts by their essential norms. Characterizing rejection by (Rejection) presupposes an understanding of mistakes and how to register them, so an understanding of rejection. This is a vicious regress.

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[20] In some sense, (P-Rejection) matches the *Smileian reductio* principle endorsed by the bilateralists Smiley (1996), Rumfitt (2000) and Incurvati and Schlöder (2017): if in the hypothetical situation in which you assert p, you can derive $\perp$, it follows that you reject p. But this match is not exact: $\perp$ registers a specific kind of mistake has been – a *logical* one. Bilateralists do not derive $\perp$ from p *and I do not know that p*, even if they accept the knowledge norm (Incurvati & Schlöder 2019).

The point is quite simple: if our social fabric is (partially) made up by certain rules, I need to be able to point out which behavior is sanctionable so that a newcomer can sort good from bad behavior. Clearly, my method of pointing that out cannot itself be defined by a rule that needs to be learned this way.

Thus, there is at least one speech act – rejection – that cannot be characterized by appealing to an essential norm. Does this doom the normative conception? I think not. But someone endorsing this conception needs to acknowledge that the registration of mistakes is a *fundamental and unanalysable* part of norm-governed activities. That is, we should accept (Mistake).

(Mistake). To reject is to register that a speech act has violated a rule of the conversation game.

With (Mistake) in place, we can then *also* adopt the norm (Rejection) to explain the data discussed in this paper. The situation is somewhat curious: I maintained that the speech act of assertion is governed by a permissive norm and that it is useless, possibly hopeless, to ask how to finish the sentence "to assert is to . . ." beyond saying that assertions are acts understood to be subject to certain norms. But for the speech act of rejection, we appear to require the more substantive principle (Mistake).

I don't think this a reason to worry. The registration of mistakes seems to be a fundamental part of any rule-governed activity. In any game we play, we will at some point want to register that someone made a mistake. But we do not expect the rules of the game to explain to us what it *is* to register a mistake, only how to proceed once a mistake has been registered.[21] We simply understand that a way to register mistakes is part of the fact that there *are* rules. This means that the speech act of rejection is on the same conceptual level as the concept of a norm or rule.

In fact, it seems that some version of this problem – the need to stipulate a fundamental principle for rejection – occurs in any attempt to characterize speech acts. In Section 14.3, I outlined how rejection appears in the Stalnakerian account of assertion. I argued that rejection cannot be reduced to some version of the fundamental operation of *updating the context*, but needs to be taken as a primitive that *governs* such updates. This is analogous to the situation for the normative conception: rejection cannot be reduced to some version of the fundamental principle of a *permissive norm*, but must be taken as a primitive that *governs* the application of these norms. Similarly, Brandom (1994), as anticipated in Section 14.3, also cannot explain rejection (as the act that points out that someone is liable to sanction) in terms of commitment but

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[21] Some games might have particular procedures for *how* to register a mistake, but this is not an explanation of *what it is* to register a mistake, which is a concept presupposed by there being rules.

needs to take it as a fundamental operation that is part of the mechanisms surrounding commitment.

14.6   Conclusion

The purpose of this chapter is to win some repute for rejection as a *sui generis* speech act whose study should be of interest to linguists and philosophers. My main goal is to establish that rejection is not reducible to assertion by arguing (i) that there are rejections that are not equivalent to negative assertions; and (ii) that the speech act of rejection fulfills a particular purpose – registering mistakes – that cannot be met by assertoric speech acts. The most natural explanation of what it means to register a mistake is that it is to point out the *violation of a norm*. This supports the idea to explain speech acts by determining the norms that *essentially* apply to them.

Importantly (and curiously), however, the speech act of rejection cannot itself be defined by an essential norm, as the act of registering mistakes must be *prior* to the norm that governs when mistakes may be registered. I do not take this to refute the project of characterizing speech acts by their norm – rather, this seems to reveal the fundamentality of rejection in linguistic practice. The arguments I presented here suggest that rejection is similarly fundamental in other conceptions of speech acts, although I have not given them as much attention as the normative conception.

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Part VIII

Implying and (Pre)supposing

15   Implicatures

Emma Borg

15.0   Questions and Answers

(1)   Why do you think both linguists and philosophers find implicatures interesting?

We owe the term 'implicature' to Paul Grice. He introduced a two-way division within what he called the 'total signification of an utterance' between 'what is said by the sentence' and 'what is implied by the speaker'. So, a speaker who says 'It is a lovely day'' produces a sentence which says simply that *it is a lovely day* but they may thereby imply a further content, such as *it is a horrible day* (if the speaker is heard as being ironic) due to features of the context in which the sentence is produced. This distinction between the contents of linguistic items *per se* versus pragmatic, communicated contents is intuitively compelling, and it provides a way in which the project of semantics might seem feasible (as semantics no longer need account for *everything* a speaker might convey by her utterance), thus it is no surprise that it has been foundational in a vast sweep of theorizing in philosophy and linguistics following Grice.

(2)   What recent developments in linguistics and philosophy do you think are most exciting in thinking about implicatures?

Recent work in philosophy of language and linguistics has seriously muddied the waters around implicatures. Whereas once (in Grice's heyday) it seemed reasonable to think that maybe we could limit the input of contextual features to the content of 'what is said by a sentence' to a handful of (fairly well-behaved) processes, like disambiguation and reference assignment, now the situation looks much more murky. I will survey the problems (such as the relativization apparently necessary for taste predicates, the hidden standards for comparative adjectives, and the completion of apparently incomplete expressions like 'enough' and 'ready') which have so exercised recent theorists.

Moves to introduce kinds of richly pragmatically enhanced but nevertheless semantically relevant contents (Sperber and Wilson's 'explicatures', Bach's 'implicitures', Recanati's 'what is said') provide an exciting recent lens through which to ask what force Grice's original machinery can still wield in

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the contemporary debate. I will also consider (and argue against) Lepore and Stone's recent rejection of the category of 'implicatures' and their claim that all pragmatically enhanced content is a question of unruly imagination, suggesting instead that there remains a well-defined place for implicatures (contrasting with explicatures) in our account of communicated content.

(3)   What do you consider to be the key ingredients in adequately analyzing implicatures?

Grice gave us a range of now classic examples of the phenomenon he thought of as implicatures – the reference-writer who states just 'Jones has nice handwriting' but thereby conveys that Jones lacks philosophical talent, the speaker who tells a stuck driver 'There is a garage around the corner' and succeeds in conveying that the garage is open and sells petrol, and so on and so forth. These examples are intuitively compelling and are crucial for understanding what implicatures are supposed to be. However, the intuitive pull of the examples has, I will suggest, served to obscure a problem at the heart of the Gricean account. For it seems that within the account are two features which are able to pull in different directions: Grice's notion of 'what is said by a sentence' (the content which lies in opposition to implicatures) is defined both in terms of the kinds of contextual inputs it allows (limited to disambiguation and reference-fixing) *and* in terms of its role in the communicative forum (as the content which the speaker directly asserts or conveys). Implicatures, on the other hand then, can be understood either in terms of the amount/kind of pragmatic processing that goes in to their recovery or in terms of the role that content plays (i.e. as indirectly conveyed or communicated). Yet again these two conditions seem able to come apart. It is thus key to correctly analyzing the phenomenon of implicatures that we get clearer on the criterion that we are using to identify or individuate them.

(4)   What do you consider to be the outstanding questions pertaining to implicatures?

The most serious question pertaining to the phenomenon of implicatures is whether they should be understood in terms of the sorts of processes involved in generating or recovering a given content *or* in terms of the role that content plays in a communicative setting. I'll suggest that improving our grip on these two (potentially conflicting) elements allows us to deliver a much clearer understanding of what implicatures are and what role they should play in theorizing. A further outstanding question (gestured at but left open in the chapter) concerns the role of speaker intentions in determining utterance meaning (see Borg et al 2022).

15.1   Introduction

The term 'implicature' is owed to Paul Grice. In a seminal contribution to the philosophy of language and linguistics, Grice took what he called the 'total

signification of an utterance' (i.e. the complete content someone communicates by producing a linguistic signal) and divided it in two, distinguishing between 'what the speaker says', on one hand, and 'what the speaker implies', on the other. For instance, imagine a speaker, Hashim, who says "It is a lovely day": Hashim says simply that *it is a lovely day* but he may thereby *imply* a further content, such as *it is a horrible day* (if he's being ironic). Or again, take the person who writes just "Smith has lovely handwriting" as a letter of reference for Smith's application for a philosophy job (Grice 1989: 33). The writer produces a sentence which says that *Smith has lovely handwriting* but they may thereby convey or implicate some further proposition such as *Smith is not a very good philosopher*.[1] I will look more closely at how Grice defines 'implicature' and the opposing notion of 'what is said' below (Section 15.2), but intuitively the distinction between the contents expressed by linguistic items per se (what the speaker says, in Grice's "favoured sense") versus pragmatic, communicated contents (what the speaker implies) seems intuitively both clear and compelling. Furthermore, as I'll argue in Section 15.1, drawing the distinction seems to really matter, as it holds out the promise of rescuing a project we might term 'formal semantics' from a plethora of utterly obvious counterexamples. Thus it is no surprise that Grice's notion of *implicature* has become foundational in a vast sweep of theorizing in philosophy of language and linguistics.

However, recent developments have served to throw doubt on Grice's taxonomy for the total signification of an utterance, with both sides of his divide coming under fire. So some have questioned the existence of implicatures (Lepore & Stone 2014), while others have questioned how he individuated his category of 'what is said' (e.g. Sperber & Wilson 1986, Recanati 2004, amongst many others). These challenges to Grice's framework will be examined in Section 15.3. However, I will argue that, on closer inspection, the recent developments canvassed do not serve to show that Grice's notion of implicature is ill-founded, nor that his "favoured sense" of what is said is unnecessary. What they do serve to highlight is a peculiar tension in Grice's original account. For it seems that Grice merged two distinct features when defining what the speaker says versus what the speaker implicates: the idea of a content dictated by word meaning and structure alone, on the one hand, versus the idea of an asserted or directly expressed proposition on the other. What the challenges to Grice's framework reveal is that these features can and often do come apart. Yet once

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[1] Although I won't recap on Grice's examples in much detail, we should note that one of the key things Grice brought to the debate was an incredibly vivid set of cases. Although some of his examples haven't stood the test of time (such as the man who implies that he is going to the opera by picking up his tailcoat), others remain classic, compelling cases whose intuitive force provides substantial support for the existence of the phenomenon Grice sought to codify.

we resolve this tension, I'll suggest, it is possible to deliver an account of the total signification of an utterance which is both (fairly) faithful to Grice's original account and which is able to do a great deal of explanatory work.

15.2   The Role of Grice's Theory of Implicatures

One of the reasons Grice's notion of implicatures has seemed so important to philosophers and linguists, I suggest, is because it holds out the promise of rescuing an attractive but prima facie doomed project in theorizing about linguistic meaning. According to this project, which we might label 'formal semantics', a core explanatory datum for a theory of meaning is the fact that ordinary speakers can produce an apparently indefinite number of novel sentences. Furthermore, hearers are commonly able to grasp the meaning of novel sentences – i.e. those they have never heard before – with ease (provided they know the meaning of the words and are familiar with the grammatical structure involved). And speakers and hearers can do these things even though the cognitive resources they are able to dedicate to linguistic understanding are constrained. From this perspective, then, a key explanatory task for a theory of meaning is to show how an indefinitely productive capacity can rest on a finite knowledge base.[2] The answer formal semantics gives is that sentence meaning is strictly *compositional*, i.e. that the meaning of a complex linguistic whole is a product just of the meanings of the parts of the whole (e.g. the words it contains) and the way those parts are put together. If language is compositional then the indefinite nature of linguistic understanding is explained because our productive capacity is based on knowing only a limited set of lexical items and a limited set of rules for putting those items together. For instance, someone who knows the meanings of "horse," "cow," "brown," "white," and the relational term "_is bigger than_" will (normally) be able to generate all the following sentences with ease:

(1) The horse is bigger than the cow.
(2) The cow is bigger than the horse.
(3) The white horse is bigger than the cow.
(4) The brown horse is bigger than the cow.
(5) The horse is bigger than the white cow.
(6) The horse is bigger than the brown cow.
(7) The white horse is bigger than the brown cow.
(8) The brown horse is bigger than the white cow.
(9) The white cow is bigger than the brown horse.
(10) The brown cow is bigger than the white horse.

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[2] The argument here goes back at least to Frege in *The Foundations of Arithmetic*. For detailed exposition of the nature of compositionality arguments see, e.g., Szabó 2012.

From a limited knowledge base of just five lexical items, then, the subject's linguistic understanding projects out to a much larger number of sentences. Compositionality thus explains what is sometimes called the 'productivity' and 'systematicity' of natural language understanding.

However, the obvious challenge to any such formal semantics programme is that we *cannot* predict linguistically communicated content just on the basis of words and structure alone – linguistically communicated content is *not* compositional in the required way. To see this, take the classic case from Grice (1989: 32), where a driver (A) says to a passerby (B) "I am out of petrol" and B replies "There is a garage around the corner." As Grice suggests, what B communicates in this context is that the garage is open, sells petrol, etc. Yet this isn't content that we can get just by paying attention to the words B says and the way those words are put together. Or again, consider an utterance of "Someone ate the last cookie" (which in the right context can communicate that *Hardeep ate the last oatmeal cookie from the jar*) or "Students can take logic or maths" (which in some contexts might convey that they can take one or the other or both, but in other contexts that they can take one or the other but not both). In each case communicated content seems to outstrip compositional, lexico-syntactic content. This recognition – that what we communicate by what we say is often much more than our words strictly and literally mean – seems to throw the entire project of formal semantics into chaos, undermining the very idea of predicting the meaning of complex wholes simply in terms of the meaning and structure of parts.

It is at this point, then, that Grice's model of communication comes to the rescue by showing that a semantic theory need not provide a treatment of *all* the content communicated by a speaker. Instead we could maintain that there is a difference between what a sentence itself says (the sort of content that a semantic theory might be able to capture) and what a speaker implies by uttering the sentence, where the latter is a pragmatically conveyed, indirectly communicated bit of content. This noncompositional implied content is nevertheless, according to Grice, something we can theorize about, recognizing the underlying principles which give rise to it.

15.3   Grice's Theory of Implicatures

Grice divides up the 'total signification of an utterance' (what I'll label 'utterance meaning') as shown in Figure 15.1.[3]

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[3] Notice that this Gricean taxonomy does not exhaust the terrain, for instance we might also want to include a category for content (such as presupposition; see Abrusán, this volume) which is neither part of 'what is said' nor 'what is implied'.

Utterance meaning

What is said by the speaker   What is implicated by the speaker

Conventional implicature   Nonconventional (Conversational)
implicature

Generalised conversational implicature   Particularised conversational
implicature
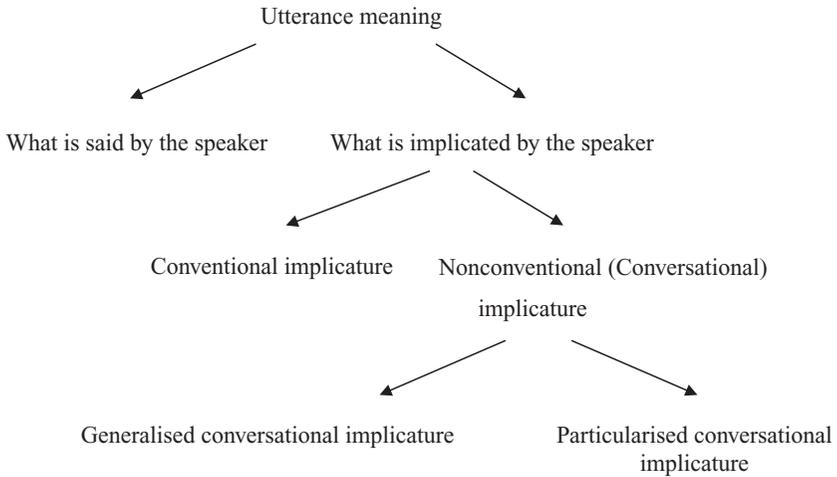
Figure 15.1 Grice's account of the elements of utterance meaning

Focusing first on the notion of 'what is said by the speaker', Grice states that he is using the term in a "special, favoured sense" (1989: 25), whereby this kind of content is fixed by the conventional meaning of the words a sentence contains together with certain, limited pragmatic processes (namely disambiguation and reference assignment). So, for instance, to get at what is said by the speaker who utters "He was in the grip of a vice" we need to know both the meaning of the words and sentence structure, and certain facts from the context of utterance, namely the referent of "he" and the disambiguation of "vice" (meaning *moral failing* or *piece of machinery*). Grice gives us, then, what I'll sometimes term below a 'structural' or 'process-based' definition of 'what is said', in terms of the degree of isomorphism between the formal elements of the sentence (e.g. the words) and the elements of the proposition delivered, or in terms of the kinds of processes required for getting at the content (lexico-syntactic interpretation plus disambiguation and reference assignment). Although Grice himself didn't use the terms 'semantics' and 'pragmatics' it has become extremely common to identify 'what is said by the speaker' with semantic content, and 'what is implied' with pragmatic content.

The second element of utterance meaning – implicatures – give us the content that a speaker contributes to the conversation in a more indirect fashion, implying rather than stating. As we can see from the above diagram, Gricean implicatures come in a variety of different kinds, individuated by the degree to which they depend on particular features of the context of utterance. 'Conventional implicatures' are carried by conventional features relating to the

meaning of the expressions the speaker chooses to use. For instance, an utterance of "She was poor but honest" implies that the speaker thinks there is some kind of contrast or tension between being poor and being honest, but it does so simply via the choice of the expression – 'but' rather than 'and' – instead of via more fine-grained contextual features.[4] 'Nonconventional' or 'conversational implicatures', on the other hand, depend more closely on the context in which an utterance is made. Generalized conversational implicatures are ones that would typically or normally arise given the utterance of a certain form of words in the given context. For instance, consider the so-called 'scalar implicature' from "Some of Year 8 ate cookies" to *Not all of Year 8 ate cookies.* It seems there is a scale of strength of expression which runs [one – some – all] and, in this context, selection by the speaker of a weaker item on the scale allows the hearer to infer the negation of the stronger item – *not (all)* – as implied by the speaker (see Horn 1972). Finally, particularized conversational implicatures, like the move from "Someone ate the cookies" to *Hardeep ate the cookies,* depend intrinsically on quite specific features of the one-off utterance situation.

In addition to distinguishing these different categories of implicature, Grice also provided a mechanism for the recovery of conversational implicatures, in terms of what he called 'calculability' (Grice 1989: 30–31). A conversational implicature should be capable of being worked out by a hearer using the following kind of schema:[5]

A speaker S conversationally implicates that q by saying that p only if:

 (i) S is presumed to be following the general principles of good communi-
     cation (what Grice termed the 'conversational maxims', the most general
     of which is the assumption that speakers are being cooperative);
 (ii) the supposition that S is aware that (or thinks that) q is required to make
     S's saying or making as if to say p consistent with this presumption;
(iii) the speaker thinks (and would expect the hearer to think that the speaker
     thinks) that it is within the competence of the hearer to work out, or grasp
     intuitively, that the supposition mentioned in (ii) is required.

So, returning to the Gricean garage example above, if we just take B's utterance 'on face value' (i.e. as communicating only the content that *there is a garage around the corner)* then their utterance seems to be irrelevant to A's prior statement. That is to say, taking B as communicating only this piece of content would entail viewing B as flouting one of Grice's general

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[4] See Potts 2005 for extended discussion of a range of other kinds of cases which might be treated
   as conventional implicatures.
[5] The psychological status of this Gricean derivational structure for conversational implicatures
   has been much discussed, see Danzer 2020 for an overview.

conversational maxims (in this case: Be Relevant). However, there is a further bit of content naturally available – that the petrol station is open (call this content 'q') – which would make B's contribution conversationally cooperative. The content given in q thus counts as an implicature because: the supposition that *B thinks that q* is required if B is to be seen as abiding by the conversational maxims; furthermore B hasn't stopped A thinking that q; so B has implicated that q.[6] This chain of reasoning shows that the implicature is calculable.[7]

As well as the requirement for calculability, Grice provided two further tests for deciding whether a given bit of communicated content counts as a conversational implicature, as follows:

(i) **Nondetachability**: if we keep the context and the content fixed, we must get the implicature, as Grice says (1989: 58), "it is not possible to find another way of saying the same thing, which simply lacks the implicature in question." So, in our above example, if, in response to A's utterance, B had said "There's a gas station around the corner" or "There's a petrol station just past the bend," the implicature that the station is open would remain.

(ii) **Cancellability**: conversational implicatures can be retracted without contradiction. Grice (1989: 58) notes two different types of cancellation: explicit vs. contextual. Explicit cancellation involves "the addition of a clause that states or implies that the speaker has opted out," whereas contextual cancellation occurs where the "context. . .makes it clear that the speaker is opting out". So, for instance, a speaker can add "but not p" or "I don't mean to imply p" (explicitly retracting a content that might otherwise be implied). Or we can find contexts in which the utterance of this form of words does not carry the implicature; for instance if B says "There is a garage around the corner" in response to the question "What facilities does this village have?", B's utterance may fail to imply that the garage is open.

While these three tests (calculability, nondetachability, cancellability) certainly serve to flesh out our intuitive grip on what counts as a conversational implicature, it seems they do not provide necessary and sufficient conditions

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[6] Note that Grice (1989: 39–40) allowed the content of a conversational implicature to be indeterminate: "Since, to calculate a conversational implicature is to calculate what has to be supposed in order to preserve the supposition that the Cooperative Principle is being observed, and since there may be various possible specific explanations, a list of which may be open, the conversational implicatum in such cases will be [a] disjunction of such specific explanations; and if the list of these is open, the implicatum will have just the kind of indeterminacy that many actual implicata do in fact seem to possess."

