

Towards a Theory of Subjective Meaning

by

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Abstract

This dissertation develops a form of relativism in which propositions are treated as sets of world-time-individual triples, in contrast to standard views that treat them as sets of worlds or world-time pairs. This builds on existing proposals for predicates of personal taste such as *fun* and *tasty*, and has ties to approaches to *de se* attitudes involving centered worlds. I develop an accompanying pragmatic view in which the context set is similarly construed as a set of world-time-individual triples. The semantic and pragmatic systems together are used to account for the behavior of predicates of personal taste, epistemic modals, indicative conditionals, and a variety of attitude reports, including control constructions. I also explore ways that this account can help solve puzzles related to Moore's paradox.

To give one concrete example, I propose that the proposition expressed by the sentence *it might be raining* is the set of world-time-individual triples $\langle w, t, x \rangle$ such that it's compatible with x 's knowledge in w at t that it's raining. On the pragmatic side, a speaker is justified in asserting this sentence in a conversation if it is compatible with the speaker's own knowledge that it's raining; by asserting it, though, the speaker is making the stronger proposal to make it common ground that it is compatible with the knowledge of the entire group of conversational participants that it's raining. If this proposal is accepted by the other participants, then the group will have established that their knowledge states are aligned in a particular way.

I introduce the core semantic and pragmatic proposals in Chapter 2, focusing on epistemic modals, predicates of personal taste, and belief reports. In Chapter 3, I extend the analysis to indicative conditionals, showing that this solves longstanding puzzles involving the relationship between conditionals and disjunction. In Chapter 4, I extend the approach to certain control constructions, with a special emphasis on capturing their *de se* interpretation. In Chapter 5, I look at two puzzles related to Moore's paradox, with special attention to the meaning of *imagine*.

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Chapter 1

Introduction

1. Preview

In this dissertation, I argue for a semantic and pragmatic system in which the truth of propositions is relativized to an individual “judge.” In other words, propositions are sets of world-time-individual triples, as is the context set of a conversation. This builds on a proposal by Lasersohn (2005) for “predicates of personal taste” such as *fun* and *tasty*, and has obvious ties to approaches to *de se* attitudes (due to Lewis, 1979 and others), where the content of a propositional attitude is seen as a set of world-time-individual triples or “centered” worlds. I propose refinements to Lasersohn’s semantic system, develop a view of the pragmatics of conversation to work alongside it and help to explain how these items are used in conversation, and extend the system to a broader domain including epistemic modals, conditionals, and certain attitude reports (including control constructions), in addition to Lasersohn’s predicates of personal taste.

To give a brief concrete example of my view, I propose that the proposition expressed by the sentence *it might be raining* is the set of world-time-individual triples $\langle w, t, x \rangle$ such that it’s compatible with x ’s knowledge in w at t that it’s raining. On the pragmatic side, a speaker is justified in asserting this sentence in a conversation if it is compatible with the speaker’s own knowledge that it’s raining; however, by asserting it, they are making the stronger proposal to make it common ground (roughly speaking) that it is

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compatible with the knowledge of the entire group of conversational participants that it's raining. This proposal need not be accepted, but if it is, then the participants will have established that their knowledge states are aligned in a particular way.

The core proposal is presented in Chapter 2, through the two case studies of epistemic modals and predicates of personal taste. In Chapter 3, I extend the view to indicative conditionals, taking the view that they involve covert epistemic modals. A particular focus of Chapters 2 and 3 is to show that the mechanism of judge dependency, together with an appropriate view of the pragmatics, can provide solutions to longstanding puzzles about epistemic modals and conditionals. I also spend some time discussing the behavior of these “judge-dependent” items (epistemic modals, predicates of personal taste, and conditionals) in attitude reports, focusing on belief. Attitude reports then become the focus of Chapters 4 and 5. In Chapter 4, I look at the phenomenon of obligatory *de se* attitudes. I show that my proposed system is exactly what is needed to account for a well-defined subclass of *de se* constructions including control constructions as well as attitude reports that embed judge-dependent items. (I suggest that other *de se* expressions such as shifting indexicals, logophors, and optionally *de se* pronouns have different properties and should not be given the same account.) This has implications for a theory of control, which I touch on at the end of Chapter 4. In Chapter 5, I look at two puzzles related to Moore's paradox, with special attention to the meaning of *imagine*.

Finally, a brief note about the organization of Chapters 2–5: Chapter 2, which contains the core ideas of this work, is intended to be self-contained. Chapters 3–5 build on these ideas and thus crucially depend on material from Chapter 2; however, the sequence of Chapters 4–5 is essentially independent of Chapter 3 (although Chapter 5 does make some reference to material from Chapter 4).¹

2. Setting the Stage

To give an idea of what I will be doing, let me start by highlighting a few key aspects of an approach to natural language semantics and pragmatics that I take to be standard.

¹ More precisely, the self-contained portions of this dissertation include Ch.2, Ch.2⊕Ch.3, Ch.2⊕Ch.4, and Ch.2⊕Ch.4⊕Ch.5.

These are not necessarily universally accepted by semanticists and philosophers of language, but they do form my starting point. I will be proposing changes to some of these, but my underlying approach to semantics and pragmatics will be in line with the approach I describe. Then I will introduce two challenges to standard views that I will be dealing with here.

2.1. What We Learned in Semantics 1

The meaning (i.e., intension) of a sentence is standardly treated as a set of possible worlds, or similarly as a set of situations or world-time pairs. (Technically, this is usually defined as a function that characterizes such a set, and I will use the two descriptions interchangeably.) The denotation, or extension, of a sentence is a truth value: true if the actual world (situation, world-current-time pair) is in the relevant set. A proposition is normally taken by definition to be the kind of thing that can be the intension of a sentence – that is, a set of worlds, situations, or world-time pairs. Related to the view of propositions as sets of possible worlds is the notion of truth conditions. The truth conditions of a sentence are the conditions under which that sentence is true – that is, what a world (or situation, or world-time pair) has to be like for that proposition to be true in it.

To illustrate this view in a very mundane case, consider sentences (1)–(2).

(1) Washington, D.C. is the capital of the United States.

(2) San Francisco is the capital of the United States.

The intension of (1) is the set of worlds where the capital of the United States is Washington, D.C., and the extension of (1) at the actual world is, of course, the truth value 1 (true), since the actual world is a member of this set. On the other hand, the intension of the sentence in (2) is a different set – the set of worlds where San Francisco is the capital of the United States, and the extension of (2) is the truth value 0 (false) at the actual world.

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2.2. What We Learned in Pragmatics 1

On the theory of conversation in the tradition of Stalnaker (1978, 2002), the exchange of information in conversation is modeled with the two related notions of a common ground and a context set. Formally, the context set is a set of worlds (and thus technically a proposition). Intuitively, it is the set of worlds that are compatible with every proposition p such that all the participants in the conversation believe that p , all the participants believe that all the participants believe that p , and so on ad infinitum. (For some purposes, this needs to be made more general by replacing “believe” with “accept for the purposes of conversation,” but I will largely be unconcerned with this distinction.) The common ground is the set of these propositions, and when a proposition p is added to the common ground, we can say that p becomes common ground.

Just as propositions can alternatively be construed as sets of situations or sets of world-time pairs rather than sets of worlds, the context set can be construed in a parallel way as a set of situations or a set of world-time pairs. Typically the same formulation is used for both notions.

An important notion on this view is that of an assertion. According to the Stalnakerian view, a speaker asserts a proposition p by making a declarative utterance of a sentence expressing p . By asserting that p , they are making a proposal to restrict the context set by intersecting it with p ; this has the effect of removing any worlds from the context set in which p is not true. Since there is a systematic correspondence between the set of worlds in the context set and the set of propositions in the common ground, an assertion can equivalently be described as a proposal to add p to the common ground.

A speaker who makes an assertion is proposing that the context set be restricted in a certain way, but that does not mean that the context set will automatically be restricted in that way. This depends on whether the other participants in the conversation accept the assertion or reject it. In English, hearers may indicate that they are accepting an assertion by saying things like *I agree*, *You're right*, *That's true*, *Oh*, *Uh-huh*, or by saying nothing; they may indicate that they reject an assertion by saying things like *Nuh-uh*, *Uh-uh*, *No!*, *You're wrong*, *That's not true*, etc. If the hearers all accept an assertion that p ,

then the context set is intersected with p , giving a new context set; if any hearers reject the assertion, then the context set is not intersected with p . In any case, the common ground is always updated with the fact that the speaker made the assertion they made, and the fact that various hearers accepted or rejected the assertion by saying different things, but I will not be concerned with updates of those kind.

2.3. First Challenge: Matters of Opinion

There is one very obvious limitation to the standard view that most semanticists have probably thought about at some point, and which will be a major theme of Chapters 2 and 3. This limitation is tackled most recently by Lasersohn (2005, 2006) who introduces the problem like this:

To many of us who teach introductory semantics courses, the following may be a familiar experience: Early in the course, when one introduces the idea of truth conditions, and of trying to formulate rules assigning truth conditions to sentences in a systematic way, students will frequently ask, “But what about sentences that aren’t about matters of fact, but are really just matters of opinion?”

(Lasersohn, 2005: p. 643)

The worry is about sentences like (3) and (4).

(3) This soup is tasty.

(4) This party is fun.

These look and act like normal sentences, just like (1) or (2). Speakers can utter them declaratively, and hearers can agree or disagree with them. At the same time, there is an obvious sense in which it is a matter of opinion whether some particular soup is tasty or a particular party is fun, whereas it is not a matter of opinion whether Washington, D.C. is the capital of the United States. (It may be a matter of opinion whether it ought to be, and some people may falsely believe that it isn’t, but this is not the same thing.) This may seem benign at first glance, but it wreaks havoc on our basic semantic and pragmatic assumptions. On the semantic side, if (3), for example, expresses a proposition, and a proposition is a set of worlds, then it becomes a matter of opinion which proposition it expresses – or worse, which worlds are members of a particular set. Accordingly, on the

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pragmatic side, if an assertion of (3) constitutes a proposal to restrict the context set in a certain way, it becomes a matter of opinion what restriction is being proposed.

2.4. Second Challenge: *De Se* Attitudes

A second challenge to the standard approach to semantics, which is less obvious but perhaps better known, involves *de se* interpretations of attitude reports. (I will take on this challenge mainly in Chapter 4.) A *de se* attitude is one that crucially involves the self, rather than simply truth conditions about the world (Lewis, 1979; Perry, 1979; Chierchia, 1989). A classic example due to Perry (1977) involves an amnesiac named Lingens who is lost in the Stanford library and doesn't know who he is or where he is. Even if he reads a biography of himself, and learns from it that there is an amnesiac named Rudolf Lingens lost in the Stanford library, he may still not realize that he himself is Rudolf Lingens and is in the Stanford library. On the other hand, if he reads the biography and then suddenly regains his memory, he may well make this connection. In the first case, he would only be inclined to say, "Lingens is lost in the Stanford library" whereas in the second, he would be inclined to say, "I am lost in the Stanford library." The latter is a report of a *de se* belief. If propositions are seen as something like sets of worlds, there is no way to distinguish between the content of these two beliefs; both, for example, would be the set of worlds $\{w: \text{Lingens is lost in the Stanford library in } w\}$.

De se attitudes are an issue for natural language semantics because certain constructions are obligatorily interpreted *de se*, in particular attitude reports involving embedded infinitives and subject control (Morgan, 1970; Chierchia, 1989). For example, the Italian example in (5) is only true in a situation where Pavarotti would be inclined to say, "I am a genius." If he unknowingly listened to a recording of himself and thought, "That singer is a genius," (5) would not be true. Similarly, (6) would only be true if the amnesiac Lingens were inclined to say, "I want to get out of the Stanford library"; if he unknowingly read a biography of himself and thought, "I want this guy Lingens to get out of the Stanford library" (6) would not be true.

Chapter 2

Epistemic Modals, Predicates of Personal Taste, and Attitude Reports

1. Introduction*

In this chapter, I present my core semantic and pragmatic proposals, using the case study of epistemic modals and predicates of personal taste. In particular, I look at the modals *might* and *must* and at predicates such as *tasty* and *fun*, which were discussed by Lasersohn (2005, 2006). These two classes of expressions share a similar analytical difficulty in determining whose taste or knowledge is being expressed. Accordingly, they have parallel behavior in attitude reports and in a certain kind of disagreement. On the other hand, they differ in how freely they can be linked to a contextually salient individual, with epistemic modals being much more restricted in this respect.

* Some of the material in this chapter is under review for *Linguistics and Philosophy*, and an older version appeared in a working papers volume (Stephenson, 2005). I would like to thank *L&P* editor Polly Jacobson and two anonymous *L&P* reviewers for their very helpful comments and discussion. Thanks also to Pranav Anand, Kai von Fintel, Danny Fox, Valentine Hacquard, Irene Heim, Sarah Hulsey, Sabine Iatridou, Ezra Keshet, Angelika Kratzer, John MacFarlane, Eric McCready, Jillian Mills, Friederike Moltmann, Craige Roberts, Robert Stalnaker, Seth Yalcin, the editors and reviewers of *MITWPL 51*, and audiences at MIT, *Sinn und Bedeutung 11*, the 2006 SNEWS workshop, the 2007 LSA Annual Meeting, Yale, and the University of Maryland.

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I propose a unified account of epistemic modals and predicates of personal taste that captures the similarities and differences between the two classes, as well as their interactions with certain attitude predicates. My semantic analysis builds on Lasersohn's (2005) analysis of predicates of personal taste using a "judge" parameter. I argue for certain modifications to Lasersohn's view, and extend the system to cover epistemic modals and a number of attitude predicates. I also sketch a pragmatic theory of conversation that goes with the semantic account and gives further explanatory power to the system.

Now let me start by introducing the basic puzzle shared by epistemic modals and predicates of personal taste. I will start with epistemic modals. It is widely assumed that (1a) has a reading (its epistemic reading) which can be expressed as something like (1b) (Kratzer, 1977).

- (1) (a) It might be raining.
(b) In some world compatible with what is known in the actual world, it's raining.

A troublesome question lurks in (1b). There is reference to the set of worlds "compatible with what is known," but the question is, known by *who*? If "what is known" is taken to mean "what is known by the speaker," the resulting meaning is too weak (see, e.g., MacFarlane, 2006). On the other hand, if "what is known" is taken to mean "what is known by anyone at all" or "what is known by people in general" the meaning becomes impossibly strong. The question of exactly whose knowledge is relevant for the interpretation of epistemic modals turns out to be difficult to answer, and a great deal of effort has gone into trying to either answer it or evade it (for example, by using descriptions like "what is known"), in both the linguistics and the philosophy literature.¹

Lasersohn (2005) discusses a similar puzzle that arises with "predicates of personal taste" such as *tasty* and *fun*. He uses examples like (2).

- (2) This roller coaster is fun.

¹ In addition to Kratzer and MacFarlane's work, see, for example, Moore (1962), Hacking (1967), Stalnaker (1984), DeRose (1991), Egan, Hawthorne & Weatherston (2005), and von Stechow & Gillies (2005, 2007a).

Lasersohn shows that if *fun* in sentences like (2) is taken to mean “fun for the speaker” or “fun for someone,” the meaning is too weak; on the other hand, if it’s taken to mean “fun for everyone” or “fun for people in general” it becomes too strong. The question of whose taste or subjective experience is relevant to the interpretation of a predicate of personal taste thus turns out to also be difficult to answer, and the difficulty in this regard is very similar to the difficulty of specifying whose knowledge is expressed by an epistemic modal. I would like to suggest, then, that these two questions are difficult for the same reason; there is just one puzzle that applies to both epistemic modals and predicates of personal taste.²

The structure of the chapter is as follows. In Section 2, I give examples of the parallel behavior of epistemic modals and predicates of personal taste, and review the reasons why standard mechanisms of context dependence are not sufficient to account for the puzzling behavior of these items. In Section 3, I present Lasersohn’s analysis of predicates of personal taste, and show how it can help to explain some of the puzzling behavior of predicates of personal taste discussed in Section 2. In Section 4, I extend this analysis to epistemic modals, first extending Lasersohn’s system directly and then arguing for a modification to it. The revised version explains the puzzling behavior of both epistemic modals and predicates of personal taste, and also accounts for a difference between them. In Section 5, I bring up some contrasts between the predicates *think*, *find* (as in *find the cake tasty*), and *believe*, and offer an explanation based on requirements similar to those of evidentials. In Section 6, I show how the semantic system of judge dependency can be placed within a Stalnakerian theory of conversation and the common ground. In Sections 7–8, I compare my analysis to recent proposals by Egan, Hawthorne & Weatherson (2005) and MacFarlane (2006) for epistemic modals, and Lasersohn (2005) for predicates of personal taste, arguing that my proposal fares better in both domains, and I sum up the chapter in Section 9.

² Egan, Hawthorne & Weatherson (2005) also connect their relativist view of epistemic modals with examples like *Rotting flesh tastes great* (uttered by a vulture), but they do not explore taste predicates in depth.

CHAPTER 2

2. Parallels between Epistemic Modals and Predicates of Personal Taste

In this section, I will show that epistemic modals and predicates of personal taste have parallel behavior in attitude reports and in certain phenomena of contradiction and disagreement.³

2.1. Epistemic Modals in Attitude Reports

Much discussion about the semantics of epistemic modals has been devoted to the question of whose knowledge state is being expressed, or as it is sometimes put, what the relevant “community of knowers” is. For example, DeRose (1991) proposes that the community of knowers is fairly free, but that it’s required to include the speaker. Egan, Hawthorne & Weatherson (2005) give counterexamples to this constraint. The main thing that seems to be generally agreed on is that it is not obvious how to figure out who the relevant “knowers” will be for any particular example. I would like to begin, though, by looking at a class of examples where this uncertainty disappears, namely those such as (3)–(4) where an epistemic modal is embedded under *think*. (I will be restricting my attention to modal verbs and auxiliaries, and leave it to future work to determine whether modal expressions of other syntactic categories, such as *probably* and *likely*, have parallel behavior.)

(3) Sam thinks it might be raining.

(4) Sam thinks it must be raining.

In (3)–(4), the embedded modal seems to express Sam’s mental state.⁴ For example, (3) is true iff Sam’s beliefs do not exclude the possibility that it’s raining, and (4) is true iff Sam’s beliefs exclude the possibility that it isn’t raining. This fact extends to cases where the grammatical subject of *think* is a quantifier, as in (5). (Indices are used just as a shorthand to indicate the intended reading and are not meant to have theoretical status.)

(5) (a) [Every boy]_i thinks he_i must be stupid.

³ Moltmann (2005) independently makes similar observations about the parallels between predicates of personal taste and epistemic modals, and gives brief suggestions towards a parallel analysis.

⁴ This observation about embedded epistemic modals is anticipated by Antinucci & Parisi (1971).

- (b) [Every contestant]_i thinks they_i might be the winner.⁵

The sentences in (5) have a reading where the “knowers” range along with the subject. On the relevant reading, (5a) says that for each boy *x*, *x*’s beliefs entail that *x* is stupid, and (5b) says that for each contestant *y*, *y*’s beliefs do not exclude the possibility that *y* is the winner. Of course, the bound pronoun need not be the subject of the embedded clause, as illustrated in (6). (Underlining indicates the “knower” for a particular modal.)

- (6) (a) [Every boy]_i thinks that his_i father must be the smartest person in the world.
 (b) [Every contestant]_i thinks that the judges might have liked them_i the best.

In cases where one propositional attitude report is embedded under another, there is still no ambiguity as to whose mental state is being reported with an epistemic modal: the modal always reports the mental state of the immediate subject. This is illustrated in (7)–(8).

- (7) (a) Mary thinks that Sam thinks it might be raining.
 (b) Mary thinks that Sam thinks it must be raining.
 (8) (a) Mary thinks that Sam might think it’s raining.
 (b) Mary thinks that Sam must think it’s raining.

In (7a), for example, the content of Mary’s belief is that Sam’s beliefs don’t exclude the possibility that it’s raining. On the other hand, (8a) says that Mary’s beliefs don’t exclude the possibility that Sam thinks it’s raining.

The adverbial clause *as far as x knows* has the same effect as an attitude predicate, as illustrated in (9)–(10).

- (9) As far as Sam knows, it might be raining.
 (10) Mary thinks that as far as Sam knows, it might be raining.

⁵ The examples in (5) are from Speas (2004), who argues that the modal base is linked to the bound variable but does not link the effect to attitude predicates. Similar examples are also used in von Stechow & Trudgill (2003) to show that quantifiers can bind pronouns across an epistemic modal.

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Again, the modal in (9)–(10) is clearly reporting Sam’s beliefs, not the beliefs of the speaker or anyone else.

2.2. Predicates of Personal Taste in Attitude Reports

Lasersohn (2005) looks at a different kind of item that turns out to have largely parallel behavior, namely what he calls “predicates of personal taste.” Lasersohn gives *tasty* and *fun* as paradigm cases. As Lasersohn observes, it is difficult to draw a sharp distinction between predicates of personal taste and predicates expressing moral or aesthetic values, such as *beautiful* or *moral*. (Some borderline examples are *funny*, *annoying*, and *tasteful*.) Ultimately it would be desirable to give all of these classes a unified treatment, but (like Lasersohn) I will focus on the predicates *tasty* and *fun* (plus related expressions such as *taste good*), taking the relevant class of items to be those which pattern in roughly the same way.

Because predicates of personal taste such as *tasty* and *fun* relate to an internal state or experience, the question arises as to whose internal state or experience is being reported in any particular case, or in Lasersohn’s terminology, who is the “judge.” And as with the issue of who the “knower” is with epistemic modals, this turns out to be hard to answer. But also like epistemic modals, predicates of personal taste behave differently when embedded under a verb like *think*. For example, consider (11)–(12).

(11) Sam thinks the dip is tasty.

(12) Sam thinks that the roller coaster is fun.

These examples have a very salient reading where the predicate of personal taste is linked to the subject of *think*, that is, where the judge is clearly Sam. We will see that this is not the only possible reading, and that predicates of personal taste differ from epistemic modals in this respect. I’ll return to this in Section 4.2.

Bearing this caveat in mind, we can see that the link remains when the subject of *think* is a quantifier that binds a pronoun in the embedded clause. For example, (13) has a reading where the judge co-varies with the boys. (Underlining indicates a link between a predicate and the judge.)

(13) [Every boy]_i thinks his_i dinner is tasty.

As with epistemic modals, when one *think*-clause is embedded under another as in (14), the predicate is linked to the subject of the *think*-clause that most immediately embeds it, as illustrated in (14).

(14) (a) Mary thinks that Sam thinks the dip is tasty.

(b) Mary thinks that Sam thinks that the roller coaster is fun.

Also as with epistemic modals, the same effect can be achieved in some cases with certain adverbial phrases, as Lasersohn points out. Some of these are illustrated in (15).

(15) (a) The roller coaster is fun for Sam.

(b) As far as Sam is concerned, the roller coaster is no fun.

(c) The cake tastes good to me.⁶

Thus one parallel between epistemic modals and predicates of personal taste is in their behavior when embedded under propositional attitude predicates such as *think*.

2.3. Contradictions and Disagreements

Another parallel between epistemic modals and predicates of personal taste is in the fact that both give rise to a peculiar kind of disagreement between speakers. I take the presence of expressions like *no* or *nuh-uh* to mark disagreement in English, as used, for example, in the dialogue in (16), which involves three people, Mary, Sam, and Sue.

(16) Mary: Where's Bill?
 Sam: He's in his office.
 Sue: Nuh-uh, he's at home! He doesn't work on Fridays.
 [OR] No, he isn't, he's at home! He doesn't work on Fridays.

⁶ I assume that *tastes good* has the same meaning as *is tasty*, ignoring the fact that it's presumably built up from *taste* and *good*. The two expressions don't have exactly the same distribution, as seen for example in the fact that *?tasty to me* is less acceptable than *tastes good to me*. But when convenient, I will substitute one for the other.

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The disagreement in (16) is about a completely objective, factual matter. But disagreement is also possible if epistemic modals are used as in the dialogue in (17), which contains an epistemic modal.

- (17) Mary: Where's Bill?
 Sam: I'm not sure. He might be in his office.
 Sue: Nuh-uh, he can't be. He never works on Fridays.
 [OR] No, he can't be. He never works on Fridays.

The puzzling thing about discourses like (17) is this: Sam seems to be expressing his mental state, and Sue seems to seem to be disagreeing with him. But if this is the case, then Sue ought to be understood as saying that Sam is wrong about his own mental state. However, Sue does not seem to be doing that, but rather expressing her own mental state. In other words, two speakers can disagree about a statement containing an epistemic modal simply because they have different knowledge states. Compare this to (18), where Sam's statement explicitly refers to his own knowledge; here it seems odd for Sue to respond as if she is disagreeing.

- (18) Mary: Is Bill in his office?
 Sam: Well, I'm not sure, but I don't know that he isn't.
 Sue: # Nuh-uh, he's at home! He doesn't work on Fridays.
 [OR] # No, he isn't, he's at home! He doesn't work on Fridays.

Thus there are two facts to be explained: the fact that disagreement is possible in (17), and the contrast between (17) and (18) in this respect.

Once again, the behavior of predicates of personal taste is very similar. For example, in (19)–(20), Sam seems to be expressing his own taste or experience, and Sue seems to be expressing hers, and yet they are disagreeing.

- (19) Mary: How's the cake?
 Sam: It's tasty.
 Sue: Nuh-uh, it isn't tasty at all!
 [OR] No it isn't, it tastes terrible!
- (20) Mary: How was the party?
 Sam: It was fun.
 Sue: Nuh-uh, it wasn't fun at all!
 [OR] No it wasn't, it was no fun at all!

On the other hand, if Sam makes explicit that he is expressing his own taste, Sue's responses then become odd, as illustrated in (21)–(22).

- (21) Mary: How's the cake?
 Sam: It tastes good to me.
 Sue: # Nuh-uh, it doesn't taste good at all!
 [OR] # No it doesn't, it tastes terrible!
- (22) Mary: How was the party?
 Sam: It was fun for me.
 Sue: # Nuh-uh, it wasn't fun at all!
 [OR] # No it wasn't, it was no fun at all!

Another way to look at this contrast is in terms of possible interpretations of elided VPs. For example, compare (23) to (24).

- (23) Sam: The party was fun.
 Sue: No, it wasn't!
- (24) Sam: The party was fun for me.
 Sue: No, it wasn't!

In (23), Sue could be responding based on the fact that the party wasn't fun for her; however, in (24), Sue's response seems to mean "it wasn't fun for you (Sam)," and has to be based on a belief of Sue's that the party was not fun for Sam.

Thus, as with epistemic modals, there are two facts about predicates of personal taste to be explained: why disagreement is possible in (19)–(20), and why these contrast with (21)–(22).⁷

I should clarify that when I say that disagreement is possible in a certain dialogue, I mean very narrowly that expressions like *no (it isn't)* and *nuh-uh* are allowed. I don't mean that we merely have an intuition that the speakers disagree about something, which

⁷ A MITWPL reviewer pointed out that the same kind of disagreement is possible with vague scalar predicates as in dialogues like (i), in a situation where George's jacket is of a color intermediate between clearly red and clearly burgundy.

(i) Mary: What color is George's jacket?
 Sam: It's red.
 Sue: No it isn't, it's burgundy!

This suggests to me that it might be possible to extend the account I give to predicates of personal taste and epistemic modals to capture certain properties of vague scalar predicates, but I will not pursue that here.

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may be a broader phenomenon.⁸ I also don't mean that the disagreement is necessarily a rational or sensible one to engage in. The dialogues in (19) and (20) are just the kind of arguments that are often pointed out to be futile, given that people's tastes simply differ. That is not my concern. The only fact that matters for my purposes is that such dialogues can and do occur – often enough, in fact, to give us ample opportunity to perceive their futility.