[7] Although this has been disputed, for example see Davis 1998.

for identifying where a given bit of communicated content sits within Grice's overall taxonomy (i.e. whether some bit of communicated content counts as what is said, versus what is conventionally implied, versus what is conversationally implied).[8] I will look briefly at failures of necessity in this section, before focusing on failures of sufficiency in the next section (Section 15.3).

First, we should be clear that Grice did not expect his tests to draw the divide between 'what is said' and 'what is implicated' in general because he explicitly notes that the tests are not passed by conventional implicatures. For instance, the move from "She was poor but honest" to the implicature that the speaker thinks there is some contrast between being poor and being honest is neither calculable nor nondetachable. I don't need to see the speaker as flouting some principle of good communication to know that I'm entitled to derive the implicature that there is a contrast between being poor and being honest (that is to say, the implicature is not calculable) and if the speaker uses a different way of saying the same thing (such as uttering "She was poor and honest") the implicature disappears (conventional implicatures are thus detachable). At most, then, Grice's tests might serve to hold apart 'what is said by the speaker' from 'what is conversationally implicated'. However, it might turn out that this worry is in fact somewhat moot since some theorists have argued that the category of conventional implicature itself is problematic. So, Bach 1999 argues that conventional implicatures simply don't exist, while Potts 2005 argues that they exist but require a very different treatment to the one Grice envisaged. Thus it may turn out that concentrating our attention just on the divide between 'what is said' and 'what is conversationally implied' is warranted.

Yet, even if we do narrow our focus in this way, questions about the necessity of the tests remain. For a start, as Grice himself acknowledged, manner implicatures (which depend on the *way* in which a given content is expressed) clearly fail the test of nondetachability. The speaker who says "Miss X produced a series of sounds that corresponded closely with the score of 'Home Sweet Home'" implicates something they would not have done if they had instead uttered "Miss X sang 'Home Sweet Home,'" despite the fact that the latter sentence appears to be just 'another way of saying the same thing' (Grice 1989: 37). Thus Grice himself explicitly excludes manner cases from the detachability test (1989: 58, *emphasis* added): "*[I]nsofar as the manner of expression plays no role in the calculation*, it will not be possible to find another way of saying the same thing, which simply lacks the implicature in question."

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[8] We should note that it may be possible to deliver alternative tests to do the work required (e.g. see Rett 2020), however, for reasons of space, I will concentrate here just on the criteria suggested by Grice himself.

So, something can be a conversational implicature but fail the nondetach-ability test.[9] Questions have also been raised about Grice's cancellability test. For instance, it has been argued that some conversational implicatures based on Grice's maxim of Quantity (which commands speakers to be as informative as required) cannot be easily cancelled. As noted above, many Quantity implicatures rely on the existence of a background scale (like the implicature from "some children ate cookies" to *not all children ate cookies*) and these cases standardly seem easy to cancel – saying "Some of the children ate cookies, in fact all of them did" is potentially conversationally odd, but the speaker doesn't directly contradict themselves. However, things seem less clear with nonscalar Quantity implicatures (see Rett 2020 for discussion). For instance, consider:

(11)   John met a woman at the bar last night.

(12)   War is war.

Example (11) implicates, via a flouting of the Quantity maxim, that the woman John met was not one he had a pre-existing relationship with. The tautology in (12) implicates that war has a number of canonical properties that cannot be avoided. In these cases (as Hirschberg 1991 and Rett 2020 point out) cancel-lation seems less acceptable than in the scalar case:

(13)   John met a woman at the bar last night. . .#although actually he met a woman he knows well.

(14)   War is war. . .#in fact, there is nothing stereotypical about war.

Rett 2020 goes on to argue that whether a conversational implicature is cancellable or not depends on further features of the conversational context, with implicature content which is crucial to the conversation (roughly, what is known as 'at-issue content') failing cancellation tests, while not-at-issue implicature content is cancelleable.[10] Yet this is to recognize that, at least as it stands, cancellability alone is not a good candidate for a necessary feature of all conversational implicatures.

   Finally, a further challenge to the claim that all conversational implicatures are cancellable comes from content which is also entailed by

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[9] Nondetachability may also be problematic given the fact that scalar implicatures do not arise in so-called 'downward entailing' contexts; see Ladusaw 1979, Rett 2020.

[10] Rett writes (2020: 52–53): "An important observation about conversational implicature – dating back to van Kuppevelt (1995, 1996) – is that, if an implicature (even a scalar one) is at-issue, it isn't cancellable. . .The inability of conversational implicatures to be cancelled when they address the [Question Under Discussion] is in line with what we know about at-issue content; it cannot be directly denied (i.e. targeted by negation in discourse), and it can be used informa-tively (i.e. to narrow the Common Ground)."

the semantic content of the sentence produced. For instance, take the following exchange:

A: Does John drink slivovitz?
B: He doesn't drink any alcohol.

B's utterance seems to both entail and imply that John does not drink slivovitz (Sperber & Wilson 1986: 61; Carston 2002: 139), yet as an entailment this is content which is not cancellable (see Haugh 2013 for further discussion). Although these kinds of cases are not universally accepted, they do once again raise a question about whether cancellation without contradiction marks a universal feature of all conversational implicatures. Of course, the brief discussion of this section doesn't suffice to show that there are *no* necessary features had by all conversational implicatures, for it may be that Grice's original three tests could be refined or reinforced in some way to yield necessary tests.[11] However, I want to leave this question to one side now and turn instead to the question of whether Grice's tests are *sufficient* – that is to say, if some piece of communicated content passes the three tests is that sufficient for us to conclude that the content in question is a conversational implicature? For recent work appears to show that (whether they are necessary or not) Grice's tests are far from sufficient for identifying implicatures. To see this, let's turn to examine recent developments at the semantics/pragmatics border and see what these can tell us about how we should characterize implicatures.

15.4   Explicatures vs. Implicatures

Recent work in philosophy of language and linguistics has seriously muddied the waters around implicatures. Whereas once (in Grice's heyday) it might have seemed reasonable to think that we could limit the input of contextual features to the content of 'what is said by a speaker' to a small handful of (fairly well-behaved) processes (i.e. disambiguation and reference assignment), now the situation looks decidedly more murky. To see this, consider the following kinds of cases (where the material after the arrow indicates what a speaker might communicate in a given context, while the underlined part indicates content that does not appear to be contributed by any element contained in the uttered sentence):

(15)   "Jill is tall" ➔ Jill is tall for a jockey.

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[11] For instance, Rett 2020 holds that there are necessary features of conversational implicatures: they are calculable, reinforceable, discourse-sensitive and embeddable.

(16)   "Everyone came to the party" ➜ everyone <u>in Year 4</u> came to <u>Samira's birthday</u> party <u>on Saturday</u>.

(17)   "Steel is strong enough" ➜ steel is strong enough <u>to support cars on the bridge</u>.

(18)   "Bill got married and had children" ➜ Bill got married and <u>then</u> had children.[12]

(19)   "It's three o'clock" ➜ it's <u>roughly</u> three o'clock.

(20)   "I've got money" ➜ I've got <u>enough</u> money <u>to pay for the contextually relevant thing</u>.

These kinds of cases (respectively: (15) comparative adjectives, (16) quantifier restriction and incomplete definite descriptions, (17) incomplete expressions, (18) bridging inferences, and (19), (20) loose talk), amongst others, have recently been at the center of discussions in philosophy about how and where to draw the boundary between semantics and pragmatics. What makes all these kinds of cases so interesting is that they appear to be examples of a speaker directly communicating something by their utterance (so content which *ought* to line up with 'what is said by the speaker' in Grice's framework) which outstrips the content that can be recovered just by appeal to the constituents of the sentence, together with disambiguation and reference assignment (so which *ought* to count as implicature content given Grice's structural definition of what is said by the speaker).[13] In the right context of utterance, the first

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[12] Although this kind of conjunction case has formed a mainstay example in debates about implicatures, there are reasons to be cautious, for it may be that terms like 'and' have a richer semantic content than Grice himself assumed. If this is the case, then the richer content Grice assigned to the implicature could in fact be directly imported via the meaning of 'and'; see Txurruka 2003. However, the phenomenon which (18) is taken to illustrate – to be labeled 'bridging inferences' below – nevertheless seems robust (e.g. consider example (22), given below, 'Maya took out her key and opened the door'. This implies that she opened the door *with* the key).

[13] There is an obvious response to be made here, which is to say that (15)–(20) merely *appear* to be cases where what the speaker says outstrips lexico-syntactic contributions since in fact all of the additional content really is delivered by lexico-syntactic elements in the sentences. Borg (2012: chapter 1 §3.2) discusses this kind of approach under the heading of 'indexicalism', for advocates see, e.g., Stanley & Szabó 2000; Stanley 2002; Martí 2006; Rothschild and Segal 2009. So, for instance, we might treat comparative adjectives as having lexical entries which demand comparison classes (so that, e.g., "tall" literally means *tall for a contextually relevant comparison class*), or we might think that a noun like "money" cohabits at the level of logical form with certain context-sensitive variables which make the meaning of (20) relevantly context-sensitive. On this approach, the cases would all be standard examples of 'what is said by the speaker' as the 'extra' content would in fact be delivered by straightforward reference determination for the hidden variables. However, while this kind of approach is undoubtedly plausible in some cases (such as quantifier restriction, see von Fintel 1994), the idea that it could

content hearers' will recover from an utterance of "Jill is tall" or "Bill got married and had children" seems to be *Jill is tall for a jockey* or *Bill got married and then had children*. The explicitness of these further contents – the fact that they seem to capture what the speaker is directly committed to – seems to be in marked contrast to the indirectness of paradigm implicatures, such as the handwriting case with which this chapter opened. What we have in cases like (15)–(20), it has been argued, are thus examples of *semantic underdetermination*: the semantic content of the sentence (i.e. what is said by the speaker) cannot be compositionally determined on the basis of the meanings of the parts of the sentence and their mode of composition, but this runs counter to Grice's original way of dividing up the total signification of an utterance.

Roughly speaking, there are three main arguments given for the existence of semantic underdetermination (see Borg 2007):[14]

- 'Context-shifting cases' (stressed in Travis 1996, 1997) where utterances of the very same (apparently nonindexical) sentence type intuitively shift in truth value across contexts, even though the relevant feature of the context remains unchanged. So, for instance, in Travis's famous example (Travis 1997: 89), we are asked to consider an utterance by Pia of "These leaves are green," said of some naturally red leaves which have been painted green. If Pia's utterance is made in response to an artist who is looking for something green to add to her composition, it seems Pia intuitively says something true, but if her utterance is made to a scientist who is looking for leaves for an experiment on photosynthesis, what Pia says seems intuitively false. Yet this apparent change in truth value occurs even though nothing alters with the leaves themselves. This is taken to show that, contrary to initial appearances, something about the meaning of "these leaves are green" must be context-sensitive (and as for this sentence, so for many/most/all other sentences).
- 'Inappropriateness cases': in very many contexts, the compositionally derived content will not be appropriate and the speaker should thus be taken to be asserting some contextually enriched content; e.g. the speaker who says "I've eaten" standardly conveys something like *I've eaten recently,* instead of the much weaker compositionally derived content which simply requires that the speaker has eaten at some point in the past.

be extended to cover *all* cases which challenge Grice's framework is highly debateable; see Collins 2007; Neale 2007, Borg 2012. In what follows, then, I will take it as a working assumption that indexicalism, while it may well be the right response in some cases, cannot provide a universal strategy for handling *all* the cases to which Contextualists appeal. I'm grateful to Daniel Altshuler for the reminder to include this option.

[14] For extended arguments that richly pragmatically enhanced contents (like the right-hand sides of (15)–(20)) should sometimes be treated as 'what is said' content, see Searle 1980; Sperber and Wilson 1986; Travis 1996, 1997; Recanati 2004, 2010. For an argument that this does not mean they should be treated as semantic contents, see Borg 2004, 2012.

- 'Incompleteness cases' seem to demonstrate that some well-formed sentences fail to express complete propositions without contextual enrichment. So "Jill is ready" or "Steel is strong enough," although grammatically well-formed, seem to require contextual completion before they can be evaluated for truth or falsity, but (at least arguably) nothing in the lexico-syntactic elements of these sentences marks this context-sensitivity.

The pragmatically enriched contents (i.e. the contents on the right-hand side of (15)–(20)) are often labeled *explicature* contents (following the terminology of Sperber & Wilson 1986). Explicature content is *directly conveyed but pragmatically enriched content;* that is to say, content which captures *what is said or asserted* but which is enriched by features contributed by robust contextual reasoning, rather than being dictated by compositional linguistic content alone. Importantly, explicature contents seem to pass Grice's three tests above. The content seems generally nondetachable (saying "Steel is sufficiently strong" or "Bill got married and had kids" would convey the same richer explicature content as conveyed by (17) and (18)), and the content is also cancellable – the speaker can retract apparently without contradiction (e.g. continuing (18) with "although not in that order"). Furthermore, at least in Sperber and Wilson's 1986 'Relevance Theory' model, explicatures are clearly calculable. According to this model, explicature content is recovered through the operation of the Maxim of Relevance, with the content on the right-hand side of (15)–(20) being (in the right context) the most relevant content the hearer can recover (for reasonable processing costs). It is this which gives the contents their status (in the right context) as 'what the speaker says'.[15]

Yet despite passing these tests, explicatures seem to be directly expressed content, rather than being indirectly conveyed implicatures. The speaker who utters "Bill got married and had children" will, in most contexts, be heard as asserting, not merely implying, that *Bill got married and then had children*. If this is right, it shows that Grice's tests for conversational implicatures are not sufficient – there are contents which pass the tests yet which we do not want to

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[15] The calculability of explicatures is perhaps somewhat more controversial than indicated here. For instance, Recanati 2004 argues that explicature content (which he terms 'what is said') is always the first content recovered by hearers and it is recovered via what he terms 'primary pragmatic processes' alone. A primary pragmatic process operates on an item which is *not* consciously accessible to the agent and it yields an item which *is* available to consciousness. To go from explicature or what is said content to implicature content then requires secondary pragmatic processes, which take an item which is already consciously accessible and yields a further consciously accessible item (together with the information that the latter item is, in some way, grounded in the former). Whether explicatures count as calculable on Recanati's model, then, will depend on exactly what we take calculability to entail (occurrent, first-personal reasoning versus some kind of subpersonal processing; see Danzer 2020 for an excellent discussion of calculability).

count as indirectly conveyed implicatures. The framework of utterance meaning inherited from Grice then – of a binary divide between, on the one hand, 'what is said' content which is recoverable on the basis of words and structure alone and, on the other, implicated content which is the result of rich contextual processing – seems fatally flawed in light of cases like (15)–(20), for many contents which intuitively constitute 'what is said by the speaker' turn out to require rich contextual reasoning to recover.

Once we recognize this problem, there seem to be two possible options. On the one hand, we might take cases like (15)–(20) as simply fatal for Grice's framework, showing that his way of carving up the total significance of an utterance cannot be maintained. As part of this kind of move we might decide to simply reject his category of implicature as itself ill-formed and explanatorily/theoretically empty. This move – what we might term 'implicature eliminativism' – has been suggested by Lepore and Stone 2014. As they write (2014: 6) "Put most starkly: we have no use for a category of conversational implicatures, as traditionally and currently understood." They deny the theoretical value of positing a distinct category of 'implicatures' since (they argue) any such label fails to pick out a unified, homogenous category. For Lepore and Stone the fundamental divide in a linguistic communicative act comes between 'convention-based contributions to the conversational record' and 'imaginative, open-ended invitations to explore content', which do not contribute to the conversational record (Lepore & Stone 2014: 242). The former kinds of contribution qualify as genuinely semantic content, while the latter kind of personal explorations qualify as individualistic imaginative endeavors, yielding at best indirectly conveyed contents. Lepore and Stone's objection to implicatures then is that the kinds of cases Grice used to motivate his category cross-cut this divide. So, some 'implicatures' (such as scalar cases, indirect requests, and bridging inferences) qualify as convention-based contributions to the conversational record and hence qualify as genuinely semantic content. While others (e.g. metaphor, irony, sarcasm) qualify as open-ended invitations to engage with what the speaker says (with no determinate proposition to be added to the conversational record). Thus, for Lepore and Stone, 'implicatures' as Grice conceived them span across the semantic/pragmatic divide. Since no unified treatment could accommodate such a disparate set of cases, they conclude that Grice's category of 'conversational implicatures' should be eliminated as theoretically unhelpful.

While Lepore and Stone's approach is clearly radical and worth fuller consideration than I can give here, we might note that there are some prima facie worries with the model they provide. First (as other theorists have noted, e.g. Szabó 2016; Stainton & Viger 2018), Lepore and Stone don't provide a particularly robust account of 'convention' or what has to be in place for content to be 'fixed by convention'. Yet this lacuna apparently leaves them

open to the challenge that there are plenty of linguistic expressions that have a conventional usage but which fail to express a semantic content that hearers should add to the conversational record. For instance, as Stainton and Viger 2018 note, the rule attaching to the term "gesundheit" is something like "used as a conventional response when someone sneezes," but the fact that the term has a clear conventional use does not entail that it contributes a determinate semantic content. Being a linguistic expression associated with a clear linguistic convention is not sufficient, it seems, to guarantee a semantic contribution.

Second, and more problematic, is the fact that there are also nonconventional, imagination-based expressions which it seems must be allowed to make a contribution to the conversational record. The conversational record is supposed to keep track of linguistically relevant moves, in order to help a speaker to decide on an appropriate conversational contribution at any given point. Yet it is clear that, in order to decide what to say at any point in a conversation, one needs to know about pragmatic content just as much as (perhaps even more than) semantic content. I won't be able to contribute appropriately to a conversation where I've heard you say "Moeen is a fine friend" if I fail to realize you've spoken ironically, or if I don't realize when you say "Jill is ready" that you've said she is ready for her exam. Planning one's next conversational move depends fundamentally, it seems, on a grasp of metaphorical content, irony, loose talk, and so on (Green 2018). If all of these kinds of contents are placed 'off record', as Lepore and Stone seem to envisage, then hearers will need to run a second, more liberal kind of conversational record, one which tracks both kinds of linguistically conveyed content, alongside the one that tracks only conventional, semantic contributions. Yet this seems to multiply conversational records (and cognitive load) unnecessarily.[16]

So, instead of eliminating the category of implicatures and entirely scrapping Grice's framework for dividing up utterance meaning, let's turn to a second, very widely endorsed response to cases like (15)–(20). On this approach the lesson to be drawn from the problematic cases is that we should refine Grice's bipartite model, replacing it with a tripartite divide which recognizes:

(i) standing sentence meaning (exhausted by lexico-syntactic features but often/always subpropositional content).

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[16] Although I won't pursue it here, we might also want a firmer grip on the kind of determinacy Lepore and Stone claim to be had by conventional expressions and lacked by nonconventional ones. Some conventional terms are vague, thus any contents they express must be, it seems, in some way indeterminate, while some nonconventionally conveyed contents seem pretty determinate – in the right context, a response of "I have a meeting" to the question "Would you like to have lunch with me?" may automatically be heard as expressing a determinate content to the effect that the speaker can't or won't have lunch with the questioner (see Borg 2017).

(ii) directly asserted, pragmatically enhanced propositional content – what the speaker says (what I'll term, following Sperber & Wilson 1986, 'explicature content').

(iii) indirectly conveyed content – what the speaker implies.

This three-way divide gives us the general shape of what have come to be known as 'Contextualist' models.[17] According to this school of thought, what a speaker says (i.e. the content which captures what the speaker directly expresses or asserts) is shot through with rich pragmatic effects. Grice's notion of what is said by a speaker, if this is to be propositional/truth-evaluable, asserted content, cannot, Contextualists argue, be content that is recovered on the basis of just a small subset of well-behaved contextual processes (like disambiguation and reference assignment), rather the full panoply of pragmatics (as partially illustrated by (15)–(20)) must be allowed to enter.

Cases like (15)–(20) provide a valuable lens through which to ask what (if any) force Grice's original machinery can still wield in the contemporary debate. However, I want to suggest that, in answering this question, we need to be careful about exactly what lessons we draw from them. For what these kinds of cases show, I contend, is *not* that the Gricean assumption about what is said – namely, that there is a useful and important notion of linguistic content which cleaves very tightly to lexico-syntactic content – is wrong. Rather what they show is that the move (somewhat tacitly made in Grice and more explicitly made post-Grice) to identify semantic content with what is said by a speaker is a mistake. To see this, however, we need to take something of a detour through the Contextualist picture of a semantic theory infiltrated throughout by rich pragmatic processing, asking how this approach distinguishes explicatures from implicatures. The question we need to ask, for any contextually given piece of content, is whether it contributes to what is said or asserted (explicature content) or to what is indirectly conveyed (implicature content)? This has proved a notoriously difficult question for Contextualists to answer and I will argue that the only plausible answer to be given serves to reveal the need for propositions determined on the basis of lexico-syntactic properties (together with disambiguation and reference assignment) alone (that is to say, it shows that we do need contents which answer to Grice's structural definition of 'what is said by a speaker').

Testing for Implicatures vs. Explicatures
The question we face is how to individuate explicature content from implicature content – if someone says "Naoki took out his key and opened the door" what makes the content *Naoki took out his key and opened the door with his*

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[17] Although this term remains vexed (see Borg 2016) I'll abstract from these issues and include theorists such as Recanati 2004, 2010; Bach 1994; Sperber and Wilson 1986; Carston 2002 under this label.

key the proposition expressed or asserted, as opposed to being a content merely implied? Or again, in our above example, should we treat the content that *there is an open garage around the corner* as part of the explicature – what the speaker directly conveys – or as part of an implicature (as Grice himself thought)? A range of tests have been proposed to answer this crucial question, including formal constraints and what I would term 'processing accounts', however as I've argued elsewhere (Borg 2016), none of these tests seem able to draw the explicature/implicature divide at the place where we intuitively want it. To see this, let's turn now to look very briefly at some of these proposals.