2.4. Note about First-Person Belief Reports

I observed in Sections 2.1–2.2 that when an epistemic modal or predicate of personal taste is embedded in an attitude report, the attitude holder becomes the person whose knowledge or taste is relevant. Then in Section 2.3 I observed that when an epistemic modal or predicate of personal taste is explicitly linked to the speaker, it is not possible for a hearer to disagree using expressions such as *no it isn't* or *nuh-uh*. Putting these two observations together, we might expect that when an epistemic modal or predicate of personal taste is embedded in a first-person attitude report, disagreement would again become impossible. For example, we might expect (25)–(26) to be odd, and yet they are perfectly acceptable.

- (25) Mary: Where's Bill?
 Sam: I'm not sure. I think he might be in his office.
 Sue: No, he can't be. He never works on Fridays.
- (26) Mary: How's the cake?
 Sam: I think it's tasty.
 Sue: No it isn't, it tastes terrible!

Notice, though, that the form of Sue's response in these dialogues shows that her disagreement is targeting the embedded clause rather than the matrix clause. That is, in (25) Sue says *no, he can't be* (i.e., Bill can't be in his office); and similarly in (26) she says *no it isn't* (i.e., the cake isn't tasty). If Sue were disagreeing with the matrix clause, she would have to say, *No you don't*, meaning *you don't think that*. It is an interesting

⁸ For example, if Sam says, "I like this cake," and Mary says, "I don't like this cake," we may have a general intuition that there is something that Sam and Mary disagree about; however, this does not count as the type of disagreement that I am talking about because disagreement markers such as *no* or *nuh-uh* would not be licensed. (This was brought to my attention by Philippe Schlenker, p.c..)

question why speakers may disagree with propositions that are embedded within attitude reports, but one that is independent of the issues at hand. I will return to this issue in Section 6.5.

2.5. Why Not Context Dependence?

One might think that epistemic modals and predicates of personal taste are simply context-dependent items, so that, for example, *tasty* means “tastes good to x” and *might* means “compatible with x’s knowledge,” where x is some salient, contextually determined individual or group. In fact this approach is often taken with respect to epistemic modals (see, e.g., DeRose, 1991; von Stechow & Gillies, 2007a). However, standard mechanisms of context dependence are not enough to account for the behavior of these items. Lasnik (2005) argues this in great detail for predicates of personal taste, and proponents of context relativism such as Egan, Hawthorne & Weatherston (2005) and MacFarlane (2006) do so for epistemic modals. Below I consider some obvious options for a context-dependent analysis, and review the reason why they fail.

First, note that in the dialogues (17) and (19)–(20) above, where Sam says that the cake is tasty or that Bill might be in his office, he seems, intuitively, to be expressing something about his own experience of taste or his own mental state. This suggests that a context-dependent account of these items ought to involve the speaker in some way. The most obvious possibility, then, is that predicates of personal taste and/or epistemic modals involve first-person indexicals, so that *tasty* means “tastes good to me (the speaker)” and *might* means “compatible with my (the speaker’s) knowledge.” But we have already seen that this cannot be right because of disagreements of the kind that occur in dialogues such as (17) and (19), repeated in (27)–(28).

- (27) Mary: Where’s Bill?
 Sam: I’m not sure. He might be in his office.
 Sue: Nuh-uh, he can’t be. He never works on Fridays.
 [OR] No, he can’t be. He never works on Fridays.
- (28) Mary: How’s the cake?
 Sam: It’s tasty.
 Sue: Nuh-uh, it isn’t tasty at all!
 [OR] No it isn’t, it tastes terrible!

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If *might* and *tasty* contained first-person indexicals, then these dialogues would be akin to that in (29), which is incoherent.

- (29) Mary: I'm a doctor.
 Sam: # No, I'm not!

Even if a simple account using first-person indexicals is not right, we might think that the hidden argument should contain something like an inclusive *us*, that is, the speaker and the addressee. On this view, *tasty* would mean something like “tastes good to us” and *might* would mean something like “compatible with our knowledge.” In this case, I will use different arguments for predicates of personal taste and for epistemic modals, so I will consider the two cases separately. In both cases, the arguments I will give below will apply equally to a view where the hidden argument consists of the speaker and addressee plus possibly other individuals.

The view that *tasty* means “tastes good to us” is initially plausible in light of dialogues like (28); there it is possible that Sue is denying that the cake tastes good to both her and Sam, on the grounds that it does not taste good to her. Assuming that the property of tasting good is distributive, this would be sufficient to make it false that the cake tastes good to both of them. However, now consider (30).

- (30) Mary: This cake is tasty.
 Sam: No, it isn't, it tastes terrible!

In this case, Sam can say that the cake tastes terrible, even though he knows that the cake doesn't taste terrible to Mary, and therefore doesn't taste good to both of them.

Lasersohn makes a similar point with examples like (31).

- (31) Sam: This cake isn't tasty at all.
 Mary: Yes it is! It tastes great!

(based on Lasersohn, 2005, no. 17)

Here since Mary already knows that the cake does not taste good to Sam, she should not be able to assert that the cake tastes good to both of them.

Now let me turn to the case of epistemic modals. Here the proposal would be that *might* means something like “compatible with our (the speaker and addressee’s) knowledge.” It is not important for the argument whether this is understood as the speaker and addressee’s combined knowledge or their shared knowledge. To see that this cannot be right, recall the behavior of epistemic modals in attitude reports such as (3), repeated in (32).

(32) Sam thinks it might be raining.

If, for example, Bill utters (32) to Sue, the sentence means that it’s compatible with Sam’s knowledge or beliefs that it’s raining. It clearly does not mean that it’s compatible with Bill and Sue’s knowledge that it’s raining, which is what the proposal would predict. Thus, in general *might* cannot mean “compatible with our knowledge.”

One solution that may come to mind here is to suggest that the component meaning *us* is not a normal indexical but a shifting indexical (see, e.g., Schlenker, 2003). The problem with this idea is that epistemic modals do not have the same behavior as shifting indexicals in this respect. The shifted interpretation of shifting indexicals is generally optional, whereas the shifting in (32) would be obligatory. Relatedly, in a case where one speech or attitude report is embedded under another, shifting indexicals can typically be linked to either the lower or higher attitude report. (I’ll say more about this difference in Chapter 4, Section 2.4.)

A similar argument applies to a view where the relevant knowledge is just that of any particular, contextually relevant group (as argued by DeRose, 1991; von Stechow & Gillies, 2007a, and others). Again supposing that Bill uttered (32) to Sue, the sentence would clearly not mean that Sam thinks it’s compatible with the knowledge of the group relevant for Bill and Sue that it’s raining. Similarly, if Bill uttered (33) to Sue, it would not generally mean that Sam thinks the cake tastes good to the group of people who Sue takes to be relevant.

(33) Sam thinks that the cake is tasty.

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One final possibility that comes to mind is that *tasty*, for example, means something like “tastes good to people in general.” I’ll address that possibility in Section 4.6.

3. Lasersohn’s Analysis of Predicates of Personal Taste

In this section I will summarize Lasersohn’s (2005) analysis of predicates of personal taste, which uses an additional individual parameter called the “judge.” On this view, the Kaplanian content of a sentence is a function from tuples $\langle w, t, j \rangle$ to truth values, where w is a world, t is a time, and j is an individual (the judge). The judge is the person whose taste or experience is relevant for a predicate of personal taste. This is in contrast to the standard view which takes the content of a sentence to be a function from just worlds or world-time pairs to truth values. I will go through the analysis in more detail below. In Section 4, I will extend the same kind of view to epistemic modals.

3.1. Basic Assumptions

Lasersohn’s starting point is the dual view of sentence meaning from Kaplan (1989). On this view, there are two senses of the “meaning” of an expression: the “character,” which is constant for a single expression across utterances, and the “content,” in which the reference of indexicals such as *I* and *now* has been fixed. For example, suppose that one speaker, A, utters the sentence *I am in Boston now* at time t_1 , and another speaker, B, utters the same sentence at time t_2 . The two utterances have the same character, but the content of A’s utterance is the proposition that A is in Boston at time t_1 , and the content of B’s utterance is the proposition that B is in Boston at time t_2 . In general, then, the content of an expression is a function from world-time pairs $\langle w, t \rangle$ to extensions (i.e., its intension). The character of an expression is thus a function from contexts of utterance to contents. In particular, the content of a sentence (a proposition) is a function from world-time pairs to truth values, and the character of a sentence is a function from contexts of utterance to propositions. The elements of the context of utterance that determine content from character are called the “context” and the parameters of evaluation that determine truth value from content are called the “index.”

Given that both the context of utterance and the world and time contribute to the extension of an expression, we can write the extension of an expression α as $\llbracket \alpha \rrbracket^{c; w, t}$, where c is the context of utterance (the context), w is the world of evaluation, and t is the time of evaluation (so $\langle w, t \rangle$ is the index). Assuming a system of semantic interpretation along the lines of Heim & Kratzer (1998), we can use the two rules of semantic interpretation in (34).^{9,10} (Note that worlds are type s and times are of type i .)

(34) **Rules of semantic interpretation:**

Functional Application (FA): If α is a complex expression formed by combining two expressions β and γ , and $\llbracket \gamma \rrbracket^{c; w, t}$ is in the domain of $\llbracket \beta \rrbracket^{c; w, t}$, then $\llbracket \alpha \rrbracket^{c; w, t} = \llbracket \beta \rrbracket^{c; w, t} (\llbracket \gamma \rrbracket^{c; w, t})$.

Intensional Functional Application (IFA): If α is a complex expression formed by combining two expressions β and γ , and $[\lambda w'_s . [\lambda t'_i . \llbracket \gamma \rrbracket^{c; w', t'}]]$ is in the domain of $\llbracket \beta \rrbracket^{c; w, t}$, then $\llbracket \alpha \rrbracket^{c; w, t} = \llbracket \beta \rrbracket^{c; w, t} ([\lambda w'_s . [\lambda t'_i . \llbracket \gamma \rrbracket^{c; w', t'}]])$.

3.2. A New Parameter

To analyze predicates of personal taste, Lasersohn adds a “judge” to the index. In particular, the content of a sentence under this view is a function from world-time-individual triples $\langle w, t, j \rangle$ to truth values. Thus the extension of an expression α should now be written as $\llbracket \alpha \rrbracket^{c; w, t, j}$, where c is the context of utterance (the context), w is a world, t is a time, and j is the judge (so $\langle w, t, j \rangle$ is the index). It should be noted that since the judge is an individual, formally speaking Lasersohn’s indices are in fact centered worlds, although he does not present the idea in those terms. I will not discuss other uses of centered worlds, but will make the connection implicitly by using the notion of doxastic alternatives.

Lasersohn’s “judge” is the individual whose taste or experience is relevant for a predicate of personal taste. Thus *fun*, *tasty* (or *taste good*), and *taste terrible* have the meanings in (35).

⁹ Lasersohn presents his analysis in a somewhat different form, as a self-contained fragment, but the two versions are essentially notational equivalents.

¹⁰ Additional rules of semantic interpretation would be needed if Kaplanian “monsters” are to be allowed (Kaplan, 1989; Schlenker, 2003); I will not address this question here, except for touching on it briefly in Chapter 4.

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- (35) $\llbracket \text{fun} \rrbracket^{c; w, t, j} = [\lambda x_e . x \text{ is fun for } j \text{ in } w \text{ at } t]$
 $\llbracket \text{tasty} \rrbracket^{c; w, t, j} = \llbracket \text{taste good} \rrbracket^{c; w, t, j} = [\lambda x_e . x \text{ tastes good to } j \text{ in } w \text{ at } t]$
 $\llbracket \text{taste terrible} \rrbracket^{c; w, t, j} = [\lambda x_e . x \text{ tastes terrible to } j \text{ in } w \text{ at } t]$

On the other hand, the extension of a normal, non-judge-dependent predicate such as [*be a*] *doctor* does not depend on the judge (which is to say that it is a constant function from the judge) as shown in (36).

- (36) $\llbracket \text{be-a-doctor} \rrbracket^{c; w, t, j} = [\lambda x_e . x \text{ is a doctor in } w \text{ at } t]$

All the meanings given so far are for expressions that don't depend on the context of utterance (and thus have the same content regardless of the context of utterance). Some expressions that do depend on the context of utterance are given in (37). (From now on I will include the context parameter only when it is relevant.)

- (37) $\llbracket \text{I} \rrbracket^{c; w, t, j} = \text{the speaker of } c$
 $\llbracket \text{you} \rrbracket^{c; w, t, j} = \text{the addressee of } c$

Adding a new parameter of evaluation requires us to revise the rules of interpretation from (34), replacing them with those in (38). Note that the judge parameter is an individual (type *e*).

- (38) **Rules of semantic interpretation [revised]:**

Functional Application (FA): If α is a complex expression formed by combining two expressions β and γ , and $\llbracket \gamma \rrbracket^{c; w, t, j}$ is in the domain of $\llbracket \beta \rrbracket^{c; w, t, j}$, then $\llbracket \alpha \rrbracket^{c; w, t, j} = \llbracket \beta \rrbracket^{c; w, t, j} (\llbracket \gamma \rrbracket^{c; w, t, j})$.

Intensional Functional Application (IFA): If α is a complex expression formed by combining two expressions β and γ , and $[\lambda w'_s . [\lambda t'_i . [\lambda j'_e . \llbracket \gamma \rrbracket^{c; w', t', j'}]]]$ is in the domain of $\llbracket \beta \rrbracket^{c; w, t, j}$, then $\llbracket \alpha \rrbracket^{c; w, t, j} = \llbracket \beta \rrbracket^{c; w, t, j} ([\lambda w'_s . [\lambda t'_i . [\lambda j'_e . \llbracket \gamma \rrbracket^{c; w', t', j'}]]])$.

In the case of modified predicates of personal taste such as *fun for Sam*, Lasersohn treats the preposition as an intensional operator that shifts the judge parameter to the object of the preposition. This is equivalent to using the syncategorematic rule in (39).

- (39) $\llbracket \text{P for } y \rrbracket^{w, t, j} = \llbracket \text{P} \rrbracket^{w, t, y}$
[where P is a predicate and y is a DP]

The *to* that is used in *tastes good to Sam* should work the same way. These are presumably different from *for* and *to* in their normal prepositional use, as in *a present for Sam* or *a letter to Sue*.

Of course, something more would need to be said to account for the fact that we say *fun for Sam* and *tastes good to Sam* in English, and not **fun to Sam* or **tastes good for Sam*. I will leave this aside for now, but return to it briefly in Section 8, when I compare Lasersohn’s view with the revised view I will propose here.

On Lasersohn’s view, attitude predicates such as *think* or *believe* take propositions as arguments, but in effect only operate on the world and time, not the judge. Roughly speaking, *think* would have a lexical entry along the lines of (40).¹¹

$$(40) \quad \llbracket \text{think} \rrbracket^{w,t,j} = [\lambda p_{\langle s, \langle i, et \rangle \rangle} . [\lambda z_e . \forall \langle w', t' \rangle \text{ compatible with } z \text{'s beliefs in } w \text{ at } t, p(w')(t')(j) = 1]]$$

This says that “z thinks that p” is true at a world-time-judge triple $\langle w, t, j \rangle$ iff in all the world-time pairs $\langle w', t' \rangle$ compatible with z’s beliefs in w at t, p is true in w’ at t’ as judged by j.

Lasersohn’s final assumption is that speakers typically make assertions, and assess the assertions of others, from an “autocentric” perspective – taking themselves to be the judge. This is not always the case, though: in contexts where the perspective of another person is particularly salient, they may make and assess assertions from an “exocentric” perspective. One such context is that of an attitude report, since if a speaker is reporting the thoughts or experience of someone else, then it is natural to take them as the judge. I will have some criticisms of this view of perspective-taking, but will again save them until Section 8.

3.3. Consequences

Lasersohn’s account can explain the “linked” reading of examples like (11), repeated in (41), where the judge of *tasty* is naturally understood to be Sam. Lasersohn’s explanation

¹¹ This is simplifying Lasersohn’s view of propositional attitudes somewhat (see Lasersohn, 2005, Sec. 6.2).

individual pairs such that it is compatible with what they believe that they themselves are that individual in that world, as defined in (2a). On a more complex formulation, a person's set of doxastic alternatives is the set of world-time-individual triples such that it is compatible with what they believe that they are that individual in that world at that time, as defined in (2b).

- (2) Doxastic Alternatives:
- (a) $\text{Dox}_{w,x} = \{ \langle w', y \rangle : \text{it is compatible with what } x \text{ believes in } w \text{ that he/she/it is } y \text{ in } w' \}$
- (b) $\text{Dox}_{w,t,x} = \{ \langle w', t', y \rangle : \text{it is compatible with what } x \text{ believes in } w \text{ at } t \text{ that he/she/it is } y \text{ in } w' \text{ at } t' \}$

I should note that the motivation for adding times into the definition of a proposition and/or into the notion of doxastic alternatives also has to do with *de se* phenomena. One example of the type discussed in the literature is given in (3) (see, e.g., Cresswell & von Stechow, 1982, no. 4).

- (3) Sam believes that today is June 1, 2007.

Sam's belief in (3) is not a belief about what kind of world he is in, but rather a belief about what time he is located at. That is, in this case all of Sam's doxastic alternatives are triples $\langle w, t, x \rangle$ such that t is during June 1, 2007. (In this case, neither the world nor the individual parameters are relevant.) In other words, it is a belief that is crucially about the attitude holder's "now," and thus is often referred to as *de nunc*. Although I will not be concerned with temporal *de se/de nunc* readings, from now on I will use the version of doxastic alternatives using world-time-individual triples in the interest of consistency.

Once we make the move to using doxastic alternatives in the sense of (2), we can distinguish between the two cases of Lingens's beliefs. In the case where Lingens only reads a biography of himself, the content of his belief is represented as the set of world-time-individual triples in (4a), and in the case where he regains his memory, the content of his belief is represented as the (distinct) set in (4b).

alternativeness," construed as a modal accessibility relation, to Hintikka (1962). However, I will only talk about "doxastic alternatives" as the kind encoding self-locating beliefs using an individual or center.

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- (4) Content of Lingens's belief (sets of world-time-individual triples):
- (a) [Reading biography] {<w,t,x>: Lingens is lost in the Stanford library in w at t}
 - (b) [Regained memory] {<w,t,x>: x is lost in the Stanford library in w at t}

The first case is simply a set of world-time pairs repackaged as a set of world-time-individual triples, since the “x” variable does not appear in the condition for membership of the set in (4a). In the second case, however, the machinery of doxastic alternatives is crucial, since the individual is involved in the description of the set.

2.2. Obligatory *De Se*

The problem of *de se* attitudes would be mainly a concern for philosophy – and perhaps an issue for the lexical semantics of certain attitude predicates – if it only arose for sentences like (5).

- (5) Lingens thinks that he's lost in the Stanford library.

Given an appropriate context, (5) allows either a *de se* construal or a non-*de-se* construal of the pronoun *he*.³ This raises the possibility that the two interpretations are not separate readings at all, but simply different situations that make the proposition expressed by (5) true. Thus examples like (5) on their own do not give evidence that *de se* interpretations are something for linguistic semantics to reckon with. This point was made by Chierchia (1989). Chierchia went on to observe, though, that some attitude reports are in fact sensitive to this distinction. He gives examples like (6), a belief report in Italian using *credere*, ‘believe’ with an infinitive complement.

- (6) **[Italian]**
Pavarotti crede di essere un genio.
Pavarotti believes COMP be a genius.
‘Pavarotti believes that he's a genius.’
[Lit.: “Pavarotti believes to be a genius”]
(Anand, 2006, no. 1a; based on Chierchia, 1989)

³ In many such cases the *de se* interpretation is strongly preferred. Anand (2006) discusses this issue in some detail and gives evidence that non-*de-se* interpretations of pronouns that co-refer with the attitude holder are generally available given the appropriate context.

For (6) to be true, Chierchia reports, Pavarotti must know that the person he believes to be a genius is himself – that is, Pavarotti must be inclined to say, “I’m a genius.” If he were to listen to a recording of a singer and come to believe that the singer was a genius, unaware that the singer was in fact him, then (6) would not be true. In contrast, (7), where the embedded clause contains the pronoun *gli*, ‘he,’ would be possible in such a case.

(7) **[Italian]**

Pavarotti crede che gli e un genio.

Pavarotti believes COMP he is a genius.

‘Pavarotti believes that he’s a genius.’

(Anand, 2006, no. 1b; based on Chierchia, 1989)

A similar pattern has been observed for other attitude predicates that allow infinitive VP complements, which are standardly analyzed as containing the null subject PRO.⁴ For example, compare (8), which contains *want* with an infinitive complement, with (9), which contains *want* with the reflexive pronoun *himself*.

(8) Lingens wants to get out of the Stanford library.

(9) Lingens wants himself to get out of the Stanford library.

If, upon reading a biography of himself, Lingens comes to feel sorry for the amnesiac lost in the Stanford library and wishes that this man would find his way out (but does not realize that he himself is Lingens), then his benevolent wish might be reported with (9), but cannot be reported with (8).

This means that there is at least one construction where a *de se* interpretation is obligatory, and therefore must be encoded somehow in the semantics. This leaves open the question of whether examples like (5) are actually ambiguous, having a *de se* interpretation and a non-*de-se* interpretation. I will not address that question here.

2.3. Epistemic Modals in Attitude Reports and *De Se* Interpretation

Consider a sentence where an epistemic modal is embedded under *think*, as in (10).

⁴ The observation about the obligatory *de se* interpretation in control constructions (also known as Equinoun phrase deletion) is originally due to Morgan (1970).

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(10) Sue thinks it might be raining.

As I observed early on, the “knower,” that is, the person whose knowledge is relevant for interpreting the embedded epistemic modal *might*, has to be the attitude holder – in this case, Sue. Thus (10) means, roughly, that Sue thinks that it’s compatible with her knowledge that it’s raining. I spent some time discussing the fact that, under appropriate assumptions about the relationship between belief and knowledge, this becomes equivalent to saying that it’s compatible with Sue’s beliefs that it’s raining. However, now I want to bring attention to another fact: for (10) to be true, it must not only be the case that the individual Sue has a particular belief about the individual Sue’s knowledge state, but Sue must also realize that it’s her own knowledge state that the belief is about, meaning that the belief reported in (10) is crucially *de se*. (This was pointed out to me by Pranav Anand, p.c.) Put another way, to properly understand the paraphrase “Sue believes that it’s compatible with her knowledge that it’s raining,” *her* must be interpreted *de se*. To see this more clearly, consider an example like (11), in the context given.

(11) [Context: Sam is a spokesperson for NASA who is frustrated at what he sees as a lack of scientific understanding among the general public and, especially, the media. He decides to vent his frustration by announcing false discoveries to journalists in some of his frequent television interviews. He starts small by saying that a black hole has been found 100 light years away, then saying that a new satellite is forming around Mars. Then, on a particularly prominent talk show, he announces that there is evidence of water on the moon. This creates a media frenzy, his supervisors catch on to what he is doing, and first thing the next morning he is fired. In despair and determined to forget his stupidity, he goes home and drowns his sorrows in alcohol. He gets so drunk that when he switches on the T.V. and happens to see a clip of his own interview announcing the possibility of water on the moon, he doesn’t recognize the man as himself. He thinks to himself, “Wow, that idiot thinks there might be water on the moon. People sure are stupid about science.”]

Sam thinks there might be water on the moon.

In the context given, Sam does come to believe that it is compatible with the knowledge of the man on T.V. that there is water on the moon, and in fact that man happens to be Sam himself, but (11) cannot be used to report Sam’s belief.⁵

⁵ If we construct a similar example using a predicate of personal taste, a non-*de-se* reading at first seems to be possible. For example, (i) could be used in a context where Sam unknowingly saw himself on T.V.

Not coincidentally, the semantics I gave for *think* and *might* directly capture the obligatory *de se* interpretation of sentences like (10) and (11). On my view, (11) has the meaning in (12a), which can be simplified to (12b).

- (12) (a) $\llbracket (11) \rrbracket^{w,t,j} = 1$ iff $\forall \langle w', t', x \rangle \in \text{Dox}_{w,t,\text{Sam}}: \exists \langle w'', t'', y \rangle \in \text{Epist}_{w',t',x}: \text{there is water on the moon in } w'' \text{ at } t''$
- (b) $= 1$ iff $\exists \langle w', t', x \rangle \in \text{Dox}_{w,t,\text{Sam}}: \text{there is water on the moon in } w' \text{ at } t'$

According to (12a), *Sam thinks there might be water on the moon* is true iff all of Sam's doxastic alternatives have some epistemic alternative(s) where there is water on the moon. More precisely, it says that for all triples $\langle w', t', x \rangle$ such that it's compatible with Sam's beliefs in the actual world and time that he is x in w' at t' , x 's knowledge in w' at t' is compatible with there being water on the moon. The combination of doxastic alternatives and epistemic alternatives thus captures the obligatory *de se* interpretation of embedded epistemic modals.

2.4. The Immediateness Requirement

We have just looked at two cases where attitudes are obligatorily *de se*; the first involved embedded infinitives as in (6) and (8), and the second involved embedded epistemic modals as in (10) and (11). These two types of examples have something else in common as well: in cases where one attitude report is embedded inside another, the obligatory *de se* interpretation always applies to the closest attitude holder. For example, in (13), *might* must be linked to Bill's knowledge, not Sue's.

- (13) Sue thinks that Bill thinks it might be raining.

That is, (13) can only mean that Sue thinks that Bill has a certain belief about his own knowledge (namely, that it's compatible with it raining). It cannot mean that Sue thinks that Bill thinks that her (Sue's) knowledge is compatible with it raining. Note that the latter could still be a *de se* belief – Sue could believe that she, herself, is the person whose knowledge state Bill has a belief about – but this reading is still not allowed for (13). I

eating cat food and expressing enjoyment. However, this is expected on my view because *tasty* can take a silent referential argument referring to the man on T.V.

(i) Sam thinks that cat food is tasty.

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will refer to this property of epistemic modals as the “immediateness” requirement. (It is tempting to call it a locality requirement, but I don’t want to suggest that it is syntactic in nature.)

My analysis accounts for the immediateness requirement for epistemic modals. This is easy to see if we just start with a singly embedded case such as (14a), which has the meaning in (14b).

- (14) (a) Bill thinks it might be raining.
 (b) $\llbracket (a) \rrbracket^{w,t,j} = 1$ iff $\forall \langle w',t',x \rangle \in \text{Dox}_{w,t,\text{Bill}}: \exists \langle w'',t'',y \rangle \in \text{Epist}_{w',t',x}: \text{it's raining in } w'' \text{ at } t''$

The *de se* interpretation has already been forced at this point because of the way the judge-dependent proposition *it might be raining* interacts with the doxastic alternatives. If (14a) is embedded inside another attitude report, as in (15a), then it has the meaning in (15b).

- (15) (a) Sue thinks that Bill thinks it might be raining. [=(13)]
 (b) $\llbracket (a) \rrbracket^{w,t,j} = \llbracket \text{thinks} \rrbracket^{w,t,j} (\llbracket \text{Bill thinks it might be raining} \rrbracket^{w,t,j}) (\text{Sue})$
 $= 1$ iff $\forall \langle w',t',x \rangle \in \text{Dox}_{w,t,\text{Sue}}: \llbracket \text{Bill thinks it might be raining} \rrbracket^{w',t',\text{Sue}}$
 $= 1$ iff $\forall \langle w',t',x \rangle \in \text{Dox}_{w,t,\text{Sue}}: 1$ iff $\forall \langle w'',t'',y \rangle \in \text{Dox}_{w',t',\text{Bill}}:$
 $\exists \langle w_3,t_3,z \rangle \in \text{Epist}_{w'',t'',y}: \text{it's raining in } w_3 \text{ at } t_3$

According to (15b), *Sue thinks that Bill thinks it might be raining* is true iff for all of Sue’s doxastic alternatives, all of Bill’s doxastic alternatives have an epistemic alternative where it’s raining. This correctly links the *de se* interpretation to Bill instead of Sue. Indeed, in the context of this analysis, it’s difficult to see how it could be otherwise, since the *de se* interpretation is already derived before (14a) is further embedded.