According to Sperber and Wilson's canonical account (1986: 182), an explicature is a "pragmatic development of the logical form" of the sentence produced. Thus, we might think to define implicatures negatively, simply as contextually derived contents that are not mere developments of extant logical form. So, for instance, we might think that (21a) counts as an explicature of (21), while (21b) could only be an implicature:

(21)   Every bottle is empty.

(21a)   Every bottle *in the fridge* is empty.

(21b)   You should go to the liquor store before the party starts.

While this proposal has intuitive force and prima facie seems to deliver the results we want (e.g. making the right ruling for (21)), it does face difficulties. For instance, consider (21c):

(21c)   Every bottle is empty and so you should go to the store.

Here it seems we have 'developed' the original logical form, via conjunction introduction; so should we count (21c) as potential explicature content or only a potential implicature? To decide how to answer this question it seems that we either need a fuller account of 'development' or we need some additional test we can apply to developed logical forms to decide if they constitute explicatures or implicatures. Proposals have been made along both these lines. For instance, Carston and Hall (2012) have suggested that any 'nonlocal' development, where this means allowing pragmatic processes to modulate a whole proposition rather than a part, must count as implicature content. This kind of 'locality constraint' seems to do the work required in ruling (21c) as an implicature rather than an explicature, but it too runs into difficult cases. For instance, consider (21d):

(21d)   Every bottle in the fridge is empty to a degree that is going to require you to go to the store before the party starts.

This is arguably a local development, yet it captures content that above we thought intuitively would only constitute an implicature not an explicature of (21).

Alternatively, then, we might turn to other features to mark the difference here. For instance, both Carston 2002 and Recanati 2004 have appealed to the 'scope test', requiring explicature content to fall within the scope of operators such as conditionals and negation, while implicature content can fall outside. However, as Carston herself notes, such a test seems problematic. First, because it seems to draw the line in intuitively the wrong place, for instance counting the content generated by sarcastic utterances as explicature content. Thus, as Camp 2006 has stressed, if I say "If you have one more great idea like that you'll be sacked" the sarcastic content – that your ideas are not great – seems to be part of the overall truth conditions of what I say (falling within the scope of operators).[18] Yet intuitively such sarcastic content is not something I assert directly but instead has a much more indirect, implicature-like feel. Furthermore, scope tests (and others like it) seem to operate at the wrong level for individuating explicatures from implicatures. For scope tests operate at the sentence level, targeting type sentences, while at least particularized conversational implicatures are most certainly properties of token utterances.

Finally, then, we might think to look to the realm of psychological processing to do the work required instead. So Sperber and Wilson 1986 suggested that the only way to individuate explicatures from implicatures is to use their general relevance framework, whereby propositions that are highly relevant for a hearer (which they define as having high cognitive effects for low processing costs) will constitute explicature content, while less relevant content will count as implicatures. Recanati 2004 also defined explicature content (what he calls 'what is said') in psychological terms, as the first full proposition available to a hearer on processing a given utterance, with all implicatures requiring further inferential work from this first available content (see n. 14 above). However, it is not at all clear that turning to psychological criteria will draw the division in the place we want either. For, on the one hand, content classed as classic Gricean implicatures and which definitely seems to be in some way indirectly conveyed (e.g. communicating *Jones is not a good philosopher* by saying "Jones has nice handwriting") might nevertheless constitute the most relevant content for the hearer. While, on the other hand, as Grice himself stressed it seems that sometimes an implicature can be 'intuitively grasped', that is grasped without entering into a complex psychological derivational procedure. As Grice writes (1989: 31, my emphasis):

The presence of a conversational implicature must be capable of being worked out; for *even if it can in fact be intuitively grasped*, unless the intuition is replaceable by an argument, the implicature (if present at all) will not count as a conversational implicature; it will be a conventional implicature.

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[18] See also Weiner 2006; Camp 2012.

This seems to suggest that Grice himself allowed that sometimes an implicature may be the first recovered content a hearer entertains (which would, contra intuition, make it count as an explicature according to the current suggested definition). For reasons of space, I won't explore the apparent problems with each of the extant criteria for holding apart explicatures and implicatures any further (see Borg 2016 for further discussion), for instead I want to turn at this juncture to what I take to be the only plausible candidate for individuating explicatures from implicatures, namely socio-linguistic features.

15.5   Using Socio-Linguistic Notions to Distinguish Elements of Utterance Content

As I've argued elsewhere (Borg 2017), I think we should move towards an understanding of the explicature/implicature divide which locates the difference in the socio-linguistic realm, arising from the relation of language to social norms and cultural expectations. On this approach, a socio-linguistic implicature is an element of communicated content that a speaker is not held strongly conversationally liable for, whereas explicature content is communicated content that a speaker is judged strongly conversationally liable for. Conversational liability I take to be a matter of degree, where a speaker can be held more or less responsible for communicating a given piece of content and where it is commensurably more difficult or more easy for the speaker to retract or reject the content in question as forming part of what she is committed to by her utterance. As with the Contextualist model above then, I want to agree that some richly pragmatically enhanced contents count as directly asserted (so constitute part of Grice's notion of 'what is said by the speaker' *when this notion is defined in terms of directly asserted, rather than indirectly conveyed, content*), while other such contents count only as indirectly conveyed implicatures. A speaker who says (in the right context) "Bill got married and had children" may well succeed in asserting that *Bill got married and then had children,* or someone who says "Jill is ready" may assert that *Jill is ready to bowl*, even though these asserted contents outstrip what we can recover on the basis of lexico-syntactic constituents alone. These contents will count as asserted, I suggest, just in case the speaker is held strongly conversationally liable for them by ordinary interlocutors, i.e. if speakers cannot, or find it extremely hard, to retract or reject them as forming part of what they said.[19] It is notions of responsibility and liability then that give us the divide Contextualists want between explicature and implicature content.

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[19] Once we take this socio-linguistic turn, there are serious questions to be asked about the role of speaker intentions in determining communicated content, for a speaker might of course be held liable for asserting a content which they did not in fact intend. For Grice, speaker intentions

Table 15.1. *Three categories of utterance content*

(a)	p is determined by lexico-syntactic content and involves no pragmatic modulation beyond disambiguation and reference determination.	p is minimal content
(b)	p involves pragmatic modulation beyond (i) and is a content typical hearers would treat the speaker as being strongly conversationally liable for.	p is explicature content
(c)	p involves pragmatic modulation beyond that in (i) and is a content typical hearers would treat the speaker as being weakly conversationally liable for.	p is implicature content

However, I suggest that once we turn to the socio-linguistic realm to distinguish these kinds of contents, what we also find is that there is an ineliminable role for propositional contents which are fixed just by word meaning, sentence structure, disambiguation and reference determination (i.e. contents which map to Grice's notion of 'what is said by the speaker' *when this is defined in structural terms*). That is to say, if we allow that socio-linguistic factors (to do with the degree of responsibility a speaker is held to have for a given communicated content) provide the most plausible ground for distinguishing between explicature and implicature content, then we cannot avoid *also* positing a notion of minimal content that tracks Grice's structural version of 'what is said by the speaker'. If this is right, it yields a slight tweak on the three-way divide within the total signification of an utterance provided by the Contextualist: if a speaker U utters a sentence s and thereby conveys p, p will fall into one of the three categories shown in Table 15.1.

Here (a) captures Grice's structural definition of 'what is said by the speaker'. Elsewhere, I've labeled this kind of content 'minimal content' (see Borg 2004, 2012 for further discussion of this terminology). Minimal content differs from 'standing sentence meaning' in the Contextualist model above as it is held always to be genuine propositional or truth-evaluable content, rather than some subpropositional fragment of meaning. So why might we think that this level of content must be propositional in nature? The answer to this

were crucial for his analysis of linguistic meaning, which saw meaning in language as reducible to meaning in thought. However opinions vary on whether Grice required all conversational implicatures to be intended by a speaker or not. For instance, Saul 2001: 635 writes: "[I]t is genuinely unclear whether Grice took being meant by the speaker to be a necessary condition for being a conversational implicature. He may well have done so, but the only place in which he states this explicitly is a passage in "The Causal Theory of Perception" which he chose to omit when he collected his papers for Studies in the Way of Words." Borg 2017 and Borg and Connolly 2022, discuss this issue further and push the idea that speaker intentions are not the final arbiters of what speakers say, with the judgments of liability made by informed hearers being potentially overriding factors.

question is: because there are socio-linguistic practices which are clearly grounded in this kind of content. So, for instance, consider the important socio-linguistic category of lying. It seems that paradigm cases of lying involve a speaker producing a sentence with a literal meaning p where they know or believe p to be false (perhaps with the additional clause that they intend to get their audience to believe p). As many authors (e.g. Camp 2006; Goldberg 2015; Saul 2013; Michaelson 2016) have suggested, paradigm judgments of lying seem to track something *very like* minimal content. So, take an utterance of:

(22)   Maya took out her key and opened the door.

Imagine that the speaker knows that Maya took out her key but did not use it to open the door (perhaps the door was already unlocked and she had taken out her key to unlock something in the room). Here the utterance is clearly misleading, and it may well be intended to be misleading, but intuitively it seems it does not count as a lie. Although the speaker might well be conversationally committed to the bridging inference that Maya opened the door with her key, since this is something most ordinary interlocutors would assume (and after all it is this which grounds our judgment that the speaker in this case is being misleading), intuitively the speaker is not judged to have the kind of responsibility for the bridging content that would underpin an accusation of lying.[20] To lie using an utterance of (22) it seems that the speaker must know or believe either that Maya didn't take out her key or didn't open the door (i.e. she must know or believe that the minimal content of (22) is false).

Or again, take the well-entrenched distinction between following the rules of a game and abiding by the spirit of the game. The rules of a game are written down or orally preserved and they state the conditions players must observe if they are to play the game. Yet the rules will often allow for a range of actions which, if a player were to undertake them, would ruin the game for others. These activities – not strictly prohibited by the rules but nevertheless not acceptable – constitute breaches of the spirit of the game and players can be criticized when they perform them, even though there are no explicit penalties or sanctions that can be imposed (as there would be with breaches of a rule). Playing in line with the spirit of the game constitutes what we recognize as fair play. So, for instance, nothing in the rules of soccer say that (if the game hasn't

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[20] To be clear, this is not to claim that it is *impossible* for a speaker to be judged to have lied on the grounds of asserting explicature content rather than purely literal content. I think the jury is still out on this question (although, to put my cards on the table, I suspect that empirical work will find that our requirements on lying cling extremely closely to literal meaning). Rather the claim is simply that paradigm judgments – the ones which ground the notion of lying as a clear and socially useful category – map to minimal content not to richly pragmatically enhanced explicature content.

been stopped by the referee) a striker can't shoot when the opposing goal-keeper is incapacitated. Yet most people recognize that shooting at an open goal when the keeper is lying on the floor injured is unsporting – it is failing to play within the spirit of the game. When a player abides by this sense of what the spirit of the game demands they are commended as examples of good sportsmanship (as in a match in 2000 when West Ham striker Paolo di Canio caught the ball, rather than taking a shot, because goalkeeper Paul Gerrard was lying injured).[21] This kind of commendation is not generally forthcoming when someone merely abides by the rules of the game. This well-established, socio-linguistic distinction again depends, I want to argue, on recognizing a minimal propositional content that is strictly bound by the lexico-syntactic content of the sentence (i.e. a kind of content which is defined by Grice's structural sense of 'what is said by the speaker') and which gives us the rules of the game. This differs from the explicature content that all reasonable interlocutors may take the rule-setter to have committed herself to by her statement of the rules (the pragmatically delivered spirit of the game). Furthermore, this kind of distinction matters in other areas as well, such as in legal discourse and similar contexts where interpretation of a text, perhaps as opposed to a speaker, matters (e.g. academic dissertations and textualist interpretations of religious scripture); see Borg 2017; Borg and Connolly 2022 for further discussion.

What cases like (15)–(20) demonstrate then, I want to suggest, is not that Grice's category of implicatures cross-cuts the semantics/pragmatics divide and so must be eliminated (Lepore and Stone's proposal), nor do they show that the only important distinction within the total signification of the utterance comes between content the speaker directly asserts and content she merely implies. Rather what they show is that Grice's original category of 'what is said by the speaker' merged two different individuating features, features which can and often do come apart.

On the one hand, Grice gave us a formal, structural definition of 'what is said', in terms of content delivered by the words and structure of the sentence together with the limited pragmatic processes of disambiguation and reference assignment. On the other hand, however, by labeling this notion 'what is said by the speaker' he seems to have intended to capture our intuitions about the content a speaker asserts or directly communicates. But as cases like (15)–(20) show (given our working assumption that Indexicalist approaches won't work, see note 13), what is asserted/directly expressed cannot be captured by lexico-syntactic elements, plus disambiguation and reference determination, alone. Instead rich pragmatically derived content must be allowed to figure. Yet none

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[21] www.theguardian.com/football/2001/nov/29/newsstory.sport4

of this is tantamount to showing that the content which lines up with Grice's structural definition is otiose.

Contextualist accounts claim that:

(i) Sentences [often/always/only] express propositions given rich pragmatic inference.
(ii) It is explicatures alone (not sentence-level contents) that have contextual effects (in terms of affecting agent's belief sets, etc.) and are therefore worthy of conscious attention (Sperber & Wilson 1986: 193).

Yet as I've tried to suggest, once we turn to look at socio-linguistic practices we see that both these claims are problematic, as we cannot make sense of the practices surrounding things like lying, perjury, misleading, deceiving, defamation, rules vs. spirit of games, and textualist interpretations in the law and religion, without positing a propositional content delivered by words and structure (together with disambiguation and reference determination) alone.

When subsequent writers took Grice's notion of what is said by the speaker as capturing semantic content, and combined this with the idea that 'what is said' must capture what the speaker intuitively asserts, this led to the view that semantics must be treated as ineliminably shot through with rich pragmatic processes. As Soames (2009: 320) notes (when discussing cases like (15)–(20)):

In all these cases, meaning, or semantic content, is incomplete, with conversational maxims playing an important role in selecting contextual completions. In this way, the maxims contribute to what is asserted, and, thereby, to the truth-conditions of utterances. [T]hese cases contrast with classical conversational implicatures, in which one says or asserts one thing, and, as a consequence, implicates something else that is not asserted.

Yet once we recognize the tension in Grice's original account and see that the two elements of his definition pull apart, we can also recognize, I contend, that the most explanatorily robust move is to retain *both* elements of his account of 'what is said by the speaker', positing both a structurally constrained minimal content *and* a socio-linguistic, pragmatically enhanced notion of explicature content.

Thus I want to recommend the kind of neo-Gricean framework for the total signification of an utterance displayed in Table 15.2.

The divide between (i) and (ii) – semantic versus pragmatic content – should be construed (as it was by Grice's structural notion of 'what is said by the speaker') as grounded in the kinds of processes licensed in production/recovery of the given content-type: limited, lexico-syntactically based processes for semantic content; rich, abductive, potentially all-things-considered processes for pragmatic content.[22] This process-based account yields a binary distinction

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[22] Notice that, if it turns out to be permissible to treat some such cases as containing hidden variables at the level of logical form (the approach I termed 'Indexicalism', note 13), this would divide up cases like (15)–(20), with some falling on the semantic side and some on the

Table 15.2. *A neo-Gricean framework for utterance content*

Type of content	Type of speech act	Kind of liability generated	Phenomena explained
(i) Semantic content	(a) *Assertion*	Strict linguistic liability	Systematicity, productivity, learnability Paradigm lies/perjury Textualist interpretations (e.g. in law/religion) (Also, the developmental trajectory for language acquisition; see Borg 2017)
(ii) Pragmatic content	(a) *Assertion*	Strong conversational liability	Misleading Defamation
	(b) *Implicature*	Weak conversational liability	Deception Innuendo

between propositions which capture the literal, standing meaning of linguistic expressions on the one side (allowing that semantic content is suitable for a potentially modular account of the cognitive capacities which underpin it, see Borg 2004, chapter 2), and propositions which capture pragmatically conveyed utterance content, a content which is not strictly compositional and which involves processes capable of considering anything a speaker or hearer knows. The divide between (a) and (b) on the other hand – asserted versus implied content – is not a division in kind but is rather a vague, hazy boundary drawn in terms of socio-linguistic notions like praise/censure of the speaker, judgments of conversational responsibility and conditions of retraction. Sometimes (but very far from always) speakers assert the literal, minimal semantic content of the sentences they produce, while at other times they assert pragmatically enhanced contents (explicatures).[23]

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pragmatic side. So if, say, a good case can be made for positing relevant variables in the logical form of sentences containing quantifiers, quantifier restriction would turn out to be a genuinely semantic phenomenon.

[23] This model allows us to say, first, that sometimes something which constitutes a particularized conversational implicature in Grice's original account can constitute an explicature (for instance, the speaker who says "There is a garage around the corner" may succeed in asserting that *there is an open garage around the corner*). The crucial fact that we need to recognize then is that the explicit/implicit divide is a socio-linguistic notion that cannot be decided without in-depth knowledge of the context of utterance, *not* a processing or structural distinction. (This is something which I suspect most Contextualists would welcome, since it is key to many such accounts that determining the difference between explicatures and implicatures is something which can only occur at the token, not the type, level.) The semantics/pragmatics distinction, on the other hand, is a processing/structural distinction but it cross-cuts the asserted/implied divide.

This model differs from the Gricean picture with which we began, in that it allows that contextually determined content (where the processes involved go beyond the ones Grice countenanced as part of what is said by the sentence, i.e. beyond mere disambiguation and reference determination, to include such things as pragmatic broadening and narrowing) can count as asserted content. However it follows the original Gricean framework in maintaining that there is an important kind of propositional content (what I would term 'minimal semantic content') which depends only on the elements of the sentence produced (broadly speaking, the words it contains) and the way they are put together. And it contrasts this kind of content with all and any content deriving from rich, all-things-considered contextual processing. It then recognizes Grice's crucial division between asserted and merely implied content but holds that this is a socio-linguistic distinction, to do with degrees of liability and conditions for retraction, which are orthogonal to the question of literal, semantic content versus nonliteral, pragmatically determined content. By clarifying the core relationship between the semantics/pragmatics divide and socio-linguistic notions like assertion and implicature, then, I suggest that we can arrive at a truly satisfying account of the intuitive category of implicature content that Grice did so much to bring to our attention.

15.6   Conclusion

I have suggested in this chapter that Grice's technical notion of 'implicature' is both intuitively appealing and does important explanatory work, capturing content that we take speakers to have indirectly communicated. However, the framework within which implicatures were originally introduced – which holds apart content delivered via lexico-syntactic processing and content delivered via rich pragmatic processing, and claims that the latter is always indirectly conveyed implicature content – is problematic. For, as Contextualists have stressed and contra to Grice's original model, not all rich pragmatic content is implied, some is directly asserted explicature content. Grice's three tests, then, turn out to be good tests for richly inferential pragmatic content, but they are not good tests of indirectly conveyed implicature content. In light of this recognition, Contextualists have proposed a refinement of Grice's original framework, which recognizes three kinds of content: incomplete sentence meanings, explicatures and implicatures. However, this revision leaves Contextualists with a fundamental question to answer concerning how to individuate explicature content from implicatures.

I suggested that the only plausible answer to this individuation question is to look to the socio-linguistic realm, asking what content a speaker is held most strongly conversationally liable for. However, once we turn our attention to the socio-linguistic realm, I argued that we find that the content individuated in

terms of Grice's structural definition of 'what is said by the speaker' (content individuated by word meaning, compositional structure, disambiguation and reference assignment alone, which I above termed 'minimal semantic content') must, contra the Contextualist suggestion, be treated as genuinely propositional content. We need propositional contents which answer Grice's structural definition of 'what is said by the speaker' in order to capture things like the lying/misleading and the rules/spirit of the game distinctions. It seems then that we need *both* (i) the distinction between content Grice identified via his structural definition of 'what is said by the speaker' and content which is arrived at via richer pragmatic processing, *and* (ii) the distinction between directly conveyed and indirectly conveyed content (the explicature/implicature divide). Although terminology is somewhat vexed in this area, I suggested that we might think of the first distinction as the distinction between semantics and pragmatics, and the second as the distinction between assertion and implication. The moral of this re-visiting of Grice's notion of implicature, and his framework in general, then, is that if we want to understand the terrain here properly, we need to appreciate that the semantic/pragmatic and asserted/implied distinctions cross-cut one another. The divide between semantics and pragmatics should, I suggest, be understood as a type-level processing distinction, where semantic content is delivered by processes that look no further than to what is given at the lexico-syntactic level, while pragmatic content is delivered by rich, abductive, all-things-considered reasoning. On the other hand, the asserted/implied distinction is a token-level socio-linguistic distinction, which cleaves content apart in terms of the role that that content plays in our communicative exchanges. Contra Lepore and Stone, I would argue that Grice's category of implicature remains an extremely useful category in contemporary theorizing about linguistic meaning, but as a speech act category, rather than as the opposite of semantics.

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16 Presuppositions[*]

Márta Abrusán

> '*The collapsing of Strawson's sleeping children into Stalnaker and Saddock's lunch-obviating sister, who herself metamorphoses into Grice's aunt's philharmonic cousin who in turn mutates into Burton-Roberts' lunch-going sister should remind us that in the evolution of presupposition theory, all progress is relative.*'
>
> (Horn 1990: 487)

16.0   Questions and Answers

(1)   Why do you think both linguists and philosophers find presuppositions interesting?