It turns out that the immediateness requirement also applies to cases of obligatory *de se* with embedded infinitives. That is, the implied subject of an embedded infinitive must

be linked to the closest attitude holder – or, put differently, PRO must be controlled by the closest subject (at least in the relevant cases). We can see this from examples like (16) and (17). For example, (16) can only mean that Sue wants it to be the case that Bill wants it to be the case that he himself goes to the party. It cannot mean that Sue wants it to be the case that Bill wants her to go to the party. Similarly, (17) can only mean that Sue tried to make it the case that Bill wants to go to the party, not that she tried to make it the case that Bill wanted her to go the party. Again, these readings could still be *de se*, but are not allowed for (16)-(17).⁶

(16) Sue wants Bill to want to go to the party.

(17) Sue tried to get Bill to want to go to the party.

I suggest that the immediateness requirement is a key diagnostic for distinguishing between two different families of *de se* constructions. As we saw with the case of embedded epistemic modals in (13)–(15), the type of obligatory *de se* that comes with the immediateness requirement falls naturally and unavoidably out of interactions between the semantics of judge-dependent propositions and attitude predicates. We have seen that embedded infinitive clauses as in (16)–(17) have an obligatory *de se* interpretation of the same kind; this suggests that it should be captured the same way, as I will propose in Section 3. I will suggest below that there is a second family of *de se* constructions which should be given a different kind of account.

2.5. *De Se* Constructions Not Subject to the Immediateness Requirement

The immediateness requirement does not apply in the case of pronouns that can be optionally interpreted *de se*, as in (5) above. Whether or not the *de se* interpretation is treated as a separate reading, it is equally available for a lower or higher attitude holder. For example, consider (18).

(18) Sue thinks that Mary thinks that she is a genius.

In (18), the pronoun *she* in the embedded clause can refer to either Sue or Mary, and moreover a *de se* construal seems to be equally available in either case. That is, it could

⁶ I will say more about the analysis of ECM and object control constructions in Sections 3.3 and 4.1 below.

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be that all of Sue's doxastic alternatives $\langle w', t', x \rangle$ are such that Mary thinks in w' at t' that x is a genius; or, alternatively, it could be that Sue thinks that all of Mary's doxastic alternatives $\langle w'', t'', y \rangle$ are such that Mary thinks that y is a genius.

It is tempting to take this as evidence that there is no separate *de se* reading of pronouns in sentences like (18); however, the presence or absence of the immediateness requirement does not correlate with whether the *de se* interpretation is obligatory. There is a well-attested class of expressions in natural languages which are obligatorily interpreted *de se* but which, it turns out, are not subject to the immediateness requirement. These include shifting indexicals of the kind found in Amharic and Zazaki⁷ (Schlenker, 1999, 2003; Anand & Nevins, 2003), and logophors of the kind found in West African languages such as Ewe, Yoruba, and Abe (Hagège, 1974; Clements, 1975; Pulleyblank, 1986; Koopman & Sportiche, 1989; Anand & Nevins, 2003). One typical example of a shifting indexical is given in (19), from Amharic. The first-person indexical in (19) can either refer to the speaker of the utterance or to the reported speaker, John.

- (19) **[Amharic]**
 $\hat{j}on$ $\hat{j}agna$ $n\hat{a}-\hat{n}\hat{n}$ $y\hat{i}l$ -all
 John hero be.PRES-1s says-3sm
 ‘John says that {I am, he is} a hero.’
 [Lit: “John says that I am a hero.”]

(Schlenker, 2003, no. 53)

A typical example of a West African-type logophor is given in (20), from Ewe. Here the pronoun *yè* can only refer to the reported speaker, Kofi.

- (20) **[Ewe]**
 Kofi be $y\hat{e}$ -dzo
 Kofi say LOG-leave
 ‘Kofi said that he (Kofi) left.’

(Clements, 1975, no. 1)

⁷ Amharic is a Semitic language spoken in Ethiopia; Zazaki is an Indo-Iranian language spoken by ethnic Kurds in Turkey.

Crucially, it has been observed that both shifting indexicals (when they have their shifted interpretations) and logophors generally must be interpreted *de se*.⁸ That is, a sentence like (19) can only report a situation where John said, “I am a hero,” not one where, for example, he unknowingly saw himself on T.V. and said, “he is a hero.” However, shifting indexicals and logophors are not subject to the immediateness requirement. We can see this from looking at cases where one speech or attitude report is embedded in another, as in (21) (from Zazaki) and (22) (from Ewe).

- (21) **[Zazaki]**
 Ali Fatima-ra va kε Rojda Bill-ra va εz to-ra miradiša
 Ali Fatima-to said that Rojda Bill-to said I you-to angry.be.PRES
 (1 possible reading)
 ‘Ali said to Fatima, “Rojda said to Bill that I am angry at you” ’
 [Lit: Ali said to Fatima that Rojda said to Bill that I am angry at you]
 (Anand & Nevins, 2004)
- (22) **[Ewe]**
 Kofi xɔ-e se be Ama gblɔ be yè-fu-i
 Kofi receive-PRO hear Ama say LOG-beat-PRO
 (i) ‘Kofi_i believed that Ama said that he_i beat her’
 (ii) ‘Kofi_i believed that Ama_i said that she_i beat him’
 (Clements, 1975, no. 73)

There is a reading of (21) on which the indexicals ‘I’ and ‘you,’ which are located in the most embedded clause, refer to the speaker and hearer of the higher speech report, that is, Ali and Fatima (rather than Rojda and Bill or the actual speaker and addressee of the sentence). Similarly, there is a reading of (22) on which the logophor *yè* refers to the subject of the higher belief report, that is Kofi (and not Ama). These are both analogous to the interpretation of (18) on which *she* refers to Sue instead of Mary, except that the *de se* interpretation is obligatory in (21)–(22).

I will not give an analysis of this second family of *de se* constructions which are not subject to the immediateness requirement; I bring them up only to show that they are

⁸ This has not been verified for every relevant language and item, but Schlenker (2003) shows it for Amharic ‘I’ and discusses the issue for logophors (citing, e.g., Kusumoto, 1998, for Bafut logophors). Also see Anand’s (2006) discussion.

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distinct from the *de se* constructions I will be concerned with here. My expectation is that this family of *de se* expressions should be analyzed using manipulation of context variables, along the lines of proposals by Schlenker (2003), von Stechow (2002), and/or Anand (2006). To give a very informal idea of the approach taken by these kind of proposals, the Amharic example in (19) would come out to mean something along the lines of (23). (I refer the reader to references cited for details.)

- (23) (19) = true iff in all possible contexts of utterance c_1 such that what Kofi said is true in the world of c_1 , the speaker of c_1 is a hero.

This captures the *de se* interpretation of the shifted indexical for the following reason: suppose that Kofi had unknowingly seen himself on T.V. and said, “He is a hero.” There are possible worlds (including all of those compatible with what Kofi believes) in which the man on T.V. is not the same person as Kofi, and the man on T.V. is a hero but Kofi is not. In these worlds, then, there are possible contexts of utterance c_1 where what Kofi said is true in the world where it was uttered (since the man on T.V. is a hero) but where the speaker of c_1 (i.e., Kofi) is not a hero. Examples with logophors would work similarly.

I have emphatically left open the question of whether sentences like (18) should be treated as truly ambiguous between *de se* readings and non-*de-se* readings, since the answer is not important for my purposes. If they are treated as ambiguous, though, the *de se* versions would need to belong to the same family of *de se* constructions as those containing shifting indexicals or logophors. One possibility (which really goes back to Castañeda, 1966, 1968) is to treat regular pronouns such as *she* as ambiguous between normal pronouns, which are not *de se*, and logophors, which are *de se*.

In sum, my claim is not that the judge-dependent system eliminates the need for other mechanisms that derive *de se* interpretations. What I am saying is simply this: we have already seen that judge dependency is independently motivated by the behavior of epistemic modals, conditionals, and predicates of personal taste; we have also seen that notions like doxastic alternatives are independently needed to account for the *de se* interpretation of embedded infinitives; and we have seen that when we put these together,

we automatically derive a particular kind of *de se* interpretation, namely the special kind that is subject to the immediateness requirement. Given these facts, it makes sense to account for this special kind of *de se* interpretation using judge dependency. What I foresee, then, is that a comprehensive account of *de se* interpretations will distinguish between two sharply delineated families of *de se* constructions, those involving the judge parameter and those involving context shifting, where the first is subject to the immediateness requirement and the second is not. This view makes the prediction, then, that any bona fide *de se* constructions which are not subject to the immediateness requirement must be able to be captured through reference to shifting contexts. I leave it to future work to see how this is borne out.

3. Analysis of Obligatory *De Se* in Infinitive Complements

3.1. The Property View of *De Se* Attitudes

A standard way to capture the obligatory *de se* interpretation of examples like (6) and (8) is to analyze attitudes as relations between an individual (the attitude holder) and a property, rather than between an individual and a proposition (see, e.g., Lewis, 1979; Cresswell, 1985; Chierchia, 1989; Anand, 2006). This amounts to giving the lexical entries in (24)–(25) to *credere*, ‘believe’ from (6) and *want* from (8). The lexical entry for *want* involves a notion of “*want*-alternatives” that is analogous to doxastic alternatives. Note that this is in a standard system without the judge parameter, so the index only consists of a world-time pair, and the variable P stands for an (intensional) one-place property (type $\langle s, \langle i, et \rangle \rangle$).

$$(24) \quad \llbracket \text{credere, ('believe')} \rrbracket^{w,t} = [\lambda P_{\langle s, \langle i, et \rangle \rangle} . [\lambda z_e . \forall \langle w', t', x \rangle \in \text{Dox}_{w,t,z}: P(w')(t')(x)=1]]$$

$$(25) \quad \llbracket \text{want} \rrbracket^{w,t} = [\lambda P_{\langle s, \langle i, et \rangle \rangle} . [\lambda z_e . \forall \langle w', t', x \rangle \in \text{Want}_{w,t,z}: P(w')(t')(x)=1]]$$

[where $\text{Want}_{w,t,z}$ is defined as in (26)]

(26) Want alternatives:

$\text{Want}_{w,t,z}: \{ \langle w', t', x \rangle : \text{it fits with what } z \text{ wants in } w \text{ at } t \text{ for } z \text{ to be } x \text{ in } w' \text{ at } t' \}$

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According to (24), “z crede P,” ‘z believes P’ is true iff all of z’s doxastic alternatives $\langle w', t', x \rangle$ are such that x has the property P in w' at t' . According to (25), along with the definition in (26), “z wants P” is true iff in all of z’s want alternatives $\langle w', t', x \rangle$, x has the property P in w' at t' , where z’s want alternatives are those world-time-individual triples $\langle w', t', x \rangle$ such that being x in w' at t' would satisfy what z wants.

This requires that the relevant infinitive clauses (e.g., *to get out of the Stanford library*) be treated as properties of type $\langle e, t \rangle$ (assuming they combine with the attitude predicate by Intensional Functional Application). Ignoring the internal structure and presence of PRO, then, the infinitive clauses from (6) and (8) need to have the meanings in (27)–(28).

$$(27) \quad \llbracket \text{di essere un genio ('to be a genius')} \rrbracket^{w,t} = [\lambda y . y \text{ is a genius in } w \text{ at } t]$$

$$(28) \quad \llbracket \text{to get out of the Stanford library} \rrbracket^{w,t} = [\lambda y . y \text{ gets out of the Stanford library in } w \text{ at } t]$$

Putting these together, the resulting meanings for (6) and (8) are given in (29) and (30), respectively.

$$(29) \quad \llbracket (6) \rrbracket^{w,t} = \llbracket \text{credere ('believes')} \rrbracket^{w,t} ([\lambda w''_s . [\lambda t''_i . \llbracket \text{di essere un genio ('to be a genius')} \rrbracket^{w'',t''}]]) \text{ (Pavarotti)}$$

$$= 1 \text{ iff } \forall \langle w', t', x \rangle \in \text{Dox}_{w,t,\text{Pavarotti}}: x \text{ is a genius in } w' \text{ at } t'$$

$$(30) \quad \llbracket (8) \rrbracket^{w,t} = \llbracket \text{want} \rrbracket^{w,t} ([\lambda w''_s . [\lambda t''_i . \llbracket \text{to get out of the Stanford library} \rrbracket^{w'',t''}]]) \text{ (Lingens)}$$

$$= 1 \text{ iff } \forall \langle w', t', x \rangle \in \text{Want}_{w,t,\text{Lingens}}: x \text{ gets out of the Stanford library in } w' \text{ at } t'$$

Thus the Italian sentence in (6), *Pavarotti crede di essere un genio*, ‘Pavarotti believes that he’s a genius’ is true iff all of Pavarotti’s doxastic alternatives $\langle w', t', x \rangle$ are such that x is a genius in w' at t' . Similarly, the English sentence in (8), *Lingens wants to get out of the Stanford library*, is true iff all of Lingens’s want alternatives $\langle w', t', x \rangle$ are such that x gets out of the Stanford library in w' at t' . These are intuitively the correct meanings, and they capture the obligatory *de se* interpretation of these sentences.

Now let's turn to the internal structure of the infinitive complements. These are standardly analyzed as containing the subject PRO, which is widely assumed to be a pronoun and thus of type *e*. On this view, infinitive clauses denote properties, and so something more needs to be said about how a sentence of the form [PRO VP] denotes a property. Chierchia's (1989) widely adopted solution is to assume that PRO is a pronoun that is obligatorily bound by an abstraction operator, meaning that the infinitive *to be a genius*, e.g., has the structure in (31).