We do not live in a void. External information from the world is constantly perceived and processed by the senses. In order to facilitate this process, our cognition relies on a number of background assumptions and predictions based on previous experience. One of the most interesting linguistic aspects of this fact is the phenomenon of presupposition. Almost anything we say presupposes a number of things; this is why presuppositions have been of interest to linguists for the last 50 years. However, the issue of presuppositions also goes to the heart of analytic philosophy: key topics such as the analysis of assertion (Schlöder, this volume), attitude ascriptions (Kratzer, this volume), argumentation (Pavese, this volume), definite descriptions (Coppock's and Kamp's contributions to this volume), indexicality (Bary, this volume), implicatures (Borg, this volume), modals (Mandelkern, this volume), perspective sensitivity (Anand and Toosarvandani, this volume) and vagueness (Carter, this volume), among others, rely crucially on an understanding of presuppositions.

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(2)   What recent developments in linguistics and philosophy do you think are most
            exciting in thinking about presuppositions?

Traditional linguistic approaches to presupposition were mostly concerned with
the interaction of presuppositions with various logical connectives and other
embedding contexts, the so-called projection problem. Recent developments in
linguistics have started to link the analysis of presuppositions to general processes
of cognition and reasoning, such as attention, probabilistic reasoning and infor-
mation structure. The bulk of the paper reviews these recent developments.

(3)   What do you consider to be the key ingredients in adequately analyzing
            presuppositions?

One key ingredient for adequately analyzing presuppositions is to understand
its interaction with the discourse context. In order to be able to do this, we need
more good quality data. This calls for more large-scale corpus studies as well
as verification of data in an experimental setting.

(4)   What do you consider to be the outstanding questions pertaining to presuppositions?

Some outstanding questions concern the acquisition of presuppositions,
perspective-taking (see Anand & Toosarvandani, this volume), the interaction
of presuppositions and discourse structure (see Hunter & Thompson, this
volume). Another question is whether presuppositions form one coherent
group or they should be thought of as different types of presuppositional
phenomena, and if yes, along what dividing lines. Finally, the answer to the
ultimate questions, why do we have presuppositions at all, and why exactly we
see the presuppositions that we see, looms still in the distance.

16.1   Introduction

What would it be like to speak a language without presuppositions? Is it even
possible to have such a language, and if yes, would we want to speak it? Here
is a game to try: let's transcribe the fist sentence of the novel *Wuthering
Heights* by Emily Brontë (1) into a text that does not contain expressions that
are typically assumed to trigger presuppositions, cf. (2):

(1)   I have just returned from a visit to my landlord—the solitary neighbour that
            I shall be troubled with. (*Wuthering Heights*, Emily Brontë)

A first attempt at a presuppositionless transcription:

(2)   I have a unique landlord that I went to visit recently. He is a (solitary)[1]
            neighbour that I shall be troubled with and there is no other neighbour that

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[1] I am assuming *solitary* has a double meaning in this context: The sole (only) neighbour and also
that this neighbour is solitary.

> I shall be troubled with. I am now at a location which is identical to where I was before I went to visit him.

An immediately visible result of this little exercise is that spelling out the presuppositions of various expressions creates a rather tedious text. I have assumed that the presuppositional expressions above are the verb *return from x* (which presupposes that its subject went to x at a previous time), the definite descriptions *my landlord, the neighbour* (which presuppose that there is a unique individual that the description refers to) and *solitary* (=*sole*) (which presupposes the clause that it modifies, and asserts an exhaustification of it). Just trying to spell out all these presuppositions creates a text that almost certainly no one would want to read any further. One reason for this tediousness is repetitions. There is something about presuppositions that helps package information in an efficient way.

In fact, the above paraphrase was based on a limited understanding of presuppositions that assigns them to a relatively small subset of the lexicon, also called conventional presupposition triggers (see an example list in Section 3.1). If we think of presuppositions as a broader category that encompasses sortal and compositional restrictions of lexical items (cf. Magidor 2013; Asher 2011) as well as bits of world knowledge and assumptions of conversational partners (a.k.a. conversational presuppositions), a presupposition-free paraphrase becomes impossible. This is because the paraphrase has a problem of regression: any word that we use to explicate the sortal restriction of another word has sortal presuppositions itself and understanding our paraphrases require a significant amount of world knowledge and assumptions about our conversational partners as well. Here is thus a second (failed) attempt at paraphrasing (1):

(3)   I am an adult who has enough money to be able to rent a habitation from a landlord, of which I have exactly one. I am able to displace myself and I went to visit him recently. Having neighbours requires at least a certain amount of human interaction which I don't like. He is a (solitary) neighbour that I shall be dealing with and there is no other neighbour that I shall be dealing with. I am now at a location which is identical to where I was before I went to visit him.

Another irreducible and arguably presuppositional aspect of the above example is the interpretation of anaphors. One reason is the gender restriction on pronouns is commonly thought of as a presupposition on their use. But more importantly, the requirement that an anaphoric pronoun needs to be resolved to a suitable referent in the discourse is usually thought about as a presupposition on using the pronoun. However, spelling out the anaphoric component of pronouns results in metalinguistic statements ("a unique discourse referent of *he* can be found in some preceding discourse"):

(4)   I am an adult who (a unique referent of *who* can be found in some preceding discourse) has enough money to rent...

Thus it seems all but impossible to transform English into a language that does not use conversational and sortal presuppositions, or anaphoric pronouns. Eliminating certain conventional triggers such as change of state verbs, definite descriptions or focus particles from our language is perhaps manageable (though one might wonder about the possibility of eliminating some other conventional triggers, for example the factive verb *know* or discourse connectives; see Pavese 2020 for discussion of the latter) but at the cost of creating a highly tedious and cumbersome text. If we add the content of presuppositions to our sentences explicitly – to the extent that it is possible – we end up endlessly repeating bits of information.

Another aspect of the original example (1) that is lost in the paraphrases is the illusion of familiarity that Brontë creates between the reader and the protagonist. This illusion might be due to the requirement according to which the content of presuppositions should be already present in the common ground of the interlocutors at the time of uttering a presuppositional sentence (see discussion in the next section). When this is not the case, and there is no information that contradicts them in the common ground, presuppositions are thought to be accommodated, i.e. silently added to the common ground. Since (1) is the first sentence of a novel, there is no common ground between the reader and the narrator other than general world knowledge. But the use of presuppositions and the resulting accommodation process forces the reader to create one, which in turn produces an illusion of familiarity between the reader and the protagonist.[2]

Presuppositions are an irreducible property of natural language use. They have a crucial role for creating coherent discourse, managing new and old information. They have a crucial role in keeping track of discourse referents, whether concrete or abstract. They have a crucial role in efficient information packaging at the lexical level: they way we fold concepts into words interacts fundamentally with presuppositions. They even have a crucial role in managing social interaction and bonding between conversational partners in dialogue.

This is why it is hard to find a topic in semantics and analytical philosophy that does *not* interact with presuppositions. The study of assertion (Schlöder, this volume), attitude ascriptions (Kratzer, this volume), argumentation (Pavese, this volume), definite descriptions (Coppock, Kamp, this volume), discourse structure (Hunter, this volume), indexicality, implicatures (Borg, this volume), modals (Mandelkern, this volume), perspective sensitivity (Anand and Toosarvandani, this volume), vagueness (Carter, this volume) and more . . . all interact crucially with presuppositions.

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[2] In the French linguistic tradition, Ducrot (1984) emphasises that presuppositions create a "fundamental complicity" between interlocutors.

And yet, there is little agreement about what presuppositions are as a theoretical phenomenon, what are examples of it, whether it is one phenomenon or many different phenomena, how presuppositions arise, what the content of particular presuppositions is, and many other issues. Perhaps the only thing that everyone agrees about is that presuppositions project: the presuppositional inference can survive in contexts that are normally entailment-cancelling: the so-called family of sentences test:

(5)   a. I doubt that Mr. Lockwood has returned from his visit.
        b. Has Mr. Lockwood returned from his visit?
        c. If Mr. Lockwood has returned from his visit, the lights should be on.
           all imply: Mr. Lockwood went for a visit.

The agreement ends there: why projection happens, why it shows the particular properties it does and what the fine-grained structure of the data is like is a matter of heated debates in both linguistics and philosophy. Indeed, the problem of explaining presupposition projection dominated the presupposition literature in the last 50 years leading to an abundance of projection theories that propose to explain the purported basic facts of projection.

Recently though, scholars have started addressing various questions in presupposition theory that are complementary to those asked by classical theories of projection: whether the presuppositions of various triggers show the same properties, why presuppositions arise to begin with (a.k.a. the triggering problem) and whether contextual and linguistic factors can influence presupposition projection and interpretation. After a discussion of major theories of what presuppositions are, this chapter overviews some of these recent developments. Unconventionally, I will not present in detail how the classic theories of presupposition predict the (alleged) projection facts (see Soames 1989; Heim 1990; Geurts 1999; Beaver 2001; Kadmon 2001; Potts 2015; Beaver & Geurts 2014, among others, for excellent overviews). Still, the conclusion I reach about presuppositions is valid for projection as well: it is complicated. Facts of presuppositions are the result of a dauntingly complex interplay of a number of lexical, contextual and extralinguistic factors and cannot be described by a simple beautiful formula one can print on a T-shirt.

16.2   What Is Presupposition?

16.2.1   *One Possibility: A Precondition to Meaning*

The dominant school of thought treats the word 'presupposition' as a speaking name: Just as the name Holly Golightly betrays the nature of the character that bears it, the word 'presupposition' tells us that it has to do with pre-existing suppositions, i.e. information that speakers in a conversation take for granted.

This information can be of many different types: it ranges from specific conditions attached to lexical items to aspects of general world knowledge and language use. The linguistic literature focuses mainly on the first type.

Understood as a precondition, presuppositions can be conceptualized as being a precondition for an expression to have a meaning in a given context (a.k.a. semantic presupposition, Frege 1892; Strawson 1950) or as a precondition for using an expression (or a sentence) felicitously in a context (a.k.a. pragmatic presupposition, Stalnaker 1972, 1973, 1974). Before I review these theories, let me add a few general observations. Although there is a debate in the literature about the true nature of presuppositions, often a mixed (or at least noncommitted, agnostic) position is assumed by researchers. One reason is that the two notions do not exclude each other, and in fact some have argued that both kinds of presuppositions are real (cf. Keenan 1971; Shanon 1976). Second, there is no such thing as a purely semantic presupposition because even semantic presuppositions have a built in pragmatic component: they place a requirement on the discourse participants' common ground and must be evaluated with respect to these.[3] This dual nature of semantic presuppositions is most explicit in the dynamic theories of Heim (1992) and van der Sandt (1992).[4] A purely pragmatic theory is possible, in principle,[5] although even proponents of Stalnaker's pragmatic view sometimes assume that semantic and pragmatic presuppositions can co-exist.[6] In the latter case the relationship between the two types of presuppositions is mediated by what came to be known as Stalnaker's Bridge Principle which states that the presuppositions of a sentence expressing a partial proposition must be commonly accepted before the proposition expressed is evaluated and added to the common ground. Finally, depending on the particular presupposition at hand, one or the other approach might seem more appropriate, at least to some researchers. The clearest examples of pragmatic presuppositions are those that cannot be traced back to particular words or expressions but seem to result from the

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[3] See discussion in Karttunen (1974) and Soames (1982), who define the notion of *utterance presupposition*, intended to capture this dual nature.

[4] A mixed, semantic-pragmatic approach to presuppositions was also developed in France by Ducrot, cf. Ducrot (1972, 1984). For reasons of space, I cannot discuss this approach in detail in this article.

[5] "I think all of the facts can be stated and explained directly in terms of the underlying notion of speaker presupposition, and without introducing an intermediate notion of presupposition as a relation holding between sentences (or statements) and propositions" (Stalnaker 1974: 50).

[6] "Since the whole point of expressing a proposition is to divide the relevant set of alternative possible situations – the presupposition set [the context set–MA] – into two parts, to distinguish those in which the proposition is true from those in which the proposition is false, it would obviously be inappropriate to use a sentence which failed to do this. Thus, that a proposition is presupposed by a sentence in the technical semantic sense provides a reason for requiring that it be presupposed in the pragmatic sense whenever the sentence is used" (Stalnaker 1973: 452).

expectations of discourse participants; in contrast, conditions tied to particular lexical items are more often viewed as semantic.

Semantic Presuppositions

Let us zoom in on semantic theories of presuppositions, which come in many flavors. The basic idea is that presuppositions are part of the lexical meaning of certain words and constructions, called presupposition triggers. One of the most widespread version of this idea, to be traced back to Frege (1892) and Strawson (1950), assumes that presupposition triggers denote partial functions. For example, on a Strawsonian analysis of definite descriptions, the latter presuppose that there is a unique individual picked out by the description. A partial-function analysis captures this by stating that the domain of the function denoted by *the* is restricted to properties with a single member (in a given context). When this condition is not met, the function cannot be applied and the result is undefinedness, a catastrophic breakdown of semantic composition. As was noted by Potts (2015), presuppositions are 'meta-properties of denotations' on this view, which also captures why presuppositions are felt to be a precondition to word or sentence meaning.

Many important variants of the semantic view have been developed in the last 50 years or so. One well-known version uses trivalent logics, cf. Keenan (1972) Karttunen (1973), and Seuren (1988) for early examples. Partial functions associated with triggers are undefined when their presuppositions are not entailed by the context. This undefinedness is, implicitly, a third truth value associated with presupposition failure. Trivalent accounts make this third truth value explicit, cf. Beaver (2001), Beaver and Krahmer (2001), George (2008) for relatively recent discussions. Other important variants include supervaluationist theories of presuppositions (cf. van Fraassen 1969), and the dynamic semantic approach of Heim (1992), to which I come back below.

Pragmatic Presuppositions

Stalnaker (1972, 1973, 1974) worked out a theory of pragmatic (or speaker–) presuppositions. (cf. also Stalnaker 1998 for a more recent exposition). On this view, speakers presuppose things, not sentences. Presuppositions are information that the speaker believes to be part of the accepted common ground among the interlocutors. If a speaker presupposes that p, she believes that p is true and also that her interlocutors believe it to be true as well. Saying that a sentence has a presupposition p, on this view, is only a shorthand for saying that the sentence can be felicitously used only if the speaker presupposes the truth of p. Thus on this view presuppositions are constraints imposed by sentences on the context in which they are uttered, the relevant notion of context being the beliefs of the speaker and what they believe to be compatible with the common ground.

An important aspect of this proposal is that presupposition failure is not predicted to lead to a catastrophic breakdown of communication. Second, this view allows for the possibility that certain (if not all) presuppositions arise due to general conversational principles or other pragmatic factors, instead of being hard-wired into the meanings of particular words or expressions.

Note that Stalnaker's theory was part of a flourishing pragmatic trend in the 1970s, inspired by Grice's pioneering work on pragmatics.[7] Much of this thinking did not assume that presuppositions are preconditions; I discuss these thories in Section 16.2.3.

Dynamic Approaches

Heim (1983, 1992) introduced a dynamic version of the partial-function approach: In this theory, sentences denote functions from contexts to contexts, but are defined only for contexts that entail their presuppositions. The idea that utterances can be viewed as functions that update the context is directly inspired by Stalnaker's theory of assertion and presupposition, and so is the assumption that presuppositions impose constraints on the context that is being updated by the assertion. But while in Stalnaker's theory assertions update the global context, Heim, following Karttunen's (1974) seminal work, proposes that the context is updated locally, i.e. the meanings of the subparts of a complex expression are added to the context step by step. Despite its conceptual closeness to pragmatic theories, Heim's theory is semantic in the sense that it relies on the idea that presuppositions are part of the lexical content of particular items, and as a result, become part of the conventional content of the clauses that contain these items.

Another major dynamic approach to presupposition is van der Sandt's (1992) anaphoric theory. Van der Sandt's idea is based on the observation that pronouns and presuppositions behave in a parallel fashion: syntactic configurations in which pronouns can be interpreted anaphorically are also configurations in which presuppositions are felicitous and conversely, configurations in which pronouns are infelicitous are infelicitous for presuppositions as well. In order to capture this connection, he proposes that all presuppositions are anaphoric in the sense that they need to establish an anaphoric link to an element in the previous discourse that entails the content of the presupposition. However, when a presupposition is bound by some element in its local context, it does not need to find a discourse antecedent in the (global) context, in other words, it does not project. Note that although the anaphoric theory is conceptually similar to Heim's common ground theory, the empirical predictions of the two approaches are not the same, see Geurts (1999) for discussion.

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[7] In Gazdar's (1979) theory, presuppositions of a sentence need to be satisfied by the context that has been first updated with the entailments and the conversational implicatures of the sentence. Presuppositions that are incompatible with this updated context are cancelled.

Projection

The idea that presuppositions are preconditions that the context needs to meet proved to be very fruitful for predicting projection facts; indeed most theories of presupposition projection on the market are based on this idea. Trivalent theories model projection via the trivalent truth tables for connectives, cf. Karttunen (1973), Beaver (2001), Beaver and Krahmer (2001), George (2008). The dynamic approach of Heim (1992) encodes projection properties in the lexical semantics (the context change potential) of the connectives. The anaphoric theory of van der Sandt (1992) derives projection facts from general rules of discourse for finding a suitable antecedent. Schlenker (2008, 2009) offer theories that attempt to derive the projection potential of connectives from pragmatic principles. See Beaver and Geurts (2014) for an overview.

16.2.2   Accommodation

A thorn in the side of the theory that views presuppositions as preconditions to meaning is the apparent ease with which we can utter sentences whose presuppositions are not entailed by the common ground of the speakers. For example the reader and the narrator clearly do not share the presuppositions of (1) at the time of uttering (or reading) the sentence. Yet (1) does not lead to a communicative breakdown, as would be predicted by the idea of presuppositions as preconditions to meaning. In fact, the sentence is easier to understand than its attempted presuppositionless variants.

There are two types of replies to this problem in the literature, skeptical and accommodating. Skeptics argue that the problem shows that the idea of treating presuppositions as preconditions is misguided cf. Burton-Roberts (1989), Gauker (1998), Abbott (2000). Others argue that the theory can be saved by assuming a repair mechanism, called presupposition accommodation. Below I briefly discuss the accommodating position, before coming back to the skeptical position in the next subsection.

An often quoted passage from Lewis (1979) suggests that presupposition accommodation is a magical process (see Abbott 2000), like some fairy in a tale that shows up to help just before a catastrophe is about to strike:

If at time t something is said that requires presupposition P to be acceptable, and if P is not presupposed just before t, then – *ceteris paribus* and within certain limits – presupposition P comes into existence at t. (Lewis 1979: 340)

Defenders of accommodation argued that the process is not so mysterious once we think more carefully about what really happens when we use a sentence with a presupposition in context. Let us look at Stalnaker's theory of presuppositions as speaker's presuppositions. According to this theory, when a speaker A uses a sentence with a presupposition p, she needs to believe

that p is true and that p is entailed by the common ground. Now suppose that A is wrong about p being in the common ground and B in fact does not believe that p is true. Then B, a competent speaker himself, will recognize the mistake and update his beliefs with 'A believes that p and that p is in the common ground', and if A can be taken to be an authority on p or the content of p is uncontroversial he might even strengthen this to the belief that p. Moreover, if the speaker knows that the hearer will behave this way, she can knowingly use sentences whose presuppositions are not met in the common ground, as long as these presuppositions are uncontroversial. Stalnaker (2002) says: "if it is common belief that the addressee can come to know from the manifest utterance event both that the speaker is presupposing that φ, and that φ is true, that will suffice to make φ common belief, and so a presupposition of the addressee as well as the speaker." (p. 710)[8] See also von Fintel (2008) and Thomason (1990) for discussion (among others).

If we accept that accommodation is a real pragmatic process, the question arises what and where to accommodate. As van der Sandt (1992), Beaver (2001), and Beaver and Zeevat (2004) show, the global context is not necessarily the right place to accommodate, sometimes accommodation can happen into embedded positions. Once we spell out all the constraints on accommodation, it turns out that a full theory of accommodation is a projection theory in disguise. Finally, as was stressed by Kamp and Rossdeutscher (1994), when we look at real-life examples we often find that even in the case of a single presupposition the context entails some but not all of the presupposed information and in practice a mixture of presupposition verification and accommodation is needed to justify the use of a presuppositional expression.

16.2.3   Another Possibility: A Side Effect of Information Packaging

Grice's writings were a major inspiration behind Stalnaker's theory, but they also gave rise to a different strand of pragmatic-minded thinking on

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[8] Immediately after, Stalnaker (2002: 710) acknowledges the importance of information structure though as well: "But it does not follow that this will suffice to make it appropriate for the speaker to say something that requires the presupposition that φ. There may be other constraints on appropriate assertion – other considerations that count in favor of stating that p rather than informing the addressee that p by manifestly presupposing it. A successful assertion may change the context in other ways than by simply adding its content to the context, for example by influencing the direction of the subsequent conversation. Suppose p is not something that the addressee will dispute, but that it is a noteworthy piece of information that the addressee might be expected to want to comment on. Then it might be inappropriate to convey the information in a way that keeps it in the background. An example of Kai von Fintel's illustrates the point: A daughter informs her father that she is getting married by saying 'O Dad, I forgot to tell you that my fiancé and I are moving to Seattle next week.'"

presuppositions. In a paper on definite descriptions, written in 1970 but published only in 1981, Grice argued that the implication of unique existence associated with 'The F is not G' should be seen as a conversational implicature because, just like other implicatures, it is nondetachable, cancellable and calculable. This idea gave rise to a number of neo-Gricean pragmatic accounts that tried to fully reduce the phenomenon of presupposition to conversational implicatures, using the maxims of relevance and quantity, e.g. Kempson et al. (1975), Wilson (1975), Atlas (1977, 1979), Atlas and Levinson (1981), Boër and Lycan (1976). More recent accounts close in spirit include Simons (2001, 2004, 2006, 2007), who argues for a conversational basis for presuppositions, as well as Chemla (2010) and Romoli (2015), who argue that certain presuppositions (namely of so-called soft triggers) are scalar implicatures.

In his 1981 paper, Grice also makes the following comment:

> For instance, it is quite natural to say to somebody, when we are discussing some concert, *My aunt's cousin went to that concert*, when one knows perfectly well that the person one is talking to is very likely not even to know that one had an aunt, let alone know that one's aunt had a cousin. *So the supposition must be not that it is common knowledge but rather that [it] is noncontroversial*, in the sense that it is something that you would expect the hearer to take from you (if he does not already know). (Grice 1981: 190, emphasis mine)

The idea that presuppositions should present noncontroversial information, rather than something that is in the common ground, was directly imported into Atlas and Levinson's (1981) theory of presuppositions as implicatures. Noncontroversiality also finds an echo in Abbott's (2000) view of presuppositions as nonassertions: if asserted information is up for discussion, then nonasserted information should be uncontroversial (see also Bezuidenhout 2010). In contrast to Grice and the neo-Griceans, Abbott (2000) does not attempt to reduce presuppositions to conversational implicatures, but assumes that presuppositions are a class of their own. Another approach that is related to the idea of presuppositions being noncontroversial and nonasserted is found in Wilson and Sperber's (1979) paper. They argue that the interpretation of an utterance involves a method of picking out and bringing to the forefront of attention the pragmatically most important entailments, on which the general relevance of the utterance depends. To achieve this, they propose that the semantic entailments of a sentence are ordered, based on syntactic form and relevance, into foregrounded and backgrounded[9] entailments, the latter acting as presuppositions. Both Abbott (2000) and Wilson and Sperber (1979) thus assume that presuppositions arise as a result of constraints on information packaging: only a subset of the total information conveyed by the sentence can

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[9] The term *backgrounded* should be understood here in terms of not being in the focus of attention, and not in the sense of being in the conversational background.

be its asserted/foregrounded content (aka its pragmatic main point), the rest (or at least a subset of the rest) is presupposed. Interestingly, this idea relates again to suggestions already made in Grice (1981) and Stalnaker (1974), who propose that using one short construction to assert two independent meanings should be pragmatically prohibited.[10]

For the accounts above, there is no infelicity in asserting informative presuppositions: For conversational implicatures, accommodation is the norm rather than the exception; and backgrounded/nonasserted information can (though does not have to) convey new information. Nevertheless, these theories were eclipsed by common ground theories because no precise projection theory with a wide empirical coverage was developed within these frameworks. Given the great number of highly successful common ground theories of projection, these came to dominate the field.

Nevertheless, recently there is a renewed interest in the idea of presuppositions as noncontroversial/backgrounded/nonasserted or – with more recent terminology – *not at-issue* material. One reason for this is the progress made in the understanding of different types of presupposition triggers (see the discussion in the next section). In particular, it has been shown that the presuppositions of some presupposition triggers can be accommodated more easily than the presuppositions of other triggers (cf. Spenader 2002; Beaver & Zeevat 2007). This fact is surprising if accommodation is a run-of-the-mill pragmatic process: it should be easily available for the interpretation of any presuppositional content. These empirical differences have lead some researchers to suggest that at least some presuppositions are genuinely informative (cf. e.g. Tonhauser 2015).

Second, although most detailed projection theories are formulated in the common ground framework, some recent theories attempt to predict projection facts without the assumption that presuppositions need to be entailed by the common ground. For example, Simons et al. (2010) propose that not at-issue meanings project, where not at-issueness is understood as content that does not address the question under discussion in a given context. A very different projection theory is proposed by Mandelkern (2016), who explicitly argues that presuppositions should not be thought of as constraints on input contexts, but rather as contents that are felt to be backgrounded.

A third reason is the growing interest in the problem of predicting why certain expressions trigger presuppositions, aka the triggering problem (cf. Simons 2001; Abusch 2002, 2010; Simons et al. 2010; Abrusán 2011, and

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[10] Grice writes: "If your assertions are complex and conjunctive, and you are asserting a number of things at the same time, then it would be natural, on the assumption that any one of them might be challengeable, to set them out separately and so make it easy for anyone who wanted to challenge them to do so" (Grice 1981: 189).

the discussion in the next section). Some of these accounts were inspired by an idea of Stalnaker (1974) who suggested that at least some presuppositions could be pragmatically derived based on considerations of efficient information packaging.[11] Inspired by this, and also by Wilson and Sperber (1979) discussed above, some of the above-cited authors assume that there is a principled way to split the total meaning of a sentence into backgrounded/ foregrounded (at-issue/not at-issue, etc.) meaning, thus predicting what part of the meaning gets presupposed. Though this not need not mean that presuppositions are not also subject to the common ground requirement (just as it did not mean this for Stalnaker, indeed some of the above-mentioned authors are agnostic on this issue), it gives a boost to the idea that they are (also) definable on information-packaging grounds.

The view that presuppositions can be defined solely as a side effect of information packaging faces a challenge though: If the characteristic property of presuppositions is that they are not at-issue (or backgrounded, noncontroversial, etc.), then what distinguishes conventional implicatures, e.g. the nominal appositive *a confirmed psychopath* in (6), the from presuppositions?

(6)   The agency interviewed Chuck, a confirmed psychopath, just after his release
       from prison. (Potts 2005: 114)

Some of the above-cited authors bite the bullet, and argue that there is no fundamental difference between presuppositions and conventional implicatures see e.g. Simons et al. (2010); Mandelkern (2016).[12] Nevertheless, the question still remains what explains the empirical differences between presuppositions and conventional implicatures: for example presuppositions can be filtered out if their content appears in the antecedent of an *if*-clause, this is however not the case with conventional implicatures, cf. Potts (2005), Tonhauser et al. (2013) for discussion:

(7)   a.   If Eddie has a dog, then his dog is a ferocious man-eater. (Potts 2005: 112)
       b.   #If Chuck is a confirmed psychopath, then Chuck, a confirmed psychopath,
            has just been interviewed by the agency.

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[11] Stalnaker (1974) writes: "It is clear that 'x knows that P' entails that P. It is also clear that in most cases when anyone asserts or denies that x knows that P, he presupposes that P. Can this latter fact be explained without building it into the semantics of the word? I think it can. Suppose a speaker were to assert that x knows that P in a context where the truth of P is in doubt or dispute. He would be saying in one breath something that could be challenged in two different ways. He would be leaving unclear whether his main point was to make a claim about the truth of P, or to make a claim about the epistemic situation of x (the knower), and thus leaving unclear what direction he intended or expected the conversation to take." As Abbott (2000) remarked, the reasoning given by Stalnaker for *know* can be recast in non-common ground theories.

[12] Abbott (2000) assumed that nonrestrictive relative clauses, which are considered conventional implicatures by Potts 2005, introduce presuppositions.

Another issue faced by these accounts is terminological: although properties such as *backgrounded*, *nonasserted*, *not at-issue*, and *noncontroversial* are intuitive, they are also highly ambiguous and not all authors use them in the same sense, which creates a certain amount of confusion in the literature.

16.2.4   Connection between the Two Views

The precondition and the information-packaging views of presupposition are not incompatible with each other: it is possible that both are at play for defining some or all properties of presuppositions. There is also no necessary implication between backgrounded and given information: Backgrounded (not at-issue) information will often be contextually given (in the sense that it is satisfied in the (local) context or has a suitable antecedent that it can link to in the context), but it can also be new (as it is the case with Grice's aunt's cousin); and foregrounded information is typically new, but does not have to be (as in the case when my aunt's cousin repeats what she just said). As Abbott (2000) and Geurts (2017) remark: there might be a nonessential connection, in that backgrounding is most naturally construed as givenness.[13]

16.3   Some Recent Developments and Outstanding Questions

There are many thorny issues in presupposition theory; this section presents a personal selection. I discuss whether all presuppositions are the same and if not, whether we can establish different classes of them. Second, I present some recent attempts at explaining why we have presuppositions in the first place, aka the triggering problem. Third, I give an overview of various linguistic and pragmatic factors that influence projection and the interpretation of presuppositions, and discuss the challenges these facts pose for projection theories. Finally, I briefly comment on the problem of presupposition projection from the scope of attitude verbs.

16.3.1   Types of Triggers

Linguists and philosophers have studied diverse examples of presupposition triggers since Frege, often not making the connection between the observed facts. An 'official' list of 13 classes of presupposition triggers, based on unpublished work by Karttunen, was popularized in Levinson (1983). Updated versions of this list can be found in most overviews of presupposition. Here is a list from Beaver (1997):

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[13] See also the theories outlined in Asher et al. (2007) and Bittner (2001, 2007) for connecting backgroundendness and givenness.

(8) a. Definite NPs (presuppose the existence of their referent, and perhaps also uniqueness; includes proper names, possessives, 'this'- and 'that'-clauses, and wh-phrases)

   b. Quantificational NPs (presuppose the existence of a nontrivial domain)

   c. Factive verbs and NPs (presuppose the truth of the propositional complement)

   d. Clefts (an it-cleft 'it was x that y-ed' presupposes that something 'y-ed')

   e. Wh-questions (presuppose the existence of an entity answering the question, or speakers expectation of such an entity)

   f. Counterfactual conditionals (presuppose the falsity of the antecedent)

   g. Intonational Stress ('X y-ed' with stressed 'X' might presuppose that somebody 'y-ed')

   h. Sortally restricted predicates (presuppose that their arguments are of the appropriate sort)

   i. Signifiers of actions and temporal/aspectual modifiers (presuppose that the preconditions for the action are met)

   j. Iterative Adverbs, e.g. *too* and *again*, (presuppose some sort of repetition).

   k. Others (e.g. implicatives such as *manage*, verbs of judging such as *criticize*, the focus-sensitive particles *even* and *only*)

What has been noted over the years, however, is that the items on this list differ with respect to various properties associated with presuppositions: accommodation, cancellability in embedded environments, the type of discourse antecedent (if any) they require, etc. As Karttunen (2016) notes, "The zoo of presupposition triggers should have been constructed with separate cages for different species." Over the years, researchers proposed various types of separate cages, but the taxonomization into different (sub)species has turned out to be problematic as well.

One question is whether the items on the list are all examples of presupposition, or if some are rather examples of a different phenomenon, e.g. conventional implicature (cf. e.g. Karttunen 2016). The trouble is that the difference between presuppositions and conventional implicatures is itself a contested matter: while Potts (2005) argued forcefully that there is a real distinction between the two phenomena, Simons et al. (2010) lump them together, and yet others proposed that certain cases of conventional implicatures should be thought of as presuppositions (cf. Schlenker 2007).

Another question is whether we should distinguish separate subspecies of presuppositions. The problem here is that different subspecies emerge depending on the particular diagnostic used, e.g. cancellability, anaphoricity, ease of accommodation, and behavior in case of presupposition failure. Differences in cancellability in embedded environments have lead Abusch (2002, 2010) to propose two classes: soft vs. hard presuppositions (see also Simons 2001; Abbott 2006; Romoli 2015). 'Soft presuppositions' (e.g. factive verbs, change of state verbs, the existential presupposition of focus) were argued to arise pragmatically, which would explain why they appear more

easily cancellable, while hard presuppositions (e.g. focus particles, clefts, definite descriptions, *too*, *again*), by assumption, are lexically triggered, hence hard to cancel.[14]

Differences in anaphoric properties were the basis of Zeevat's (1992) classification of triggers into *resolution* vs. *lexical* triggers. The first class contains items that are primarily anaphoric such as definite descriptions, factive *when* and *after*-clauses and clefts. The second class contains items that denote concepts which can only be applied if certain conditions are met. Examples include predicates with an associated sortal restriction or predicates of actions and states with associated preconditions. (Zeevat (1992) also distinguishes a third class, though without giving it a name, the class of iterative presuppositions associated with items such as *too*, *again*.)

Triggers also show differences with respect to how easily they can be accommodated. Spenader (2002) examined the behavior of various presupposition triggers in spoken discourse (the London–Lund Corpus), such as factive verbs and adjectives, aspectual verbs, *it*-clefts, definite descriptions, and *too*. She observed that the tendency to convey new information for the hearer in the discourse (i.e. to accommodate) differed greatly by trigger type: The most likely items to force accommodation were aspectual verbs and factives, while the presuppositions triggered by *too* were almost never used in a way that required accommodation.[15] Spenader's findings are corroborated by observations made in Beaver and Zeevat (2007). These authors identify demonstratives, pronouns, short definite descriptions, names, iteratives *too*, politeness markers (French *tu*, *vous*), intonational marking of focus as having presuppositions that are hard to accommodate. The remaining class of items with more easily accommodating presuppositions includes factives, implicatives, aspectual verbs, sortally restricted predicates, clefts, long definite descriptions, and long names.

Glanzberg (2005) was concerned with presupposition failure, i.e. what happens when a presuppositional item is uttered in a context that is incompatible with the presupposition of that item. He observed that presuppositions fall into two categories with respect to their behavior in this situation: some presupposition failure leads to failure to express a proposition (e.g. in the case of clefts, demonstratives and factives), but this does not happen with all

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[14] Abusch's distinction has reopened the possibility that at least soft presuppositions are a type of conversational implicatures, cf. Romoli (2015). See also Gyarmathy (2015), who uses abductive reasoning to derive the presuppositions of event culminations.

[15] Spenader also identified differences that pertain to the semantic type of the triggering material, whether they presuppose semantically concrete individuals (as definite NPs) or semantically abstract objects (factives, aspectuals, etc.), and also differences in the tendency to be globally or locally accommodated when they occur embedded.

triggers, e.g. *even*, *too*. He proposes that the observed differences follow not so much from the basic nature of presuppositions, but rather from the relationship between the asserted content with the presupposition: when the asserted content can update the context even when the presupposition fails we do not observe failure to express a proposition.

Tonhauser et al. (2013) examined various types of projective content, presuppositions as well as conventional implicatures. They argue that projective content should be divided into three subclasses, depending on whether they are subject to what they call the "Contextual Felicity" constraint (roughly whether the trigger imposes an anaphoric requirement on the context), and whether they give rise to a so-called "Local Effect," roughly the ability to accommodate locally under certain operators (e.g. attitude verbs). Class A triggers (pronouns, demonstratives, *too*) are subject to both constraints, Class B triggers (conventional implicatures) are subject to neither, and Class C triggers (e.g. change of state verbs, *almost*, *only*, possessive NP's) show the "Local Effect" but are not subject to "Contextual Felicity" constraint. Remarkably, they do not find significant differences between the two languages they examine, English and Guaraní.

What is the cause of the observed empirical differences among triggers? One type of reply holds that presuppositional inferences can be classified into fundamentally different types. This approach is taken when researchers classify presuppositions into soft vs. hard triggers (cf. Abusch 2002, 2010; Simons 2001, and others): soft triggers have presuppositions that arise from pragmatics while hard triggers have hard-wired semantic presuppositions. A taxonomy of presuppositional inferences was also proposed in Tonhauser et al. (2013): "The evidence presented above minimally suggests that the classes of projective content A, B and C form a subtaxonomy in a better-developed taxonomy of meaning and are distinct on some dimension from e.g. ordinary entailments."

Another type of explanation of the empirical differences does not assume a fundamental difference in the nature of presuppositional inferences. Instead, the differences are assumed to follow from the complex interplay of the meaning of the presuppositional item with its context as well as semantic and pragmatic principles. Glanzberg's (2005) proposal is in this spirit and so is Spenader's (2002) reasoning about accommodation as well as Abrusán's (2016) explanation of cancellation facts. Some facts clearly favor this view, e.g. the observation that longer definite descriptions and clefts accommodate more easily than short ones (cf. Prince 1978; Delin 1990, 1992; Beaver & Zeevat 2007), but on other facts the jury is still out.

A major recent contribution to this area was made by a wealth of experimental research. Since the empirical criteria described above can be easily investigated with experimental tools, the differentiation among various triggers have played an important role in this literature. Unfortunately, due to

limitations of space, I cannot enter into the details of this extremely rich literature here. Overall, the findings seem to point towards real but gradient differences among triggers. As Schwarz (2019) notes in his recent article,

Many results have lent further support to the notion that (classes of) triggers differ from one another in various ways, but these difference are neither absolute or categorical, nor do they straightforwardly support any current conceptual approach to differentiating triggers. While all aspects of the study of presupposition will benefit from further experimental work, the behavior of embedded triggers and the relation of triggers to more intricate aspects of discourse and discourse structure seem like an especially important area that deserves further scrutiny. (p. 35)

It thus seems that in the zoo of presuppositions we should not construct cages for subspecies after all; rather, the richness of presuppositional phenomena should be studied in the jungle of their interactions with other factors.

16.3.2   Triggering

If presuppositions are lexical properties of words and linguistic constructions, one would expect that the class of presupposition triggers should differ from language to language. Strikingly, this does not seem to be the case. For example, Levinson and Annamalai (1992) argued that presupposition triggers in English and Tamil overlap and also have the same projection properties in complex sentences. Similarly, Tonhauser et al. (2013) showed that Paraguayan Guaraní and English expressions consistently convey the same projective contents[16] and also show the same projection pattern (see also Tonhauser 2020 for an even more fine-grained study).[17] Both studies point out that the finding that the same truth-conditional meaning comes with the same presuppositions suggests that presuppositions arise nonconventionally (see also Simons 2001).[18] A more recent argument in favor of presuppositions being pragmatically triggered comes from the observation that presuppositions are not strictly linguistic: co-speech gestures and various other signs seem to have a presuppositional structure as well (cf. Schlenker 2021).

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[16] Modulo some elements that do not exist in Guaraní, for example the definite article and gender on third person pronouns.

[17] Based on extensive empirical work on St'át'imcets (a.k.a. Lillooet, Northern Interior Salish), Matthewson (2006, 2008) argued that languages differ in the pragmatic constraints that they impose on the contexts in which they appear: for example, the content of presuppositions in St'át'imcets does not need to be entailed by the common ground, and this is the case even for triggers such as *too, again* that in English are very hard to accommodate. Nevertheless, presuppositions in St'át'imcets project, just as they do in English.

[18] Naturally, for researchers who argue that presuppositions are nothing but conversational implicatures (reviewed in the previous section), presuppositions arise conversationally; see Kadmon (2001) for discussion.

At the same time, as we have seen in the previous subsection, presupposition triggers differ from each other along various dimensions: cancellability, accommodation, anaphoricity, behavior in case of presupposition failure, referentiality, etc. These observations have prompted researchers to argue that at least some presuppositions arise in a pragmatic way, and to propose a triggering mechanism dedicated to certain classes of triggers (Abusch 2002, 2010; Simons 2001; Abrusán 2011, 2016). Others aimed to find the "holy grail" of presupposition theory: a uniform process of presupposition triggering, see Simons et al. (2010) and Schlenker (2021). Let me review below the main types of ideas that have been proposed:

(a) **Triggering from alternatives.** An influential take on the problem was offered by Abusch (2002, 2005). She proposed that some presuppositions that are easily cancellable (namely, 'soft' presuppositions, for example the existential presupposition of factives, questions and the presuppositions of factives and change of state verbs) can be derived from the pragmatic alternatives that they associate with, by assuming that expressions presuppose that the disjunction of their alternatives is true. In the case of focus the alternatives are given by the semantics of these expressions cf. Rooth (1992) and subsequent work. In the case of factives and change of state verbs the alternatives need to be stipulated: For example the lexical alternative of *know* is to *be unaware*, while the lexical alternative of *stop* is *continue*. Abusch's idea is widely accepted as an account of the (volatile) existential presuppositions of focus and questions. However, the proposal concerning verbs relied on a stipulation about lexical alternatives; indeed Abusch (2010) does not apply the idea to factive and change of state verbs any more. On the other hand, Abrusán (2016) proposed that the alternative-based method could be extended to the presuppositions of clefts as well, assuming we can explain the non-cancelability of the latter via other factors. Szabolcsi (2017) applied the idea to derive the presupposition of *too*, another notorious hard trigger. The idea of triggering from alternatives does not coincide any more with the cancelability of the presupposition (or, the class of 'soft triggers'). Instead, it seems to be at play for triggers whose presuppositions arise from focus alternatives.

(b) **Triggering from the structure of semantic information (Aboutness).** Another approach to presupposition triggering starts from the idea that the complex information conveyed by a proposition has internal structure.[19] Once we understand the nature of this internal structure, it might give us a clue about what part of the conveyed total information is backgrounded

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[19] This idea of internal structure of propositions was more recently explored in Yablo (2014) and Fine (2014, 2017) in a somewhat different context.

(presupposed) and why. Informal remarks by Stalnaker (1974) and Abbott (2000) point in this direction, with Stalnaker suggesting that presuppositions arise in order to avoid uncertainty about what a complex sentence's main contribution to the context is. Wilson and Sperber (1979) order semantic entailments of the proposition expressed by a sentence based on the sentence's syntactic form (including focus-marking). Entailments with a certain degree of semantic independence from the rest of the entailments are predicted to be presupposed. Abrusán (2011) focuses on the presuppositions of verbs. I proposed that there is default triggering rule according to which what is not the main point of a sentence is presupposed. Entailments that are about the main event described by the sentence constitute the sentence's main point; what is not about the main event is presupposed. For example, in *John knows that it is raining* the main event is described by the matrix verb *know*. The entailment that 'it is raining' is not about this event (in a technical sense of aboutness given in Demolombe and Fariñas del Cerro 2010) and is therefore presupposed.[20] Abrusán (2016) extends the idea to certain other triggers as well, e.g. *too, again*.

(c) **Triggering based on discourse status.** Simons et al. (2010) proposed that information that does not answer the current question under discussion (QUD) projects. QUD is to be understood as defined in Roberts (2012). This theory was proposed for all projective meaning, presuppositions and conventional implicatures alike. Note that it is radically context-sensitive: changing the QUD might completely change what ends up being presupposed (projected). Abrusán (2011) argued that context-sensitivity of presuppositions, though real, is much more limited in scope than what is predicted by Simons et al. (2010). Simons et al. (2016) offer a refined version of their original proposal, concentrating on factive verbs.