(31) Op₁ [PRO₁ [to be a genius]]

Following widely accepted views of operator-binding (as in, e.g., Heim & Kratzer, 1998), this will give the infinitive clause *to be a genius* the appropriate property meaning (the same as that in (27)).

There are other obvious possibilities, of course. For example, PRO could be taken to be semantically vacuous; or we could eliminate PRO from the theory altogether and treat *de se* attitude predicates as combining directly with VPs rather than sentences. The choice between these various options will not matter here (though see note 14.)

Given this view of *de se* attitudes, we now need to ask how non-*de-se* attitudes are captured in this theory. For example, we need to be able to predict the meaning of (5), repeated in (32), in the context where Lingens has read a bibliography of himself but does not realize that it's about him.

(32) Lingens thinks that he's lost in the Stanford library.
 [non-*de-se* interpretation]

In this case, we want this sentence to say that all of Lingens's doxastic alternatives $\langle w', t', x \rangle$ are such that Lingens is lost in the Stanford library in w' at t' . (This says nothing about "x.") There are two ways to achieve this. The first way is to say that *think* is ambiguous between a meaning equivalent to (29) and a standard one where it takes a proposition. (Chierchia, 1989 takes this approach.) The second way is to say that *think* always takes properties, and to redefine the relevant embedded clauses as denoting properties which are vacuous in a particular sense. (This more closely follows Lewis,

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1979.) For example, the embedded clause *he's lost in the Stanford library* in (32) would denote the property in (33) (putting aside the issue of the interpretation of pronouns).

$$(33) \quad \llbracket \text{he's lost in the Stanford library} \rrbracket^{w,t} = [\lambda y . \text{Lingens is lost in the Stanford library in } w \text{ at } t]$$

This property is vacuous in the sense that the lambda expression introduces a variable y that does not appear in the description of the predicate.

There are trade-offs between the two options. On the first kind of view, there is some redundancy in letting attitude predicates have both a property-taking and a proposition-taking meaning. On the second kind of view, another decision has to be made about whether matrix clauses should be treated the same way as embedded clauses. Even if all sentences that serve as arguments of attitude predicates are treated as properties, matrix clauses could still be treated as type t ; in this case, there would be a fundamental semantic distinction between two kinds of sentences. On the other hand, matrix clauses could be treated as properties as well, in which case there would be an extra individual argument that is systematically idle in matrix sentences.

Once again, this still leaves open the question of whether the optional *de se* interpretation of (32) is a separate reading of the sentence.

3.2. A Judge-Dependent Proposal

Recall that the meaning I have given to *think* is in (34).

$$(34) \quad \llbracket \text{think} \rrbracket^{w,t,j} = [\lambda p_{\langle s, \langle i, et \rangle \rangle} . [\lambda z_e . \forall \langle w', t', x \rangle \in \text{Dox}_{w,t,z}: p(w')(t')(x) = 1]]$$

Roughly speaking, this says that “ z thinks that p ” is true iff in all of z 's doxastic alternatives (which are world-time-individual triples), p is true at that triple. Crucially, since I treat propositions as sets of world-time-individual triples (following Lasersohn, 2005), this means that they are already the right kind of thing to apply directly to doxastic alternatives in this way. It also means that if the propositional argument of *think* is judge-dependent, the judge is in effect shifted to the attitude holder, in a way that is *de se* and satisfies the immediateness requirement, as discussed above.

Notice that the lexical entry for *think* in (34) is exactly the same as the one for *credere*, ‘believe’ given in (24) above. The clausal argument of the attitude predicate is intended to be thought of as a property in (24) and as a proposition in (34), but since a proposition on my view is of type $\langle s, \langle i, et \rangle \rangle$, this amounts to the same thing. An analogous lexical entry for *want* is given in (35), using the same notion of want alternatives defined in (26). Again, this is exactly the same as the property-taking version in (25) except that the argument of type $\langle s, \langle i, et \rangle \rangle$ is now thought of as a proposition. (35) says that “z wants p” is true iff p is true at all of z’s want alternatives.

$$(35) \quad \llbracket \text{want} \rrbracket^{w,t,j} = [\lambda p_{\langle s, \langle i, et \rangle \rangle} . [\lambda z e. \forall \langle w', t', x \rangle \in \text{Want}_{w,t,z}: p(w')(t')(x)=1]]$$

In my system, then, the most straightforward way to capture the obligatory *de se* interpretation of infinitive clauses is not to have them denote properties, but rather judge-dependent propositions. Specifically, the meanings for the infinitive clauses in (27)–(28) should be replaced with those in (36)–(37).

$$(36) \quad \llbracket \text{di essere un genio ('to be a genius')} \rrbracket^{w,t,j} = 1 \text{ iff } j \text{ is a genius in } w \text{ at } t$$

$$(37) \quad \llbracket \text{to get out of the Stanford library} \rrbracket^{w,t,j} = 1 \text{ iff } j \text{ gets out of the Stanford library in } w \text{ at } t$$

According to these meanings, the infinitive phrase *to be a genius* (for example) is a proposition that is true if the judge is a genius.^{9,10}

The next question is how to derive the meanings in (36)–(37). If these infinitive clauses have PRO as their subject, where PRO is taken to be an obligatorily bound pronoun, they will denote one-place properties (on my view, type $\langle s, \langle i, \langle e, et \rangle \rangle \rangle$) rather than propositions. Treating PRO as an unbound pronoun will not help either, since then the subject will not be linked to the judge parameter. What we need is for the subject of

⁹ This raises the question of why infinitive clauses cannot be asserted, since judge-dependent propositions can of course be asserted. Thus I probably need to assume that an infinitive cannot head a matrix clause for reasons relating to tense or to purely syntactic requirements.

¹⁰ By this point “judge” may seem to have become something of a misnomer, since there is no obvious intuitive sense in which the subject of an infinitive sentence is the person “judging” it. However, the use of the judge parameter in control constructions will generally be closely connected to an attitude of the controller, as we will see, and so in that sense it makes just as much sense to use the term as it does for the “knower” of epistemic modals. In any case I don’t think the term “judge” should be taken too literally.

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these infinitives to be something that simply denotes the judge. Recall that I have argued for just such an item, PRO_J , whose lexical entry is repeated in (38).

$$(38) \quad \llbracket PRO_J \rrbracket^{w,t,j} = j$$

I suggest, then, that the subject of the infinitive clauses in sentences like (6) and (8) is not PRO, as standardly construed, but PRO_J . There are at least two ways to understand this proposal. One possibility is that PRO should be reanalyzed as PRO_J , in all cases where it is thought to occur.¹¹ Another possibility is that PRO still exists, but does not appear in these particular kinds of cases. I will discuss evidence that speaks to this question in Section 4 below.

If we take the subject of these infinitives to be PRO_J , this will straightforwardly give them the (judge-dependent) propositional meanings in (36)–(37). For example, (37) is derived as shown in (39).

$$(39) \quad \llbracket PRO_J \text{ to get out of the Stanford library} \rrbracket^{w,t,j} = [\lambda y . y \text{ gets out of the Stanford library in } w \text{ at } t] (j)$$

$$= 1 \text{ iff } j \text{ gets out of the Stanford library in } w \text{ at } t$$

The resulting meaning of (8), *Lingens wants to get out of the Stanford library*, is shown in (40).

$$(40) \quad \llbracket (8) \rrbracket^{w,t,j} = \llbracket \text{Lingens wants } PRO_J \text{ to get out of the Stanford library} \rrbracket^{w,t,j}$$

$$= \llbracket \text{want} \rrbracket^{w,t,j} ([\lambda w'' . [\lambda t'' . [\lambda j'' . \llbracket PRO_J \text{ to get out of the Stanford library} \rrbracket^{w'',t'',j''}]]]) (\text{Lingens})$$

$$= 1 \text{ iff } \forall \langle w', t', x \rangle \in \text{Want}_{w,t,\text{Lingens}}: x \text{ gets out of the Stanford library in } w' \text{ at } t'$$

This says that *Lingens wants to get out of the Stanford library* is true iff all of Lingens's want alternatives $\langle w', t', x \rangle$ are such that x gets out of the Stanford library in w' at t' , which captures the obligatory *de se* interpretation of this sentence.

¹¹ This might loosely be seen as a variation on the view that PRO is a “logophor” in some sense (see, e.g., Williams, 1992; Landau, 2000), which is echoed by a suggestion by Anand that one instantiation of an Amharic shifting indexical is “a local logophor (hence something of the equivalent of PRO)” (Anand, 2006: p. 102).

The main motivation behind my analysis of these examples has been to derive their obligatory *de se* interpretation in a way that fits naturally into the judge-dependent system. In effect, though, I have also suggested that the control properties of *want* and *credere*, ‘think’ follow from their lexical semantics, since the meanings I have given them force the controller to be the attitude holder.¹² (This happens to be the subject in both of these cases, but in Section 4.1 I will discuss cases where it is the object.) The goal of deriving control relations from the lexical semantics of control predicates has been the impetus for a number of analyses of control, particularly around the 1980s.¹³ One particular approach within that tradition is to connect control relations to general properties of the situation or event-types involved (as, e.g., in Jackendoff, 1974; Farkas, 1988; Sag & Pollard, 1991). My proposal is of this kind. For example, on Sag & Pollard’s (1991) view (also citing Comrie, 1984), the fact that *want* is a subject control verb comes from it being of the “orientation” type, which means that the controller is the “experiencer.” (Italian *credere*, ‘think’ could also be placed in this category.) On my view, this follows from the fact that *want* and *credere* express simple attitudes of the subject towards some proposition, with no additional mediating attitudes involved.

3.3. Non-De-Se Cases and ECM

On this approach, nothing special needs to be said about cases of non-*de-se* attitudes, such as the non-*de-se* interpretation of (5), repeated again in (41).

- (41) Lingens thinks that he’s lost in the Stanford library. [non-*de-se* interpretation]

Again putting aside the details of the interpretation of pronouns, the *that*-clause in (41) simply denotes the proposition in (42), which is non-judge-dependent.

- (42) [[that he [Lingens] is lost in the Stanford library]]^{w,t,j} = 1 iff Lingens is lost in the Stanford library in w at t

¹² This fact about the meanings is independent of the judge-dependent semantics, since the same effect could be achieved by giving them the property-based meanings from (24)–(25) (Section 3.1).

¹³ Some examples are Jackendoff (1974), Bach (1979), Bach & Partee (1980), Jacobson (1982), Klein & Sag (1982), Chierchia (1983, 1984), Dowty (1985), Chierchia & Jacobson (1986), Farkas (1988), and Sag & Pollard (1991).

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When this is taken as the argument of *think* in (41), the resulting meaning is given in (43).

$$(43) \quad \llbracket (41) \rrbracket^{w,t,j} = \llbracket \text{think} \rrbracket^{w,t,j} ([\lambda w'' . [\lambda t'' . [\lambda j'' . \llbracket \text{that he [Lingens] is lost in the Stanford library} \rrbracket^{w'',t'',j''}]]]) (\text{Lingens})$$

$$= 1 \text{ iff } \forall \langle w', t', x \rangle \in \text{Dox}_{w,t,\text{Lingens}}: \text{Lingens is lost in the Stanford library in } w' \text{ at } t'$$

This says that *Lingens thinks that he's lost in the Stanford library* is true (on a non-*de-se* interpretation) iff in all of Lingens's doxastic alternatives, the individual Lingens is lost in the Stanford library. This can be true in the context where Lingens reads a biography about himself but does not realize that he himself is the person the biography is about. Formally, the non-*de-se* nature of this interpretation is captured by the fact that the “x” in Lingens's doxastic alternatives $\langle w', t', x \rangle$ does not appear in the description “Lingens is lost in the library in w' at t' .” (As I discussed in Section 2.5, if there is a distinguished *de se* reading of the sentence, it would not be derived using judge dependency.)

Similarly, the meaning I gave to *want* immediately carries over to the use of *want* in ECM constructions, also known as object-raising, exemplified in (44).

(44) Sue wants Mary to be happy.

I assume that (44) has the structure in (45a), where the entire infinitive clause *Mary to be happy* is a single syntactic and semantic argument of *want* (see, e.g., Haegeman, 1994: pp. 169–171). Using the meaning for *want* from (35), this predicts that (44) has the meaning in (45b). (I assume that *Mary to be happy* is true at a world-time-judge triple $\langle w, t, j \rangle$ iff Mary is happy in w at t .)

$$(45) \quad (a) \quad \text{Sue } [_{\text{VP}} \text{ wants } [_{\text{S}} \text{ Mary to be happy}]]$$

$$(b) \quad \llbracket (a) \rrbracket^{w,t,j} = \llbracket \text{want} \rrbracket^{w,t,j} ([\lambda w'' . [\lambda t'' . [\lambda j'' . \llbracket \text{Mary to be happy} \rrbracket^{w'',t'',j''}]]]) (\text{Sue})$$

$$= 1 \text{ iff } \forall \langle w', t', x \rangle \in \text{Want}_{w,t,\text{Sue}}: \text{Mary is happy in } w' \text{ at } t'$$

This says that (44) is true if in all of Sue's want alternatives $\langle w', t', x \rangle$, Mary is happy in w' at t' , which is the correct meaning. This attitude report is predicted not to have any *de se* quality because the subject of the infinitive clause is *Mary* rather than PRO_J , and thus the infinitive argument expresses a non-judge-dependent proposition.

In a sense, what I have done to derive cases of non-*de-se* attitudes and ECM constructions is the same thing that would be accomplished by making all sentences denote properties. Some of those properties are vacuous in the sense that their formalizations involve vacuous binding of an individual variable, in the same way that the formalizations of non-judge-dependent propositions involve vacuous binding of a variable for the judge parameter. Either way there has to be an idle wheel somewhere in these cases. The difference is that on my view, that wheel is independently needed (for epistemic modals and predicates of personal taste), and it is not always idle in matrix clauses.