(d) **Triggering via probabilistic reasoning.** Schlenker (2021) assumes that presuppositions are epistemic preconditions of the global meaning of a sentence. He employs probabilistic reasoning to attempt to predict which of the entailments of the global meaning become presupposed.

It is interesting to note that most of the above theories relate presupposition triggering to *information structure*, in one sense or another: be it (a) focus structure, (b) aboutness or (c) discourse structure. These are different – though related – ways of foregrounding/backgrounding information. The ideas do not exclude one another, either. For example, Abrusán (2011) complements her basic, aboutness-based account with a discourse-sensitive aspect as well. It is

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[20] The actual proposal of Abrusán (2011) uses event times instead of events, to avoid some complications that arise with events. Here I present the intuition behind the proposal.

also possible that different types of triggers require different mechanisms, as was suggested in Abrusán (2016). The triggering problem(s), though far from being solved, has at least come within sight.

16.3.3   *Factors That Influence Presupposition Projection and Interpretation*

As was discussed in Section 16.1 of this chapter, a defining characteristic of presuppositions is that they project. Most of the research on presupposition in the last 50 years concentrated on explaining a small set of projection 'facts', more or less as they were established in the 1970s in Karttunen's pioneering works. The aim was to provide precise rules that explain how compositional calculation of meaning interacts with presuppositions. Gradually though it came to be noticed that projection is influenced by various semantic, pragmatic, and contextual factors that are difficult to incorporate into a rule-based view of presupposition projection, be it semantic or pragmatic. Instead, it seems that actual projection facts result from a complex interaction of these factors, perhaps in conjunction with a basic projection mechanism (cf. also Degen & Tonhauser 2020). Below I provide a (nonexhaustive) list of various factors that seem to interact with projection in nontrivial ways: the first three relate to information structure of the sentence and the discourse, the remaining ones are more disparate.

Complex Interaction with the Previous Discourse Context

It has been long noted that the treatment of presuppositions should be integrated with a richer notion of discourse structure and update than is available in standard dynamic semantics. Ideas that point in this direction were put forth both in rhetorical structure based and question-based theories of discourse. In the context of SDRT, Asher and Lascarides (1998) argued that in order to capture projection facts we need to reason about how the presupposition is rhetorically connected to the previous discourse context: projection depends (among other things) on the plausibility and strength of the available coherent rhetorical connections. Question-based theories of discourse organization are the background for Simons et al.'s (2010) proposal: they argue that all projection facts can be derived from association with the question under discussion (QUD): simplifying somewhat, semantic material that does not answer the QUD projects. Whether or not this bold claim is empirically correct is a matter of debate (cf. Abrusán 2011; Karttunen 2016), but the idea that the QUD at least *influences* presupposition projection is likely true, see also earlier discussions in Chierchia and McConnell-Ginet (2000), Kadmon (2001), Beaver (2010). For example, a QUD that is explicitly about the content of a presupposition tends to block the presupposition from projecting. In the following example the context makes clear that the author is wondering whether method

works with wombats as well: the presupposition addresses this question and is not felt to project.

(9)   I haven't tried this with wombats though, and if anyone discovers that the method is also wombat-proof, I'd really like to know. (Beaver 2010)

For further discussion of the effects of the QUD on presupposition projection, see Abrusán (2011), Simons et al. (2016), Beaver et al. (2017), Tonhauser et al. (2018), Xue and Onea (2011).[21]

Prosodic Prominence/Focus Marking

Related to the previous is the issue of prosodic prominence/focus marking. I list it separately from QUD, because although focus marking some constituent can signal that it is an answer to some QUD, prosodical prominence (/focus marking) can also be motivated by other reasons. The importance of prosodic prominence for presupposition projection was already recognized in Delin (1992), Spenader (2002), Beaver (2010). More recently, numerous studies have tested the effect of prosodic prominence on projection (cf. e.g. Tonhauser 2016; Tonhauser et al. 2019; Cummins & Rohde 2015; Djärv & Bacovcin 2020), and though results vary, overall it is fair to say that prosodic prominence does seem to have an effect on projection.[22,23]

Topicality

Another information structural notion that seems to play a role in projection is topicality. The role of topicality was mostly discussed in connection with the interpretation of definite descriptions: Strawson (1950, 1964) observed that non-topical NP's can more easily get a nonpresuppositional interpretation than topical ones (cf. also Atlas 2004; Atlas & Levinson 1981; Reinhart 1981; Schoubye 2009, among others.) For example, the NP in (10b) is nontopical, and therefore more easily understood as nonpresuppositional, in contrast to (10a):

(10)   a. The King of France is bald.
          b. The exhibition was visited yesterday by the King of France.

The effect of topics on the interpretation and projection of definite descriptions was confirmed experimentally in Abrusán and Szendröi (2013). In a

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[21] A related issue is the question-sensitivity of knowledge and attitudes in general; see Schaffer and Szabó (2014), Yalcin (2016), and Glanzberg (2019).

[22] Crosslinguistically, factivity-alternations often seem to interact with prosody and focus, cf. e.g. Abrusán (2011) (Hungarian); Kallulli (2006) (Albanian); Özyildiz (2017) (Turkish); Jeong (2020) (Korean).

[23] The discussion in Schlöder and Lascarides (2020) concerning the presupposition of focus suggests that on top of focus, pitch contour might also play a role in projectivity.

different context, Beaver (1994) was concerned with predicting the right level at which presuppositions should be accommodated in sentences with quantificational determiners and conditionals. He shows that intermediate accommodation should be explained by taking into account the topic structure of the sentence and discourse.

Types of Triggers

As was mentioned above, all presuppositions are not equal, and recent empirical research has discovered significant differences among presuppositions with respect to projectivity, cf. e.g. Smith and Hall (2014), Tonhauser et al. (2018). Interestingly, differences exist not only when we compare types of triggers but even within a type, e.g. the presuppositions of individual factive verbs might differ in their projection properties. Moreover, the difference between 'classical' factives and verbs that presuppose their complement only optionally (also called part-time triggers, cf. Schlenker 2010) is not categorical but a matter of degree.

The Content of the Sentence: Probability, Possibility of Verification

The content of the sentence and of (what might become) the presupposition seems also to have an effect on whether it ends up being projected. I single out two aspects that have been noted in the literature: the prior probability of the content of the presupposition and whether the truth of the sentence can be easily verified by the hearer.[24] With respect to probability, Beaver (1999) already noted that presupposition accommodation depends on the plausibility of its content in a given context. More recently, Yalcin (2007) argued that epistemic modals rely on probabilistic information states. Based on this idea, Lassiter (2012) proposed that the information states relevant to the theory of presupposition are also probabilistic: presuppositions are information that is judged highly probable. He argued that this idea can explain some recalcitrant problems for presupposition projection theories, e.g. the proviso problem.[25] Schlenker (2010) argued that the probability of the content of the sentence in a given context[26] influences whether or not it is felt to be veridical and presupposed: the implication that Mary is pregnant is true and projects in contexts in which Mary is a responsible adult, but not in contexts in which Mary is a playful 7-year old:

(11)   Mary hasn't announced to her parents that she is pregnant.

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[24] See also Asher and Lascarides (1998) for discussion on the role of the content of the presupposition and the context.

[25] The basic idea is that conditional presuppositions are conditional probability statements, which, if certain independence relations hold, are equivalent to unconditional probability statements.

[26] Schlenker (2010) in fact talks about the credibility of the attitude holder, but the issue boils down to the perceived probability of the embedded clause.

Relatedly, Jayez (2011) and Tonhauser et al. (2018) hypothesized that probabilistic reasoning should influence what projects, while Degen and Tonhauser (2021) provide empirical data for the claim that contents that are judged as more likely true (have a higher prior probability) project more easily than content that is less probable.

Another factor is whether the truth of a sentence can be verified, whether or not its presupposition is true in the context. Sentences such as (12a) are felt to be true, in contrast to (12b):

(12) a. The King of France is not sitting in this chair.
      b. The King of France has not heard about the accident on the turnpike last night.

Lasersohn (1993) proposed that (12a) is felt to be true because we can evaluate it independently from the King of France: the chair is either empty or someone other than the King of France is sitting in it. But a similar reasoning is not possible for (12b); see von Fintel (2004), Yablo (2006), and Abrusán and Szendrői (2013) for more discussion.

Perspectival Reasoning

Presuppositions are inherently connected to perspective-taking, a connection that has been much emphasized in the French pragmatic tradition (cf. Ducrot 1984). In the Anglo-Saxon approach to presuppositions the issue of perspective has been less prominent. Nevertheless, scholars have observed that in certain cases the apparent lack of presuppositions might be due to perspectival reasoning: the presupposition is satisfied not in the global conversational context but in the beliefs of some contextually relevant protagonist. This was argued to be the case in connection with some examples of factives in Gazdar (1979), Holton (1997) and Abrusán (2022):

(13)   She knew that he would never let her down, but, like all the others, he did.
                                                                        (Holton 1997)

In the above example, the attitude report is interpreted from the perspective of the subject of the attitude: this is why the content of the complement only needs to be true in the beliefs of the attitude holder. Abrusán (forthcoming) argues that perspectival reasoning can also explain other examples in which presuppositions fail to project, i.e. in the case of temporal adjuncts or preposed *because*-clauses.

Morale

It is becoming increasingly clear that presupposition projection is the result of a complex interaction of a number of factors (and the above is by no means an exhaustive list). Theories of projection cannot succeed unless they make room

for taking into account all these diverse factors. One way to proceed might be to start with a baseline projection theory, but let its predictions be influenced by diverse pragmatic and semantic effects. An (incomplete) example of this way of thinking is Asher and Lascarides (1998), who extend van der Sandt's (1992) anaphoric theory in ways that can make room for rhetorical effects and effects of sentential contents. Another way to proceed might be a constraint-based projection theory along the lines advocated by Degen and Tonhauser (2020) according to which projection theory is nothing else than a set of interacting constraints. This second option implies a more radical departure from conventional thinking about projection.

16.3.4 *Presuppositions in Attitude Contexts*

The behavior of presuppositions in the scope of attitude verbs is a notoriously difficult problem. Depending on the context, (14a) can imply (14b) or (14c) or both (14b,c).

(14)   a. John wants to sell his cello.
          b. John has a cello.
          c. John believes that he has a cello.

For a long time, scholars debated which of the two inferences should be seen as primary, and how to derive the other inference, if present, from the primary presupposition (cf. Karttunen 1973, 1974; Heim 1992; Geurts 1999). Recently, Karttunen (2016) suggested that the problem should not be thought of a simple question of projection, but should be examined in the broader context of what licenses descriptions in the scope of attitudes. Recent work on the fine-grained representation of mental states e.g. *mental files* of Recanati (2012) and MSDRT by Kamp (2015), Kamp and Bende-Farkas (2018) and Kamp (this volume) as well as ADT of Maier (2016) paves the way for an in-depth analysis of this issue; see Maier (2015) for a first step.

16.4   Conclusion

By way of conclusion, let me quote a paragraph from Kamp and Rossdeutscher (1994) which suits presuppositions perfectly:

There is a sense, therefore, in which this work confirms the widespread opinion that textual interpretation and inference are based on a complicated – in fact, for all we can see at present, a desperately complicated – web of linguistic and extralinguistic knowledge. We admit that we ourselves, as linguists of an essentially rule based persuasion, would have preferred if at least the inferences with which we deal here, and which seemed to us innocuous enough when we started, had proved amenable to a more strictly linguistic analysis than the one to which we have been led in the end.

We do not think, however, that all that has been achieved is a long and convoluted proof of a general point that was plain to begin with. For analyses of the kind we attempt here do reveal something of how linguistic and extralinguistic knowledge interact. True, the interaction is extremely complicated, and we are only beginning to understand some of its intricacies. But this is a road along which there is a definite possibility of progress. The complexity of the web is daunting, and often it may drive us to despair. But it is not, we think, ultimately inextricable. (Kamp & Rossdeutscher 1994: 167)

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17   Modals and Conditionals

Matthew Mandelkern

17.0   Questions and Answers

(1)   Why do you think both linguists and philosophers find modals and conditionals interesting?

The difficulty of simultaneously accounting for logical and semantic properties which seem to jointly obtain is one thing that makes modals and conditionals endlessly interesting to linguists and philosophers.* This, in turn, has important ramifications for the foundations of semantics and pragmatics. And modals and conditionals play a central role in rational decision-making and practical reasoning, making their proper treatment of broad interest across cognitive science.

(2)   What recent developments in linguistics and philosophy do you think are most exciting in thinking about modals and conditionals?

Especially of interest to me is work that has explored surprising connections and interactions, for instance, between modality, presupposition, and anaphora; between modality and attitude predicates; and between modality and moral psychology.

(3)   What do you consider to be the key ingredients in adequately analyzing modals and conditionals?

A successful account of modals and conditionals will compositionally account for the interaction of 'if'-clauses with overt modals, while also accounting for the meaning and logic of conditionals that do not contain overt modals. It will give a systematic account of the interaction of modals and conditionals with other logical connectives and attitude predicates. It will situate the theory of modals and conditionals within a psychological theory of our modal representations, and in the context of other semantic/pragmatic systems, like anaphora and presupposition.

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(4)   What do you consider to be the outstanding questions pertaining to modals and conditionals?

What is the logic of the conditional? And, relatedly, what is the underlying structure of the conditional and the nature of the interaction of 'if'-clauses with overt modals? What is the precise connection of modality to anaphora and presupposition? How unified is the semantics and psychology of different kinds of modality (epistemic, deontic, agentive, circumstantial) with each other, and with conditionals? How do modals and conditionals interact with attitude predicates?

17.1   Introduction

Modals ('It might rain'; 'You must eat a cookie'; 'I can fly') and conditionals ('If it rains, the picnic will be cancelled'; 'If you want a cookie, let me know'; 'If I had wings, I would have been able to fly') play a starring role in philosophical and linguistic research. The ability to think modally distal thoughts is central to the human capacity to plan and choose; and the ability to express such thoughts is central to the human capacity for collective action.

Modals and conditionals have yielded a rich bounty of puzzles about logic, semantics, and pragmatics. In light of the obvious futility of giving an overview of these puzzles, I will organize this chapter around just three topics, focusing further in each case on just a few questions that particularly fascinate me. The result is partly autobiographical; but that seems inevitable for the task set out for this volume, and I hope to thus give a taste of some of the many interesting issues raised, together with pointers to further resources.

The first topic I explore is epistemic modals: words like 'might' and 'must', on a broadly epistemic reading. I survey a handful of puzzles about epistemic modals, puzzles which also touch on questions about attitude predicates, propositions, anaphora, and presupposition (for more on which, see Angelika Kratzer's, Yael Sharvit and Matt Moss's, Elizabeth Coppock's, and Márta Abrusán's contributions to this volume).

The second topic is conditionals. One reason the conditional has played a central role in logic, semantics, and pragmatics is because it does not seem amenable to a bivalent truth-functional analysis. For this reason, the conditional constitutes a major challenge for the Gricean research program which aims to treat the logical connectives and operators of natural language – 'and', 'or', 'not', 'if … then …' – as the truth functions of classical logic, and explain their communicative complexity via the interaction of simple truth conditions with complex pragmatic reasoning (see Emma Borg's chapter). If conditionals are not truth functions, what are they? A prominent view in philosophy says that ⌜If p, then q⌝ is true just in case the closest *p*-world(s)

are *q*-world(s).[1] A prominent view in linguistics says that ⌜If p, then q⌝ is a restricted epistemic modal claim, which says that q must be true, on the assumption that p is true. In my discussion I will focus on points of convergence and divergence between these approaches.

The final topic I will explore is practical modality: modal claims about what one should do (deontic modals: 'You should give me a cookie'), and about what one can or cannot do (agentive modals: 'You can pass this test'). This topic has obvious ramifications for philosophical questions about morality, ability, and their connections. I will focus on recent work which suggests that these modals build on a representation of a set of available actions, and explore a puzzle about how we represent that set of actions when we give orders.

17.2   Epistemic Modals

Epistemic modals are words like 'might' and 'must' on a broadly epistemic interpretation, as in (1):

(1)   a. Susie might bring her new girlfriend to the party.
        b. Latif must be furious.

The standard analysis of modals in natural language, growing out of work in modal logic (Kripke 1963; Kratzer 1977, 1981; Lewis 1979), treats them as quantifiers over accessible worlds.[2] The idea is that modals are evaluated relative to a binary accessibility relation between worlds. An existential modal sentence (⌜Might p⌝, ⌜May p⌝, etc.) is true at a world *w* just in case some world accessible from *w* makes *p* true; a universal modal sentence (⌜Must p⌝, ⌜Have to p⌝, etc.) is true at *w* just in case every world accessible from *w* makes *p* true. Different kinds of modality are associated with different kinds of accessibility relations. Epistemic modals are associated with a broadly epistemic one, on which a world *w* can access a world *w'* just in case *w'* is compatible with the relevant evidence or knowledge in *w*.

17.2.1   Embedding

On the standard approach, ⌜Might p⌝ thus means roughly the same thing as ⌜For all we know, p⌝. There is some flexibility here, given the context-sensitivity of the accessibility relation for 'might', but not too much.

On the face it, this seems reasonable enough. But introspection about meanings is a limited technology. To evaluate a proposed synonymy claim,

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[1] I will use lower-case Roman letters for sentences and italics for corresponding propositions, often ignoring relativization to context for readability.

[2] Many of Kratzer's classic papers on modals and conditionals were reprinted with substantial revisions in Kratzer 2012.

we must, among other things, explore whether the expressions in question embed in similar ways. Wittgenstein (1953: II.x.109) called attention to sentences with the form ⌜Might p and not p⌝, as in:

(2)   # It might be raining, but it isn't.

Sentences like this, and in the reverse order,[3] have formed the basis for much recent work on the semantics of epistemic modals.[4] Specifically, it has been revealing to compare the behavior of Wittgenstein sentences like (2) to Moorean sentences (Moore: 1942) like (3):

(3)   # For all we know, it's raining, but it's not raining.

If the standard theory is right, (2) and (3) should mean roughly the same thing. Again, on the face of it, this looks like a reasonable prediction. But a little investigation shows that it is wrong: (2) and (3) embed in very different ways. Yalcin (2007) made this point by embedding sentences like these under 'Suppose', as in the pair in (4):

(4)   a. # Suppose it might be raining but it isn't raining.
           b. Suppose for all we know it's raining, but it isn't raining.

Yalcin observed that there is a striking difference between (4a) and (4b): the modal variant in (4a) is infelicitous, while the nonmodal variant in (4b) is felicitous. But if the embedded sentences meant the same thing, then (4a) and (4b) should mean the same thing, too.

One response would be to posit something special about the meaning of 'Suppose', or perhaps about attitude operators in general, to account for these data. But this is too narrow, because the divergence in (4) reappears in many different environments. For instance, similar phenomena arise when sentences like this are embedded in conditionals (Yalcin 2007), under quantifiers (Groenendijk et al. 1996; Aloni 2000; Yalcin 2015; Ninan 2018; Mandelkern 2019a), epistemic modals (Gillies 2018; Mandelkern 2019a), and disjunctions (Mandelkern 2019a). The latter provides a particularly simple, and thus revealing, case:

(5)   a. # Either it's raining but it might not be, or it's snowing but it might not be.
           b. Either it's raining but we don't know it, or it's snowing but we don't know it.

Example (5b) is a coherent, if periphrastic, way of saying that it's either raining or snowing, but I don't know which; (5a), by contrast, sounds incoherent.

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[3] I.e. with the form ⌜p and might not p⌝, which Yalcin (2007) calls *epistemic contradictions*.
[4] See Boylan 2020 for discussion of a different kind of divergence between 'might' and 'for all we know', having to do with tense.

These are, however, just disjunctions of Wittgenstein and Moore sentences, respectively.[5]

The most obvious response to minimal pairs like these is to hold that, while Moore sentences are consistent (i.e. true at some points of evaluation), Wittgenstein sentences are not. But this is a hard line to maintain. Suppose ⌜Might p and not p⌝ were a contradiction. If 'and' and 'not' have classical Boolean semantics (something we might deny, on which more presently), then for any sentences p and q, if ⌜p and q⌝ is a contradiction, then p entails ⌜Not q⌝. So ⌜Might p⌝ would entail p if ⌜Might p and not p⌝ were a contradiction. But clearly it doesn't ('It might rain and it might not' does not entail 'It will rain and it won't'). How, then, can we account for the robust infelicity of Wittgenstein sentences across embedding environments, without predicting that ⌜Might p⌝ entails p?

17.2.2   *Some Possible Solutions*

I will give a brief, and opinionated, overview of four solutions that have been posed to this puzzle.

The *informational* response comes from Yalcin 2007, and says that, while Wittgenstein sentences are logically consistent, they are inconsistent in a different, *informational* sense.[6] On the informational conception of logic, roughly speaking, p entails q just in case, whenever you rationally accept *p*, you rationally must also accept *q*. Yalcin gives a theory of epistemic modals on which ⌜Might not p and p⌝ and ⌜p and might not p⌝ are informationally inconsistent – that is, they can never be rationally accepted.[7] Such sentences remain classically consistent, however, and so Yalcin avoids the unacceptable conclusion that ⌜Might p⌝ entails p (I'll henceforth just call this *the bad conclusion*).

This approach has sparked much interesting research and debate, for instance on the nature of informational logic and the relation between informational and classical logics (e.g. Bledin 2015, 2020; Santorio 2021; Mandelkern 2020a). And this approach nicely accounts for the infelicity of Wittgenstein sentences when embedded under operators like 'Suppose' and 'If'. The basic idea is that both of these can naturally be given semantics

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[5] I'll use 'but' and 'and' interchangeably here, on the assumption that the differences between them don't matter for present purposes. Readers suspicious of this can simply substitute 'and' throughout, which will not affect the basic observations.