4. More on Control Constructions

I have proposed that the infinitive clause in an example like *Lingens wants to get out of the Stanford library* has PRO_J as its subject. The fact that the implicit subject is “controlled” by the subject of the higher clause follows from the semantics of the attitude predicates and general aspects of the judge-dependent system. This raises the question of which, if any, other putative cases of controlled PRO (within the Government-Binding/Minimalist approach to syntax¹⁴) can be treated instead as PRO_J . In this section I will briefly discuss a few prominent cases, some of which are amenable to this analysis and some of which are not. I will not attempt here to review the literature on control

¹⁴ There are, of course, syntactic views where PRO is not posited, and bare infinitivals and gerunds are taken to have no subject at all, especially within approaches to syntax that are more lexicalist and surface-based than the general Government-Binding/Minimalist approach. Such a view could still be combined with my approach to *de se* attitudes with infinitivals, provided that the silent item PRO_J were added (or replaced with a category-changing rule with the same effect). In this case the question of which occurrences of PRO can be reanalyzed as PRO_J becomes instead the question of which kinds of apparently subjectless VPs actually contain PRO_J as a silent subject (or undergo some equivalent process). The issues that arise in these kind of theories might well be different, but the basic phenomena are the same, and so the various constructions I consider below would still have some impact on how to analyze VPs that lack overt subjects. For a discussion of raising and control on one view of this kind, see Jacobson (1992).

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theory, which is full of intricacies and controversies, but will simply take as my starting point what I consider to be a standard Government/Binding view of control.¹⁵

4.1. Object Control

The view of PRO as PRO_J can be fairly easily extended to the case of object control. Object control occurs with verbs such as *persuade*, *convince*, *ask*, *tell*, *order*, *warn*, and *defy*, as exemplified in (46).¹⁶

- (46) (a) Sue persuaded Mary to take Sam to the movies.
(b) Sue told Mary to take Sam to the movies.
(c) Sue defied Mary to leave Sam behind.

I assume that both syntactically and semantically, object control verbs take two arguments: a DP, and an infinitive clause with PRO_J as subject. For example, (46a) has the structure in (47).

- (47) Sue [_{VP} persuaded [_{Mary}] [_S PRO_J to take Sam to the movies]]

This is in line with standard views within the Government/Binding framework (see, e.g., Haegeman, 1994, Ch. 5) except, of course, for replacing PRO with PRO_J.

There are well known reasons why these verbs need to take the DP argument separately rather than simply combining with an infinitive clause, as in (48).

- (48) Sue [_{VP} persuaded [_S Mary to take Sam to the movies]]

Essentially, it comes down to the fact that the DP argument makes a crucial contribution to the meaning of the sentence – or, as it's usually stated, it gets a theta role from the higher verb. We can see this in two ways: first, from the fact that expletive subjects are impossible with object control verbs, as in (49); and, second, from the fact that (50a) does

¹⁵ My background assumptions owe something to the discussion in Haegeman's textbook (Haegeman, 1994, Ch. 5) and a literature review by Adler (2006, Ch. 2). Some other key sources for the syntax and semantics of control include Chomsky (1981), Chierchia (1984), Williams (1992), and Landau (2000), to name a few.

¹⁶ These are a representative sample of a list of more than 20 object control verbs given in Jacobson (1992: pp. 162–163).

not entail (50b), even though *Mary takes Sam to the movies* entails that Sam goes with Mary to the movies.

- (49) (a) * The bride persuaded it to be obvious that she was happy.
 (b) * The director told there to be actors on the stage.
- (50) (a) Sue persuaded Mary to take Sam to the movies.
 (b) Sue persuaded Sam to go with Mary to the movies.

What object control verbs have in common is that they all in some way involve one individual (e.g., Sue) getting another individual (e.g., Mary) to have particular intentions towards some action. This generalization is discussed by Sag & Pollard (1991), citing Comrie (1984); Sag & Pollard call these events of the “influence” type, where the controller is the “influenced participant. For example, for x to persuade y to do P is for x to cause y (through some kind of force of reasoning) to intend to do P; for x to tell y to do P is for x to try (through an imperative speech act) to cause y to intend to do P; for x to defy y to do P is for x to do something like try (through a particular kind of speech act) to get y to intend not to do P (or else!). In order to give lexical meanings for these kind of verbs, then, we first need to have an idea of what it means to intend something. As the reader hopefully expects by now, I suggest that a notion of “intention alternatives” is in order. This is defined in (51).

- (51) Intention alternatives:
 $\text{Intend}_{w,t,z}: \{ \langle w',t',x \rangle : \text{it fits with what } z \text{ intends in } w \text{ at } t \text{ for } z \text{ to be } x \text{ in } w' \text{ at } t' \}$

Using this notion, we can then give *persuade* (and *convince*, on the relevant use) a lexical entry along the lines of (52).

- (52) $[[\text{persuade}]]^{w,t,j} = [[\text{convince}]]^{w,t,j} = [\lambda y_e . [\lambda p_{\langle s, \langle i, et \rangle \rangle} . [\lambda z_e . z \text{ communicates with } y \text{ in a way that causes it to be the case that } \forall \langle w',t',x \rangle \in \text{Intend}_{w,t,y}: p(w')(t')(x) = 1]]]$

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This says, roughly speaking, that “z convinces y (to) p” means that z communicates with y in a way that causes y to intend p.¹⁷ Since p is evaluated with respect to the intention alternatives of the direct object (“y”), the judge is in effect shifted to the direct object.

The meaning of (46a) (minus the past tense) is computed in (53), using the lexical entry for *persuade* in (52) and the structure in (47).

$$\begin{aligned}
 (53) \quad \llbracket (46a) \rrbracket^{w,t,j} &= \llbracket \text{Sue persuades Mary to take Sam to the movies} \rrbracket^{w,t,j} \\
 &= \llbracket \text{persuade} \rrbracket^{w,t,j} (\text{Mary}) ([\lambda w'' . [\lambda t'' . [\lambda j'' . \llbracket \text{PRO}_j \text{ to take Sam to the} \\
 &\quad \text{movies} \rrbracket^{w,t,j}]]]) (\text{Sue}) \\
 &= 1 \text{ iff Sue communicates with Mary in a way that causes it to be the case} \\
 &\quad \text{that } \forall \langle w', t', x \rangle \in \text{Intend}_{w,t,\text{Mary}}: x \text{ takes Sam to the movies in } w' \text{ at } t'
 \end{aligned}$$

This says that *Sue persuades Mary to take Sam to the movies* is true iff Sue communicates with Mary in a way that causes Mary to intend to take Sam to the movies, which seems to be the correct meaning.¹⁸

Similarly, *tell* (on the relevant use) can be given the lexical meaning in (54), which predicts that the sentence in (46b) (again, minus the past tense) has the meaning in (55), which is exactly analogous to the case of *persuade* in (53). Other object control verbs can be treated similarly.

$$\begin{aligned}
 (54) \quad \llbracket \text{tell} \rrbracket^{w,t,j} &= [\lambda y_e . [\lambda p_{\langle s, \langle i, et \rangle \rangle} . [\lambda z_e . z \text{ performs an imperative speech act} \\
 &\quad \text{addressed to } y \text{ whose purpose is to make it the case that} \\
 &\quad \forall \langle w', t', x \rangle \in \text{Intend}_{w,t,y}: p(w')(t')(x) = 1]]]
 \end{aligned}$$

$$(55) \quad \llbracket (46b) \rrbracket^{w,t,j} = \llbracket \text{Sue tells Mary to take Sam to the movies} \rrbracket^{w,t,j}$$

¹⁷ The notion of intention referred to in the lexical meaning for *persuade* does not behave exactly the same as the English word *intend*. Both contain a requirement of some kind of agency towards a described action, but an essentially non-agentive predicate can be more easily coerced into an agentive interpretation with *intend*. For example, (i) is acceptable, but (ii) is not (Kai von Fintel, p.c.).

(i) John intends to be rich one day.

(ii) ?? Mary persuaded John to be rich one day.

¹⁸ There is a technical problem here in that according to (53), it must be the case that for every world-time-individual triple compatible with Mary’s intentions, she takes Sam to the movies in that world at that time, which requires her to intend to take Sam to the movies constantly. I will make the optimistic assumption that this problem can be overcome by a proper treatment of tense and of the future orientation of certain infinitives (see, e.g., Stowell, 1982; Abusch, 1998, 2004; Wurmbrand, 2006); I will leave this to future work.

$$= \llbracket \text{tell} \rrbracket^{w,t,j} (\text{Mary}) ([\lambda w'' . [\lambda t'' . [\lambda j'' . \llbracket \text{PRO}_j \text{ to take Sam to the movies} \rrbracket^{w,t,j}]]]) (\text{Sue})$$

= 1 iff Sue performs an imperative speech act addressed to Mary whose purpose is to make it the case that $\forall \langle w', t', x \rangle \in \text{Intend}_{w,t,\text{Mary}}: x$ takes Sam to the movies in w' at t' .

Here, again, I have in effect proposed a view on which the control properties of verbs like *persuade* and *tell* are derived from their lexical semantics. In this case, the reason the controller must be the object is because the attitude that applies most directly to the embedded proposition at the level of semantics is an attitude of the object – in all of these cases, the attitude of intention.¹⁹

It is worth noting that there is a second use of *convince* (and *persuade* for at least some speakers), illustrated in (56).

(56) Sue convinced Mary that it was raining.

Instead of an infinitival clause, this use takes a regular finite clause with an overt subject, in this case *it was raining*. On this use, what the subject (in this case Sue) seems to be doing is causing the direct object (in this case Mary) to come to believe the embedded clause, rather than to intend it in some sense. Thus this use needs a meaning different from that in (52) – but only minimally so, as it turns out. We can give *convince* on this use the lexical entry in (57).

$$(57) \quad \llbracket \text{convince}_2 \rrbracket^{w,t,j} = [\lambda y_e . [\lambda p_{\langle s, \langle i, et \rangle \rangle} . [\lambda z_e . z \text{ communicates with } y \text{ in a way that causes it to be the case that } \forall \langle w', t', x \rangle \in \text{Dox}_{w,t,y}: p(w')(t')(x) = 1]]]$$

The only difference between (57) and (52) is that the attitude involved is belief, and so the lexical entry makes reference to $\text{Dox}_{w,t,y}$ (the doxastic alternatives of y in w at t) rather than $\text{Intend}_{w,t,y}$. (Recall that $\text{Dox}_{w,t,y}$, the doxastic alternatives of y in w at t , is the set of triples $\langle w', t', x \rangle$ such that it is compatible with what y knows in w at t that he/she/it

¹⁹ Again, this is independent of the judge-dependent semantics, since *persuade* (for example) could be given the property-based meaning in (i). (In fact, this is the same as (52) except that the argument of type $\langle s, \langle i, et \rangle \rangle$ is construed as a property rather than as a proposition.)

(i) $\llbracket \text{persuade} \rrbracket^{w,t} = [\lambda y_e . [\lambda P_{\langle s, \langle i, et \rangle \rangle} . [\lambda z_e . z \text{ communicates with } y \text{ in a way that causes it to be the case that } \forall \langle w', t', x \rangle \in \text{Intend}_{w,t,y}: P(w')(t')(x) = 1]]]$

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is x in w' at t' .) This predicts that (56) has the meaning in (58) (again, putting aside the past tense).

- (58) $\llbracket (56) \rrbracket^{w,t,j} = \llbracket \text{convince}_2 \rrbracket^{w,t,j} (\text{Mary}) ([\lambda w'' . [\lambda t'' . [\lambda j'' . \llbracket \text{it's raining} \rrbracket^{w'',t'',j''}]]]) (\text{Sue})$
- = 1 iff Sue communicates with Mary in a way that causes it to be the case that $\forall \langle w', t', x \rangle \in \text{Dox}_{w,t,\text{Mary}}$: it's raining in w' at t'

This says that *Sue convinces Mary that it's raining* is true iff Sue communicates with Mary in a way that causes Mary to believe that it's raining, which again is the correct meaning.

This also predicts that when this second use of *convince* embeds a proposition containing a judge-dependent item, the judge should be linked to the direct object. For example, (59a) (minus the past tense) is predicted to have the meaning in (59b), where *might* is linked to the mental state of the direct object, Mary.

- (59) (a) Sue convinced Mary that it might be raining.
- (b) $\llbracket (a) \rrbracket^{w,t,j} = 1$ iff Sue communicates with Mary in a way that causes it to be the case that $\forall \langle w', t', x \rangle \in \text{Dox}_{w,t,\text{Mary}}: \exists \langle w'', t'', y \rangle \in \text{Epist}_{w',t',x}$: it's raining in w'' at t''
- = 1 iff Sue communicates with Mary in a way that causes it to be the case that $\exists \langle w', t', x \rangle \in \text{Dox}_{w,t,\text{Mary}}$: it's raining in w' at t'

This says that (59a) is true iff Sue communicated with Mary in a way that caused it to be compatible with Mary's beliefs that it's raining (making the usual simplification from belief of knowledge to simple belief), which seems to be correct.

4.2. Extensional Adjuncts

Another construction commonly thought to contain PRO is sentences with adverbial gerunds such (60a–b) (see, e.g., Williams, 1992; Adler, 2006, Ch. 2).

- (60) (a) Sam left without saying goodbye.
- (b) Sue walked down the street (while) singing.

If the gerunds are taken to have PRO subjects, the structures for (60a–b) should be something like (61a–b), respectively.

- (61) (a) Sam [left [_{AdvP} without PRO saying goodbye]]
 (b) Sue [walked down the street [_{AdvP} (while) PRO singing]]

Since these are extensional contexts, we cannot treat the null subject of these gerunds as PRO_J. If we did, (60a), for example, would have the bizarre meaning that Sam left without the judge saying goodbye. A speaker could assert this proposition provided that Sam left without them saying goodbye, and if it were added to the common ground, it would have the same effect as adding the proposition that Sam left without the group of conversational participants saying goodbye. Clearly the sentence does not have this meaning, and so this seems to be a case where the silent subject of a non-finite clause cannot be assimilated to PRO_J. This suggests that there do have to be two kinds of silent subjects for infinitivals and gerunds, where perhaps examples like those in (60) involve something like traditional PRO.