[6] This, in turn, draws on earlier work from the dynamic tradition (Heim 1982; Veltman 1996; Groenendijk et al. 1996).

[7] Yalcin presents his view in a *domain semantic* framework (see also MacFarlane 2011), but Ninan 2016 shows that the basic idea can also be spelled out in a standard relational framework.

characterized in terms of acceptance: for instance, ⌜A supposes p⌝ is true iff the set of worlds representing A's suppositions accepts p.

The problem with this approach is that operators like quantifiers and disjunction are not naturally characterized in terms of acceptance, and so this approach does not naturally account for the infelicity of Wittgenstein sentences embedded in these environments. This suggests that this approach may be too limited to account for the range of the phenomenon.

A different approach is given by *dynamic semantics*. The dynamic approach is much more revisionary. In dynamic semantics, particularly in the framework growing out of Heim 1982, 1983, sentence meanings are not sets of points of evaluation, but are rather functions which take one context (a set of variable-assignment/world-pairs) to another. Connectives are treated nonclassically: in particular, conjunction is treated as successive application of the functions denoted, first, by the left conjunct, then by the right conjunct. Finally, ⌜Might p⌝ is a "test" function which checks its input context (its argument) for compatibility with p (Veltman 1996; Groenendijk et al. 1996; Beaver 2001; Aloni 2000, 2001; Gillies 2004; Yalcin 2015; Gillies 2018; Goldstein 2019; Ninan 2019). The dynamic framework was developed to capture patterns involving anaphora and presupposition (in Karttunen 1973, 1974, 1976; Stalnaker 1974; Kamp 1981; Heim 1982, 1983), suggesting the intriguing possibility of a connection between the three phenomena of anaphora, presupposition, and modality.

Since conjunction is successive update, in a sentence like ⌜p and might not p⌝, the input context for ⌜Might not p⌝ will entail p; and ⌜Might not p⌝ tests this context for compatibility with ⌜Not p⌝. But this test will never be passed (at least, provided that p itself does not contain modals).[8] Thus ⌜p and might not p⌝ will (for nonmodal p) be a contradiction. Finally, the bad conclusion is avoided thanks to the nonclassicality of the dynamic conjunction.

This approach is obviously well-suited to make sense of a wide range of the embedding data above, and it has been deeply influential. But it has an obvious problem with order. This approach predicts that, while ⌜p and might not p⌝ is a contradiction (when p is nonmodal), sentences with the reverse order, ⌜Might not p and p⌝, are not. On this approach, the input context for a left conjunct is just the global context; so this approach predicts that ⌜Might not p and p⌝ should pattern much like the corresponding Moore sentence.[9] But this is

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[8] When p is modal (or, in some systems, when p contains (in)definites), ⌜p and might not p⌝ can in fact be consistent; this is related to a perhaps more serious problem, namely that ⌜p and not p⌝ is also consistent in standard dynamic systems (van Benthem 1996; Mandelkern 2020b).

[9] 'Much like' because there is still a difference: in the technical jargon of dynamic semantics, Wittgenstein sentences are consistent but not *acceptable*, meaning that no single nonempty context remains unchanged when updated with a Wittgenstein sentence in either order. But this difference will generally wash out in some embeddings – for instance, on standard dynamic

wrong: both orders are much worse than the corresponding Moore sentences. For instance, (6b) is substantially worse than (6a), and seems as bad as its right-modal variant in (6c).

(6)   a. Either for all we know it is raining, but it isn't; or, for all we know, it is snowing, but it isn't.
        b. # Either it might be raining but it isn't, or it might be snowing but it isn't.
        c. # Either it's raining but it might not be, or it's snowing but it might not be.

A variety of proposals have been made to essentially bleach the order sensitivity out of dynamic systems (Klinedinst & Rothschild 2014; Yalcin 2015; Rothschild & Klinedinst 2015). These are interesting and deserve detailed consideration beyond our scope, though one might worry that there is something circuitous about building a system on top of an asymmetric conjunction and then finding ways to eliminate that order dependence.

A third, *salience-based* approach, due to Dorr and Hawthorne 2013, says that the standard *semantics* for modals is correct; the infelicity of Wittgenstein sentences has to do instead with broad considerations about salience.[10] The idea is that these considerations lead us to generally interpret modals in such a way that we take into account locally salient information in determining what accessibility relation is salient. The result is in some ways like a pragmatic version of dynamic semantics: in ⌜p and might not p⌝, *p* is salient and thus will generally be incorporated into the accessibility relation associated with 'might', rendering such sentences inconsistent on most interpretations (but not logically contradictory, thus, once more, avoiding the bad conclusion).

Can a broadly pragmatic approach account for the systematic infelicity of Wittgenstein sentences? This raises general questions about how to think about pragmatic defaults, as well as about just how systematic this infelicity is. But however this question is answered, this approach faces the same obstacle as dynamic approaches, namely order. These approaches, like dynamic approaches, are fundamentally asymmetric, since salience is very much an order-sensitive matter. To see this point, compare the following:

(7)   a. John is here, but he isn't.
        b. He isn't here, but John is.

Example (7a) sounds a bit weird out of the blue, intuitively because there is some pressure to interpret 'he' as referring to John, leading to incoherence (of course (7a) can be rescued if we make salient a different referent for 'he'). By contrast, there seems to be no pressure whatsoever in (7b) to interpret 'he'

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approaches, Wittgenstein sentences under an epistemic modal or existential quantifier yield sentences which are both consistent and acceptable.
[10] Broadly similar ideas, though with important differences in detail and motivation, can be found in Dowell 2011, 2017; Silk 2017; Stojnić 2017.

as referring to John. In general, it seems that any salience-based approach will predict – simply because of the temporal asymmetries inherent in processing sentences – that Wittgenstein sentences display marked order contrasts. In particular, in a sentence with the form 'It might not be raining and it is', the proposition that it is raining is not yet salient when we process the modal, and so on the most prominent reading of such sentences, they should be interpreted just like Moore sentences – and thus should be felicitous in embeddings like (6b). But, again, this does not seem to be the case. While there certainly *are* asymmetries in the interpretation of modals (for instance, in phenomena like modal subordination; Roberts 1989), the data under discussion here do not seem to be clearly asymmetric in the way predicted by the dynamic or pragmatic accounts.

A fourth approach – the one I am inclined towards – is the bounded theory which I develop in Mandelkern 2019a. That theory builds on the dynamic approach by tying the interpretation of epistemic modals to their local informational environment. In particular, the *bounded theory* builds on the theory of *local contexts* developed in work on presupposition by Karttunen (1974); Schlenker (2008, 2009). A local context is a quantity of information in some sense locally accessible in a given part of a sentence in a given context. In dynamic semantics, a local context for a given function is, in essence, just the argument of that function. But Schlenker shows how to systematically staticize the notion of a local context and recursively assign them to the parts of sentences, in a way which, crucially, is symmetric.

Given this account of local contexts, the bounded theory proposes that epistemic modals come with a *locality presupposition* which requires that, under the modal's accessibility relation, local context worlds can access only local context worlds. In other words, the information in the local context must be incorporated into the modal's accessibility relation throughout the local context. So epistemic modal claims have their classical, relational truth conditions; on top of that, they have a presupposition which ensures that they take into account their local information – and crucially, that they do so in a symmetric manner.

This theory predicts that Wittgenstein sentences can never be true *and* have their presuppositions satisfied at any context world. By recruiting local contexts in a symmetric way, this approach avoids the order-based objection to dynamic and pragmatic approaches. And, since the notion of a local context is as applicable in extensional as in intensional contexts, this approach avoids the objection to Yalcin's informational approach, accounting for the infelicity of disjoined or quantified Wittgenstein sentences. Finally, Wittgenstein sentences, though never true at any context world when their presuppositions are satisfied, are not invariably false – so we avoid the bad conclusion.

In Mandelkern 2019a I spell out and argue for this system at much greater length. Since I am obviously sympathetic to this approach, I want to highlight

some questions that the system raises. One concerns the logic of conjunction. Although the system builds on a classical system, the final result is not exactly classical (depending what one means by this). For instance, conjunction introduction will not always preserve satisfaction of presuppositions. So p and q can each be true and have their presuppositions satisfied at a given context, while ⌜p and q⌝ does not have its presuppositions satisfied (whether we want to say that conjunction introduction is thus not valid depends on our understanding of logical consequence, and our formal treatment of presuppositions; see Sharvit 2017; Chemla et al. 2017 for related discussion). This is central to the system's ability to predict that ⌜Might p and not p⌝ is inconsistent, without also predicting that ⌜Might p⌝ entails p. And this provides a nice illustration of the long shadow modality casts in the study of the logic of natural language. Like dynamic semantics and like some versions of the pragmatic approach above, the bounded theory uses tools developed to account for anaphora and presupposition. This raises many questions. Why are epistemic modals bounded by their local context in this way? And why is the relevant notion of local contexts symmetric? The latter question is especially pressing in light of evidence that other systems that involve local contexts, like anaphora, redundancy, and presupposition, at least in some cases appear to require asymmetric local contexts.[11] Divergences aside, why do these different systems pattern together in the first place?

Finally, let me note some of the many other theories of epistemic modals which I pass over merely for reasons of space: for instance, the various probability-based theories given in Swanson 2015; Lassiter 2011; Rothschild 2011; Moss 2015; Charlow 2019; the bilateral, state-based, and possibility-based theories of Hawke and Steinert-Threlkeld 2018, 2020; Aloni 2016; Flocke 2020; Incurvati and Schlöder 2020; the situation-based theory of Kratzer 2020b; and the relativist theories which I discuss in the next section. There are also many other important facets of the issues we have explored in this section, for instance about crosslinguistic facts about embeddability (Močnik 2019a, 2019b) and the syntax/semantics interface (Hacquard 2006; Kratzer 2020b).

17.2.3   *Attitudes and (Dis)agreement*

I will turn now to some further puzzles that arise from the behavior of epistemic modals when embedded under attitude operators. The first starts with the observation that sentences with the form ⌜I believe p, but I know might not p⌝ can be felicitous:

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[11] On the latter see e.g. Chemla and Schlenker 2012; Schwarz 2015; Mandelkern et al. 2020.

(8)   I believe I'll win but I know I might not.

By contrast, ⌜I believe p, but I believe might not p⌝ seems much worse:

(9)   # I believe I'll win but I believe I might not.

This is puzzling, since ⌜I know p⌝ is standardly taken to entail ⌜I believe p⌝, and so (8) should entail (9) (see Hawthorne et al. 2016; Beddor & Goldstein 2018; Bledin & Lando 2018).

In response to this puzzle, one could hold that the inference from knowledge to belief is not valid when p itself is modal. This is, in fact, a consequence of a number of contemporary theories, including the domain semantics and standard implementations of the dynamic approach. But this is not satisfying, since the inference from 'knows might' to 'believes might' does *feel* valid. If you *know* that it might rain, it's hard to see how you could fail to *believe* that it might rain; sentences like 'I know it might rain, but it's not that I believe it might rain' feel incoherent.

The bounded theory suggests the beginnings of a solution to this puzzle. That theory predicts that the inference from ⌜S knows p⌝ to ⌜S believes p⌝ preserves truth whenever both sentences have their presuppositions satisfied: but, whenever a sentence with the form of (8) is true, the corresponding sentence in (9) will not have its presuppositions satisfied (assuming it is assessed relative to the same accessibility relation as (8)).[12] More generally, the bounded theory predicts that (9), but not (8), must ascribe inconsistent beliefs to the speaker whenever its presuppositions are satisfied. From a technical point of view this solution looks satisfying, but, again, more needs to be said to explain why the interpretation of epistemic modals is constrained in this way.

A potentially related topic concerns epistemic modals under factive operators, as in 'Susie knows it might be raining' (Lasersohn 2009; Moss 2013a, 2018). Lasersohn (2009) brings out an interesting puzzle. Intuitively, what 'Susie believes it might be raining' says is that Susie believes her evidence is compatible with rain.[13] Generalizing from that intuition, we would predict that 'Susie knows it might be raining' would mean that Susie knows that her evidence is compatible

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[12] This is because the local context for 'might' in ⌜I know might not p⌝ is my knowledge worlds, while the local context for 'might' in ⌜I believe might not p⌝ is my belief worlds, a smaller set. If its presuppositions are satisfied, ⌜I believe p, but I know might not p⌝ can only be true if all of my belief-worlds are *p*-worlds, and all of my knowledge-worlds can access some ¬*p*-worlds in my knowledge state. But in that case, ⌜I believe p, but I believe might not p⌝ will not have its locality presupposition satisfied, since that presupposition would require all belief-worlds to access only belief-worlds.

[13] Or perhaps not: Yalcin (2007) argues that a sentence like this is just a first-order claim that it is compatible with Susie's belief that it is raining – though this claim has not gotten much subsequent uptake because it is very hard to extend this intuition to factives, for reasons discussed in Yalcin 2012; Mandelkern 2019b.

with rain. But this does not seem to be what it means. Consider a context where *we* know that it's not raining, but Susie doesn't know this, and in fact knows that she has evidence compatible with rain. In this context, 'Susie knows that her evidence is compatible with rain' is true, but 'Susie knows that it might be raining' does not seem true, or at least does not seem assertible.

This is a fascinating puzzle. As Lasersohn discusses, this is a pattern that fits naturally with a relativist approach to epistemic modality, on which modal propositions are not sets of possible worlds but rather something like sets of judge–world pairs (see also Stephenson 2007b, 2007a; Coppock 2018). To know such a proposition is for it to be true in every world compatible with your knowledge, relative to your own accessibility relation; but what projects due to the factivity presupposition of 'knows' is not a set of possible worlds, but rather the set of judge–world pairs. (Lasersohn observes that the puzzle extends to predicates of personal taste like 'tasty', and proposes a parallel relativist treatment of those predicates.)

Further complicating matters is the existence of cases with epistemic modals which parallel Gibbard (1981)'s Sly Pete case. Suppose you are sure that the murderer is either the gardener, the plumber, or the butler. Your two sleuths are out looking for clues about who it might have been. You know that the gardener and the plumber are not canny operators, and that, if either of them committed the crime, your sleuths will be able to figure it out. By contrast, if it was the butler, she will have set out misleading evidence to throw them off her path. The first sleuth comes to report, and says 'I know that the culprit might be the gardener'. The second sleuth arrives and says 'I know that the culprit might be the plumber'. You thereby conclude that it was the butler. It seems that you reached this conclusion via two true and felicitous knowledge ascriptions, and you can subsequently explain your course of reasoning this way. But on a relativist approach, this would be impossible, since the complements of both knowledge ascriptions are false, relative to the information you now have. There is a real tension here, then, which needs to be sorted out.[14]

Relativist approaches have also been defended on other grounds, having to do with cross-contextual judgments (e.g. Egan et al. 2005; MacFarlane 2011; Egan 2007; Beddor & Egan 2018). This defense has recently been challenged by Phillips and Mandelkern (2019) in a way that raises interesting methodological issues. The key motivations for relativism from cross-contextual judgments come from cases like the following:

You overhear George and Sally talking in the coffee line. Sally says, 'Joe might be in Boston right now.' You think to yourself: Joe can't be in Boston; I just saw him an hour ago here in Berkeley. (MacFarlane 2011)

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[14] I'm indebted to Jeremy Goodman for discussion of this case.

The relevant intuition is that it is reasonable, in this case, to say that Sally is wrong, or spoke falsely, or that she should retract what she said – even though it may have been compatible with *her* evidence that Joe was in Boston. But if that is reasonable, the thought goes, then speakers must evaluate Sally's 'might', not relative to *her* evidence, but rather relative to *their* evidence.

But, as Fintel and Gillies (2008) and others have noted, while this intuition seems reasonably robust, it seems like we find similar intuitions with attitude predicates. In particular, consider a close variant of this case which replaces 'Joe might be in Boston right now' with 'I think Joe is in Boston right now':

> You overhear George and Sally talking in the coffee line. Sally says, 'I think Joe is in Boston right now.' You think to yourself: Joe can't be in Boston; I just saw him an hour ago here in Berkeley.

In this variant, there is a similar intuition that we can reasonably say that what Sally said was wrong; that she spoke falsely; and that she should retract what she said – even though *she* thinks that Joe is in Boston. Phillips and Mandelkern (2019) argue for this by replicating experiments from Knobe and Yalcin 2014; Khoo and Phillips 2019; Beddor and Egan 2018 and showing that speaker intuitions for 'I think . . .' pattern in the same way as for modals. Insofar as we take the first set of intuitions to speak in favor of relativism about 'might', we would then have to take the second set of intuitions to speak in favor of relativism about 'thinks'. But the latter view seems untenable: clearly, whether *Sally* thinks Joe is in Boston doesn't depend on what *we* think about where Joe is. So we need some theory other than relativism (or its close cousin, expressivism; Yalcin 2007; Swanson 2015; Moss 2015) to account for these latter judgments.

If this is right, then it raises important questions about how to account for these judgments in a unified way (one might, for instance, look to the account of modal disagreement in Khoo 2015a). But, if we reject relativism, that leaves us with the puzzle of how do we account for Lasersohn's striking observations about epistemic modals in the complements of factive attitude verbs. It seems to me an open question about how to best account for the range of phenomena here.

17.3   Conditionals

I will turn now from modals to conditionals, which have been a topic of lively philosophical debate since antiquity. The literature on conditionals is thus extraordinarily large. For some helpful overviews, see e.g. Edgington 1995; Bennett 2003; von Fintel 2011; Kaufmann and Kaufmann 2015; Gillies 2017; for some of the earlier history of the debate, see Mates 1953 and Algra et al. 1999: part II. Let me emphasize again that I make no pretense of giving an

overview here. (Conditionals have also played a central role in philosophical work well beyond philosophy of language, for instance in the theory of rational decision [Stalnaker 1980b; Gibbard & Harper 1981] and (relatedly) causation [Lewis 1973a].) In my brief space here, I will start by explaining why the traditional identity of the conditional with the material conditional is not viable. Then I will introduce two influential theories of the conditional: one, from the philosophical literature, which regards 'if' as a two-place operator; and one, from the linguistics literature, which regards 'if' as simply providing a restriction on modals in the conditional's consequent. I will argue that there is more disagreement between these approaches than first appearances suggest.

17.3.1   Not Grice's 'If'

Let me start by highlighting one of the most obviously interesting things about the conditional: it is a point where a part of the Gricean research program breaks down. That project aimed to vindicate the classical Boolean analyses of natural language connectives, and to explain apparent divergences in usage by way of broadly pragmatic considerations. This program is alive (if controversial) for disjunction, conjunction, and negation. By contrast, it is no longer taken seriously by students of the conditional: identifying 'if . . . then . . .' with the material conditional (the connective true iff the antecedent is false or consequent true), and trying to explain deviations in usage by way of broadly pragmatic considerations, is largely considered a dead end.[15]

A simple way to see why is to reflect on negated conditionals. If the conditional were material, then the negated conditional would be equivalent to the conjunction of its antecedent and its negated consequent; so, e.g. (10a) and (10b) would be equivalent to (11):

(10)   a. It's not the case that, if Patch is a rabbit, she is a rodent.
        b. It's not the case that, if Patch had been a rabbit, she would have been a rodent.

(11)   Patch is a rabbit and not a rodent.

But these are plainly inequivalent: the conditionals in (11) are true simply in virtue of facts about taxonomy, irrespective of whether Patch is a rabbit. Gricean pragmatic tools are generally most effective in explaining how inferences are *amplified* – how we draw inferences which are not logically entailed by what was asserted; it is not at all clear how they could explain our failure to draw a logically valid inference from (10) to (11).

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[15] See Edgington 1995 for a good overview of arguments. For prominent dissent, see Grice 1989: chapter 4; Jackson 1987; Williamson 2020.

For another example, note that, assuming a classical semantics for 'every', ⌜Every p is q⌝ entails the material conditional ⌜p(a) ⊃ q(a)⌝, for any 'a' which names an individual in the domain. Suppose, then, that I tell you:

(12)   Every coin in John's pocket is a dime.

You are not sure if I'm speaking truly. You have a penny which you are particularly fond of, called Pen. You don't know where Pen is, but you certainly know that (13) is false:

(13)   If Pen is in John's pocket, then Pen is a dime.

John's pocket is not magic, after all. But the fact that (13) is false obviously doesn't tell us that (12) is false. And so, again, 'if' cannot be material.

This is not to say that 'if' is *never* material on any use: on most theories of the conditional, the material interpretation is a limiting case (in which the world of evaluation is accessible and no other world is); some, like Kratzer 2020a, have argued that we sometimes find this special case in natural language. And this is not to say that 'if' is not truth-functional: intriguing recent discussion in Egré et al. 2020a, 2020b, 2020c has tried to revive the trivalent truth-functional approaches of Finetti 1936; Reichenbach 1944 (cf. Cooper 1968; Cantwell 2008). The basic idea is that ⌜If p, then q⌝ is true provided that p and q are both true, false when p is true and q is false, and otherwise undefined. Extending this with different treatments of the connectives, notions of logical consequence, and pragmatic theories leads to a variety of intriguing theories of the conditional.

17.3.2   Two Approaches to 'If'

I will, however, focus on two different analyses of the conditional here. The first is arguably the most prominent approach in the philosophical literature. That approach says that 'if' is a two-place operator which evaluates the consequent at the closest world(s) where the antecedent is true: so ⌜If p, then q⌝ says, roughly, that the closest accessible *p*-world(s) are *q*-world(s) (if there are any accessible *p*-worlds, true otherwise) (Stalnaker 1968; Stalnaker & Thomason 1970; Stalnaker 1975; Lewis 1973b). The idea is that context provides some kind of ordering over worlds. In the Stalnakerian picture this is a well-order, so there is a unique closest *p*-world; in the Lewisian picture, it is a total pre-order, so there can be more than one equally close *p*-world.[16]

The most prominent line in the linguistics literature says that it is a mistake to treat 'if' as itself a modal operator. Instead, on this line, 'if'-clauses simply restrict the domain of a modal operator in the consequent of the conditional. When there is

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[16] Or, indeed, no closest *p*-world, when there are infinite descending sequences; if we admit such cases, we need to elaborate our truth conditions. I'll ignore cases like that for simplicity.

no overt operator, there is an unpronounced one. This is Kratzer's *restrictor theory* (Kratzer 1981, 1986).[17] The idea is that, just as a sentence like 'The picnic must be cancelled' says that the picnic is cancelled in all the closest epistemically possible worlds, a sentence like 'The picnic must be cancelled *if it's raining*' is still an epistemic necessity claim – just one where the universal quantification is restricted to the closest worlds where it's raining. A sentence like 'The picnic was cancelled if it was raining', which has no overt modal, is assumed to contain an unpronounced modal – typically, an epistemic 'must' – so that the 'if'-clause again simply restricts the domain of quantification for the modal. So ⌜If p, [must] q⌝ says that the closest *p*-worlds are *q*-worlds (relative to a background partial pre-order on worlds), where '[must]' is a possibly covert modal.

One thing that you might think from this exposition – something that has been argued for – is that there is no need to choose between these views: the Kratzer restrictor theory is essentially a view about the *syntax/semantics interface* of the conditional, and so is fully consistent with the Stalnaker/Lewis operator approach as far as semantic questions go. Indeed, in a famous passage, Kratzer wrote:

> The history of the conditional is the history of *syntactic* mistake. There is no two-place 'if...then' connective in the logical forms for natural languages. 'If'-clauses are devices for restricting the domains of various operators. (Kratzer 1986: 656, my emphasis)

And indeed, a conciliatory line is taken by Rothschild (2020), as well as by Stalnaker (2014: 180), who writes:

> There is no conflict between the Kratzer-style analyses and the kind of formal semantic analysis that I and David Lewis proposed for conditionals. Those analyses are not guilty of a "syntactic mistake" since they make no claim about the syntax of any natural language ... I don't want to suggest that Kratzer would disagree with the distinction I am making here, or that she intended a serious criticism of the kind of semantic account that Lewis and I gave.

I think this conciliatory line is wrong: there is more of a conflict between the Stalnaker/Lewis approach and the Kratzer restrictor approach than there first appears, even when we focus solely on semantic questions. In arguing for this, I will draw attention to an overlooked point of disagreement, and thus an exciting area for future work.

17.3.3   Kratzer's Restrictor Theory

To develop this point, I will first say more about what Kratzer's restrictor theory amounts to, remaining fairly informal throughout. There are different

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[17] With roots in Lewis 1975, and important developments in Heim 1982; von Fintel 1994 among others.

versions of the restrictor view in the literature; here I will follow Kratzer 1981, 1991 in particular.[18] On this view (simplifying slightly in ways irrelevant to present purposes), the role of 'if'-clauses is to add their prejacent to the modal base (the parameter which provides the background domain of quantification for modals). Let f be a modal base: a function which takes any world to a set of worlds. Then we have:

(14) $[\![\text{If p, then q}]\!]^{f,w} = 1$ iff $[\![\text{q}]\!]^{f^p,w} = 1$

f^p is the restriction of f to p: the smallest function such that for all worlds $w : f^p(w) = f(w) \cap [\![\text{p}]\!]^f$. We then assume that q contains a modal; if any part of q lies outside the scope of an overt modal, we assume a covert modal takes scope over the relevant part of q. Crucially, then, f^p will serve as the modal base for modals in q. Finally, a modal sentence like $[\![\text{[Must] p}]\!]^{f,w}$ is true iff p is true in all the closest worlds to w in $f(w)$, according to a background function $\leqslant$ which takes any world to an ordering on worlds. So ⌜If p, [must] q⌝ is true at $\langle f, \leqslant, w \rangle$ iff all the closest worlds to w in $f^p(w) = f(w) \cap [\![\text{p}]\!]^f$ are q-worlds – in other words, iff all the closest relevant p-worlds to w are q-worlds.

A direct motivation for Kratzer's restrictor view comes from conditionals with overt modals, like 'If you are going to England, you must bring an umbrella' or 'If it rained, the picnic might have been cancelled'. Since 'if'-clauses, on the restrictor view, just restrict modal domains, the intuitive meanings of sentences like this fall out naturally.

17.3.4   Conditional Excluded Middle

So far, you might think that, as Stalnaker suggests, there really is nothing to choose between, from a *semantic* perspective, between the operator and restrictor theories. Before coming to my main point, let me start by giving you even more reason to believe this, by briefly considering the inference pattern known as *Conditional Excluded Middle (CEM)*, which says that disjunctions with the form ⌜(If p, q) or (if p, not q)⌝ are logical truths. There is substantial intuitive evidence for *CEM* (see e.g. Stalnaker 1980a; Higginbotham 2003; Williams 2010; Klinedinst 2011; Cariani and Goldstein 2020; Cariani 2019; Mandelkern 2018; Santorio 2017; Dorr & Hawthorne 2018), but it famously conflicts with a different pattern which is also intuitive, namely *Duality*, which says that ⌜If p, q⌝ and ⌜If p, might not q⌝ are contradictory (Lewis 1973b). If both *CEM* and *Duality* were true, then ⌜If p, might q⌝ would entail ⌜If p, q⌝, contrary to fact. (There are interesting parallels here,

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[18] This approach is elaborated in slightly different directions in von Fintel 1994; Kratzer 2020a. And this approach differs subtly from the exposition in Kratzer 1986; see Schulz 2009 for helpful discussion.

brought out by Santorio (2017), to the situation with epistemic modals that we explored above.)

The Stalnaker/Lewis theories cross-cut *CEM*: it is validated by Stalnaker's theory but not Lewis's. For Stalnaker assumes that, for any p, there is a unique closest p-world if there is any accessible p-world. Since the closest p-world will either be a q or $\overline{q}$-world, at least one of ⌜If p, q⌝ or ⌜If p, not q⌝ will always be true. By contrast, Lewis does not assume that, for any p, there is a unique closest p-world if there are any accessible p-worlds; instead, conditionals quantify universally over a set of closest p-worlds. That set could include both q- and $\overline{q}$-worlds, in which case neither ⌜If p, q⌝ nor ⌜If p, not q⌝ is true.

Where does the restrictor view fall on this question? Apparently on the side of *Duality*. For the standard assumption is that the covert modal in 'bare' conditionals is a 'must'; since 'might' is the dual of 'must', *Duality* falls out immediately, and *CEM* is invalid, since 'must' obviously quantifies over a set of worlds, rather than talking about a single world. But this assumption is not forced on us. As Cariani and Santorio (2018); Kratzer (2020a); Mandelkern (2018); Cariani (2019) explore, we could instead say that bare conditionals have a covert "selection" modal that selects the closest world in the modal base to the starting world. If we do that, then we validate *CEM* after all.[19]

This brings out the flexibility of the restrictor view, and illustrates why one might think that, indeed, it represents a semantically noncommittal assumption about the syntax–semantics interface.

17.3.5 Logical Divergences

And indeed, as long as p and q themselves do not contains modals or conditionals, the predictions of Kratzer's theory about a sentence with the form ⌜If p, [must] q⌝ closely match the predictions of Lewis's theory about sentences of the form ⌜If p, q⌝;[20] assuming a covert selection modal instead of '[must]', the predictions match Stalnaker's theory.

But when we turn to complex conditionals – conditionals whose antecedents or consequents themselves contain conditionals – Kratzer's restrictor theory

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[19] This move would also help account for observed divergences between ⌜If p, q⌝ and ⌜If p, must q⌝, on which see Rothschild 2013 (citing Benjamin Spector). This issue, in turn, is closely related to questions about the difference between p and ⌜Must p⌝ in general, on which see Karttunen 1972; von Fintel and Gillies 2010; Ninan 2014; Lassiter 2016; Goodhue 2017; Ippolito 2018; Mandelkern 2019c; see also Diti Bhadra's chapter in this volume on evidentiality.

[20] See Lewis 1981. More precisely, the match is precise if we assess the conditionals relative to the same kind of background ordering; Kratzer in fact makes slightly weaker assumptions than Lewis about that ordering (see Boylan & Schultheis 2019), but this is, again, independent from the choice of underlying framework.

diverges in deep ways from the Stalnaker/Lewis theory. To see this, consider a sentence like (15):

(15)   If John had come, then if Mary had come, then it would have been a real mess.

Example (15) has the superficial form ⌜If p, then if q, then r⌝. On the restrictor theory, this will naturally get the logical form ⌜If p, then if q, then MODAL(r)⌝; and that, in turn, will be equivalent to ⌜If p and q, then MODAL(r)⌝, since the successive conditional antecedents each restrict the same modal.[21]

By contrast, the Stalnaker/Lewis theories do not validate this *Import-Export* equivalence: if the closest q-world from the closest p-world is an r-world, it does not follow that the closest pq-world is an r-world. So (15) could be true while 'If John had come and Mary had come, it would have been a real mess' is false, and vice versa. On the other hand, Stalnaker/Lewis theories validate *Modus Ponens*, while restrictor theories do not. *Modus Ponens* says that ⌜If p, q⌝, together with p, entails q. On the Stalnaker/Lewis theory, if the closest p-worlds to w are all q-worlds and p is true at w, then q must be true there as well. But *Modus Ponens* is not validated by the restrictor theory, as Khoo (2013) discusses. For instance, ⌜If p, then if not p, then q⌝ will be trivially true on the restrictor theory, when p is not modal or conditional: assuming it has the logical form ⌜If p, then if not p, then MODAL(q)⌝, both of the antecedents will restrict the same modal, and so the modal base will be empty. But it is easy to see that ⌜If not p, then MODAL(q)⌝ can be false even if p is true.

So the restrictor theory and the Stalnaker/Lewis theory come down on different sides of *Import-Export* and *Modus Ponens*. And this divergence does not depend on the choice of covert modal in the restrictor theory: it is an architectural difference, and it shows that the restrictor theory is semantically committal after all.

There is a case to be made for the validity of each. While philosophers have tended to assume that *Modus Ponens* is valid, McGee (1985) makes a fascinating case against it, and in favor of *Import-Export*. I will not explore or assess those arguments; my aim is merely to highlight a fundamental logical difference between the two approaches.

In fact, the differences run even deeper than this: not only do the Kratzer and Stalnaker/Lewis views diverge on *Import-Export* vs. *Modus Ponens*, they also

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[21] Assuming that p and q remain conditional-free; see Khoo and Mandelkern 2019; Mandelkern 2020c for the case where they don't. It is difficult to make generalizations about the logic of the restrictor theory: to be stated rigorously, any such generalizations would need a full translation schema between sentences of natural language and logical forms (i.e. one which tells us where to put covert modals; see Rothschild 2012 for the beginnings of such a schema). So the claim is not that the restrictor theory validates *Import-Export* in full, but rather that it validates equivalences in the simple instances where p and q are conditional-free.

disagree about the *Identity* principle, which says that conditionals of the form ⌜If p, then p⌝ are logically true. Arló-Costa and Egré (2016) call this principle 'constitutive of the very notion of conditional', and it has come in for very little explicit criticism.[22] But, while *Identity* is validated by the Stalnaker/Lewis theory, it is, intriguingly, not validated by the restrictor theory. The reason for this brings out a central contrast between the two approaches. On the restrictor theory, the interpretation of conditionals depends on the modal base; and the modal base can change, within a sentence, depending on the presence or absence of conditional antecedents. Now suppose that p itself contains a conditional. Then in the sentence ⌜If p, then p⌝, the second occurrence of p will be evaluated relative to a different modal base than the first, meaning that it can express a different proposition than the first.

More concretely, consider a sentence with the form ⌜If (a, and not(if b, then a)), then (a, and not(if b, then a))⌝. This sentence has the form ⌜If p, then p⌝. *Identity* thus predicts that it will always be true. On the restrictor theory, this will have a form along the lines ⌜If (a, and not(if b, then [MODAL](a)), then [MODAL](a, and not(if b, then [MODAL](a)))⌝. The modal base of the third modal will be restricted by the whole conditional's antecedent, which entails *a*; and so the embedded conditional ⌜not(if b, then [MODAL](a))⌝ will never be (nontrivially) true relative to this updated modal base; meaning the whole conditional can never be nontrivially true. (See Mandelkern 2021a for further discussion: there, extending results of Dale 1974, 1979; Gibbard 1981, I show that the failure of *Identity* will follow almost immediately for any theory that validates *Import-Export*.)

So the two approaches under discussion diverge, not just with respect to *Import-Export* versus *Modus Ponens*, but also with respect to the arguably more fundamental *Identity* principle. Again, I will not try to take sides here; my goal is rather to argue that the restrictor theory is semantically committal. There are real choices to be made here.

Given the extent of existing work on the conditional, it would be natural to think that all the interesting work has already been done. I hope this discussion brings out the degree to which many interesting issues remain open. And I have, of course, just brushed the surface of one active debate. To give just a few more examples (with, in turn, just a few references), recent work has brought out intriguing facts about the interaction of conditionals and attitude predicates (Drucker 2017; Pasternak 2018; Blumberg & Holguín 2019; von Fintel & Pasternak 2020); the alternative-sensitivity of conditionals, and their interactions with infinities (Fine 2012a, 2012b; Santorio 2018; Ciardelli et al. 2018; Bacon 2020); the relation between the semantics of conditionals,

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[22] The most famous exception comes from Empiricus's 'emphasis' account, which invalidates *Identity* (*PH 2.112*). See Weiss 2019 for a recent attempt to reconstruct that theory.

knowledge, and the evolution of conversations (von Fintel 2001; Gillies 2007; Williams 2008; Moss 2012; Lewis 2018; Holguín 2020b); the relation between conditionals and iteration principles in the logic of knowledge (Dorst 2020; Holguín 2020a; Boylan & Schultheis forthcoming); conditionals and semantic paradoxes (Field 2014, 2016), the probability of conditionals (McGee 2000; Kaufmann 2004, 2009; Williams 2012; Bradley 2012; Rothschild 2013; Moss 2013b; Bacon 2015; Charlow 2015; Khoo 2016; Schultz 2017; Schwarz 2018; Khoo 2019; Schultheis 2020; Goldstein & Santorio 2021); decision theory and conditionals (Stefánsson 2015; Fusco 2017; Bradley & Stefánsson 2017); and tense, mood, aspect, and conditionals (Iatridou 2000; Ippolito 2003; Schulz 2014; Biezma et al. 2013; Karawani 2014; Romero 2014; Martin 2015; Khoo 2015b; von Fintel & Iatridou 2020).

17.4   Practical Modality

In this final section, I will turn to a class of modals which I'll call *practical* modals. This class comprises, first, deontic modals – modals that communicate permissions, obligations, and requirements, as in (16):

(16)   a. You may have a cookie.
         b. You should visit your grandmother.
         c. John must stop cheating on his husband.

And, second, agentive modals: modals which ascribe abilities and compulsions, as in (17):

(17)   a. Dumbo can fly.
         b. I have to sneeze.

Anankastic modals, which represent something like conditional practical necessity, as in (18), are plausibly also in this class:

(18)   If you want to have a meeting, you have to give two weeks' notice.

Categorization here is controversial: one might think, for instance, that anankastic modals are just restricted compulsion modals. One might also think that agentive modals are just circumstantial modals: modals which say how things could or must go given local circumstances. There seems to be a difference, however, between the agentive (19a) and the circumstantial (19b):

(19)   a. Susie can hit the bullseye.
         b. It could be that Susie hit the bullseye.

If Susie is an untalented dart player, we may be disinclined to accept (19a), whereas (19b) still seems true, since of course she *could* hit a bullseye. In other words, (19b) seems to say something about mere compatibility with local

circumstances, while (19a) says something stronger – something, intuitively, about Susie's abilities.

There is a related point in the neighborhood concerning deontic modals. While there are perfectly well-formed "impersonal" deontic modal claims, like 'There have to be 50 chairs in the living room by 5 p.m.' (Bhatt 1998), it doesn't look like we can generally use deontic modals to simply describe preferable states of affairs which don't involve agents. For instance, suppose that your doctor tells you that you need to go running in the sun more. The best states of affairs, then, are ones where you run in the sun. However, while (20a) seems true in this situation, (20b) seems weird (on the intended deontic reading):

(20)   a. You should run more.
        b. It should be sunny more.

This raises an interesting possibility: perhaps practical modals always concern *actions*. This hypothesis would have both linguistic and philosophical significance. It would suggest there is a distinction between modals which take propositions and those which take actions as complements, a distinction which maps onto a contrast between theoretical modality – claims about possibility, necessity, and conditionality – versus practical modality – claims involving ability, permission, and so on.

In Mandelkern et al. (2017), we develop this idea by arguing that ability ascriptions depend on an underlying representation of a set of actions which we treat as *practically available* to the relevant agent. Our aim there is to rehabilitate (in improved form) the classical conditional analysis of ability, which says that ⌜S can q⌝ is true just in case S would do q if she tried to. This kind of theory has obvious appeal: for instance, our judgments about whether Susie can hit the bullseye seem to map neatly onto our judgments about whether she would, if she tried. In fact, it's natural to think the latter is rather unlikely, though not certainly false; and this seems true of the former, too. But, as is well known, this account faces some rather dramatic counterexamples; for instance, if you're going to a movie, you may be inclined to say you can't go to dinner with your friend – but of course, if you tried to go to dinner, you would have no trouble doing so (see Thomason 2005). These problems can be circumvented by relativizing the conditional analysis to a set of actions: we say that ⌜S can q⌝ is true just in case there is an action A among the actions practically available to S, such that if S tried to do A, S would do q (see Boylan 2021 for more recent developments).

Whether this strategy is successful depends on whether a principled account of practical availability can be given. We make some preliminary remarks about the notion in those papers, but there is much more work to be done here.

Here I would like to draw out a connection to the high-level hypothesis that there is a distinctly practical kind of modality. The picture that results here is structurally reminiscent of theories of deontic modals put forward by Cariani et al. (2013); Cariani (2013), which make the evaluation of deontic modals depend on a partition of logical space – a partition that we can think of as a set of actions. Likewise, in Mandelkern and Phillips 2018, we use experimental results concerning order effects to argue that ascriptions of freedom and force similarly are built on domains of actions, not just possibilities. And all this, in turn, goes naturally with standard approaches in decision theory, which take for granted a background set of actions available to the agents. It seems plausible to me that there is a potential for unification across these domains: namely, all these models of practical reasoning draw on the same core representation of practically available actions.

While I have emphasized here the distinctness of the class of practical modals, it is worth also noting here that, if our theory of agentive modality is correct, then at least that particular species of practical modality is intimately connected to our judgments about conditional facts. Along the same lines, Mandelkern and Phillips (2018) argue that the set of practically available actions is constrained by a theoretical representation of the causal structure of a given scenario (cf. Phillips & Cushman 2017; Phillips & Knobe 2018 for related work on the psychological representation of modality). Causal decision theory (Stalnaker 1980b; Gibbard & Harper 1981) likewise ties together practical modality – what one ought to do – with theoretical modality – what would happen if one did such-and-such.

Let me conclude this discussion by highlighting a puzzle about practical modality from Silk 2015, 2018; Mandelkern 2021b concerning orders.[23] We can use deontic modals to give orders; we can also use other constructions, like imperatives or performatives, which are presumably closely related:

(21)   a. You have to give me your cookie.
        b. Give me your cookie!
        c. I order you to give me your cookie!

An important fact about giving orders is that there is nothing wrong with giving an order when you aren't sure you will be obeyed. Susie could say any of (21a)–(21c) to John, knowing that John is very unlikely to part with his cookie. She might communicate this to an onlooker with a construction like one of the following:

(22)   a. He might not do it.
        b. I'm not sure if he will give me his cookie.

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[23] See Ninan 2005 for a slightly different but plausibly related puzzle.

The puzzle is that, in spite of this, there is something very weird about Susie telling *John* that he might not obey her at the same time that she is ordering him to give her the cookie:

(23)   a. # You have to give me your last cookie, but you might not.
        b. # Give me your last cookie! I'm not sure if you will.
        c. # I order you to give me your last cookie, but you might not.

The weirdness can be brought out if we contrast variants which are not used to give orders, like weak deontic modals or verbs of desire:

(24)   a. You should give me your last cookie, but you might not.
        b. I want you to give me your last cookie, but I don't know if you will.

Sentences which both give an order and express uncertainty about whether it will be carried out (which I call *practical Moore sentences*) are generally infelicitous. But this is puzzling: if there's nothing wrong with giving an order while being unsure whether it will be carried out, what is wrong with giving an order and simultaneously saying that it might not be carried out? One thing that I want to point out here is that it's not clear what *kind* of puzzle this is. Is it a puzzle about the semantics of deontic modals, imperatives, and performative sentences? About the speech act of ordering? Or about the moral psychology of ordering? Or all of these, or something else? In Mandelkern 2021b, I argue that these sentences reveal a surprising norm on ordering: namely, in giving an order, you must act towards your orderee as though they will obey you. If this is correct, it might be revealing about the structure of conversational norms more generally; whether or not this is correct, this is an area where further exploration is clearly needed.

17.5   Conclusion

I have focused on a handful of puzzles concerning epistemic modals, conditionals, and practical modals, respectively. I have just brushed the surface of a rich and enormous literature, and I have done so in a necessarily idiosyncratic and autobiographical way. By delving into the details of these few topics, I hope to have said enough to show how much interesting work has been and remains to be done here by both philosophers and linguists.

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