4.3. Partial Control

It has been observed that certain control verbs allow an interpretation where the silent subject PRO seems to refer not to the subject of the higher clause, but rather to a larger group that is contextually salient and includes that individual (see, e.g., Lawler, 1972; Martin, 1996; Petter, 1998; Landau, 2000). These “partial control” verbs include *want*, *prefer*, *decide*, and *intend*, as illustrated in (62).

- (62) (a) John told Mary that he preferred to meet at 6:00.
 (Adler, 2006, no. 15d)
 (b) The chair decided to gather during the strike.
 (based on Adler, 2006, no. 15e)
 (c) John told Mary that he intended to separate before it was too late.
 (Adler, 2006, no. 15f)
 (d) Mary wants to meet at the movie theatre (but Sam wants her to take him there).

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We can tell that the implicit subject of the lower clauses in these cases refers to a group because the embedded predicates *meet*, *gather*, and *separate* are collective predicates, hence the unacceptability of the corresponding sentences in (63).

- (63) (a) */# John met at 6:00. [cf. (62a/d)]
(b) */# The chair gathered during the strike. [cf. (62b)]
(c) */# John separated before it was too late. [cf. (62c)]

As Landau (2000) and others observe, some control verbs do not allow partial control. (Landau calls these “exhaustive control” verbs.) One example is *manage*, illustrated in (64).

- (64) */# The chair managed to gather during the strike.
(based on Landau, 2000, Ch. 2, no. 2a)

I will have little of significance to add to the discussion of the phenomenon of partial control, and what determines whether a particular control verb allows it or not, but I would at least like to show that it is not an insurmountable problem for the view of PRO as PRO_j.

Note first that even cases of partial control are obligatorily interpreted *de se* in the sense that the attitude holder must know that they themselves are part of the group involved. For example, suppose the amnesiac Lingens reads a biography of himself (not realizing that it’s about him). Suppose further that he comes to believe that this man Lingens has regular meetings with his biographer, and for some reason develops a desire for the meetings to occur in the lobby of the Stanford library. This desire cannot be reported with (65).

- (65) Lingens wants to meet in the Stanford library lobby.

For (65) to be true, Lingens would have to realize that his desire is about a group that includes himself.

To account for partial control, Landau (2000, Ch. 2) assumes, among other things, that PRO can carry a feature for semantic plurality. Simplifying somewhat, this means

that there is a “singular” PRO and a “plural” PRO. (It is crucial for him that these are semantic features, not syntactic phi-features.) Essentially, partial control occurs when the subject of the higher clause is singular but PRO is plural, which is allowed under certain conditions because of the particular way that agreement relations work between the higher and lower clause.²⁰

Without going into the details of Landau’s analysis, I will just show that there is a coherent way to posit a plural version of PRO_J, which will yield the right interpretation for partial control cases. Borrowing an idea of Kratzer (2006, to appear), I assume that the plural version of PRO_J refers to the unique salient group containing the judge, rather than the judge alone. A lexical entry for this plural version of PRO_J, which I’ll call PRO_{J-PLUR}, is given in (66).

$$(66) \quad \llbracket \text{PRO}_{\text{J-PLUR}} \rrbracket^{c; w, t, j} = G_c(j),$$

where $G_c(x)$ = the salient group containing x in context c

For example, the partial control structure in (67a), which contains PRO_{J-PLUR}, is predicted to have the meaning in (67b).

$$(67) \quad (a) \quad \text{Mary wants } [\text{PRO}_{\text{J-PLUR}} \text{ to meet}]$$

$$(b) \quad \llbracket (a) \rrbracket^{c; w, t, j} = \llbracket \text{want} \rrbracket^{w, t, j}$$

$$\quad \quad \quad ([\lambda w'' . [\lambda t'' . [\lambda j'' . \llbracket \text{PRO}_{\text{J-PLUR}} \text{ to meet} \rrbracket^{c; w'', t'', j''}]]]) (\text{Mary})$$

$$= 1 \text{ iff } \forall \langle w', t', x \rangle \in \text{Want}_{w, t, \text{Mary}}: G_c(x) \text{ meets in } w' \text{ at } t'$$

This says that *Mary wants to meet* is true iff for all of Mary’s want alternatives $\langle w', t', x \rangle$, the salient group containing x meets in w' at t' , which captures the “partial” nature of the control. It also correctly predicts that the attitude is still *de se* in the relevant sense, as seen in example (65) above.

²⁰ This has to do with whether the infinitive clause contains tense or not; thus Landau links the possibility of partial control to the possibility of having a certain kind of temporal mismatch between the higher and lower clauses. The relevant kind of mismatch is allowed with partial control verbs such as *want* (i), but not with exhaustive control verbs such as *manage* (ii).

(i) Yesterday, John wanted to solve the problem tomorrow. (Landau, 2000, Ch. 1, no. 11b)

(ii) * Yesterday, John managed to solve the problem tomorrow. (Landau, 2000, Ch. 1, no. 11a)

I leave it to future work to determine to what extent Landau’s account of the distribution of partial control could be adapted to fit the judge-dependent view I suggest, once my view is modified to correctly capture the temporal interpretation of control clauses (see note 18).

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Another possibility is to modify the lexical meanings of the relevant verbs, again using Kratzer's notion of the salient group containing an individual. There are two ways to do this, which I will illustrate using *want*. The first way is to build the plurality into the statement about the attitude holders want alternatives, as in (68).

$$(68) \quad \llbracket \text{want} \rrbracket^{w,t,j} = [\lambda p_{\langle s, \langle i, et \rangle \rangle} \cdot [\lambda z_e \cdot \forall \langle w', t', x \rangle \in \text{Want}_{w,t,z}: p(w')(t')(G(x))=1]]$$

where $\text{Want}_{w,t,z} = \{ \langle w', t', x \rangle : \text{it fits with what } z \text{ wants in } w \text{ at } t \text{ for } z \text{ to be } x \text{ in } w' \text{ at } t' \}$, and $G(x)$ is the contextually salient group containing x .

This says that “ z wants p ” is true iff in all of z 's want alternatives $\langle w', t', x \rangle$, p is true at world w' , time t' , and the judge that is the contextually relevant group including x .

The second way of doing this is to keep the basic lexical meaning for *want* and build the plurality into the notion of want alternatives, as in (69).

$$(69) \quad \llbracket \text{want} \rrbracket^{w,t,j} = [\lambda p_{\langle s, \langle i, et \rangle \rangle} \cdot [\lambda z_e \cdot \forall \langle w', t', X \rangle \in \text{Want}_{w,t,z}: p(w')(t')(X)=1]]$$

where $\text{Want}_{w,t,z} = \{ \langle w', t', X \rangle : \text{it fits with what } z \text{ wants in } w \text{ at } t \text{ for } G(z) \text{ to be } X \text{ in } w' \text{ at } t' \}$, and $G(x)$ is the contextually salient group containing x .

This says that “ z wants p ” is true iff for all the triples $\langle w', t', X \rangle$ such that it fits with what z wants for $G(z)$ to be the group X in w' at t' , p is true at $\langle w', t', X \rangle$.

4.4. Non-Obligatory Control

A significant amount of discussion in the literature has gone to analyzing so-called non-obligatory control: cases where PRO does not seem to have an overt controller in the same sentence or where its apparent controller is in a structural position that is not expected to be able to enter into the right syntactic relation with PRO (see, e.g., Bresnan, 1982; Williams, 1992; Kawasaki, 1993; Landau, 2000, 2001). Some examples are given in (70).²¹ (I have underlined the apparent controller and the relevant non-finite clause.)

$$(70) \quad (a) \quad \underline{\text{Tom}} \text{ felt sheepish. } \underline{\text{Pinching those elephants}} \text{ was foolish.}$$

(Adler, 2006, no. 24a; citing Bresnan, 1982)

²¹ To simplify matters, I am focusing on cases where PRO has a referential interpretation rather than an arbitrary interpretation. I leave it as an open question how much of what I say about the referential cases could be extended to arbitrary or generic cases.

- (b) Frankly, I'm worried about Mary. ... Getting herself photographed with those starving wolves was dangerous.
(Adler, 2006, no. 24b; citing Bresnan, 1982)
- (c) John said to Mary that it would be easy to prepare herself for the exam.
(Adler, 2006, no. 26)

As with extensional adjuncts, it is generally not possible to treat these as containing PRO_j. However, there is a sub-type of apparent non-obligatory control involving predicates of personal taste that can be analyzed this way given certain assumptions. Epstein (1984) observes that in examples like (71), the implicit subject of the infinitival clause (*to play baseball*) is the same person whose experience is evaluated by the predicate *fun*. He intended this example to be interpreted generically, but it also has an interpretation where it says that it's fun, for the judge, for the judge to play baseball, and I will focus on this interpretation. (On this interpretation, a speaker S can assert (71) provided that S playing baseball is fun for S, and a hearer H will accept it if H playing baseball is fun for H.)

- (71) It is fun to play baseball.
(Epstein, 1984, no. 1)

Epstein observes further that if the implicit argument of *fun* is made explicit, the required link remains, as in (72), which seems to mean that it's fun, for Lucy, for Lucy herself to play baseball.

- (72) It is fun for Lucy to play baseball.
(Epstein, 1984, no. 3)

(Actually, (72) is ambiguous, but Epstein intends it on the reading equivalent to *Playing baseball is fun for Lucy*; I will return to the second reading below.)

However, if both of the implicit elements are made explicit, they do not have to corefer, as shown in (73).

- (73) It is fun for Lucy for Joe to play baseball.
(Epstein, 1984, no. 9)

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Note that the same pattern holds for gerunds, so (74)–(76) pattern with (71)–(73), respectively.

- (74) Playing baseball is fun.
(75) Playing baseball is fun for Lucy.
(76) Joe playing baseball is fun for Lucy.

I will put aside questions about the structure and interpretation of copular sentences, and will simply assume that in these sentences *fun* takes two arguments in the semantics: the gerund (or infinitival), and an expression giving the person whose experience is relevant (either PRO_j or a referential argument).²² In my analysis of predicates of personal taste in Chapter 2, I assumed that both arguments of *fun* are individuals, but it is straightforward to extend this so that one of the arguments can be a proposition. For simplicity, I will assume a second lexical entry for *fun* along the lines of (77) (and similar meanings for other predicates of personal taste).

- (77) $[[\text{fun}_2]]^{w,t,j} = [\lambda p_{\langle s, \langle i, et \rangle \rangle} . [\lambda y_e . \text{it is fun for } y \text{ in } w \text{ at } t \text{ if } p(w)(t)(y) = 1]]$

This says that “p is fun for y” is true iff y enjoys the fact (when it holds) that p is true as judged by y. My claim is essentially that *fun* denotes a relation between individuals and propositions that has to do with the proposition as judged by that individual.²³

Now, consider the example from (74) (and similarly (71)). If both of the implicit elements are PRO_j, as in (78a), then the meaning is (78b) (under the assumptions I outlined above).

²² The approach I will take here is based closely on suggestions by Irene Heim (p.c.). It is also somewhat reminiscent of Chierchia & Jacobson’s (1986) analysis of verbs like *bother*, *prove*, and *make* in the so-called Super Equi construction, except of course that I treat the non-finite clause as a judge-dependent proposition rather than as a property.

²³ The lexical entry in (77) has the stipulative quality of simply shifting the judge parameter to the “y” argument without a mediating attitude, which I have avoided in other cases. It might be possible to get around this by defining a notion of a person’s “fun alternatives,” which are triples $\langle w', t', x \rangle$ such that it’s compatible with the person’s idea of what is fun for them to be x in w’ at t’. Then “p is fun for y” would be true iff all of the triples $\langle w', t', x \rangle$ where p is true are among y’s fun alternatives. Note that the quantification goes in the reverse direction compared to the meanings of *want* and *think*. (Thanks to Kai von Fintel, p.c. for discussion of this point). It is not clear to me, though, that *fun* really has this kind of modal component to its meaning, and so I leave this as an open question.

- (78) (a) [PRO_J Playing baseball] [is fun₂ PRO_J]
 (b) $\llbracket (a) \rrbracket^{w,t,j} = \llbracket \text{fun}_2 \rrbracket^{w,t,j} ([\lambda w' . [\lambda t' . [\lambda j' . \llbracket \text{PRO}_J \text{ playing baseball} \rrbracket^{w',t',j'}]]])$
 ($\llbracket \text{PRO}_J \rrbracket^{w,t,j}$)
 = 1 iff it is fun for j in w at t if j plays baseball in w at t

This says that it is fun, for the judge, for the judge to play baseball, which seems to be correct.

Now consider (75) (and similarly (72)), where the argument of *fun* is made explicit. Again assuming that the implicit subject is PRO_J, as in (79a), the predicted meaning is (79b).

- (79) (a) [PRO_J Playing baseball] [is fun₂ for Lucy]
 (b) $\llbracket (a) \rrbracket^{w,t,j} = \llbracket \text{fun}_2 \rrbracket^{w,t,j} ([\lambda w' . [\lambda t' . [\lambda j' . \llbracket \text{PRO}_J \text{ playing baseball} \rrbracket^{w',t',j'}]]])$
 (Lucy)
 = it is fun for Lucy in w at t if Lucy plays baseball in w at t

This says that it is fun, for Lucy, for Lucy herself to play baseball, which again seems to be correct.

This also predicts that (71) and (74) should have a reading where *fun* is evaluated with respect to a salient referent, in which case the implied subject of the infinitive or gerund has to be the same individual. This kind of interpretation does indeed seem to be possible in (80), which can mean that it's fun for the cat if the cat hunts mice.

- (80) [Context: Sam is watching his cat hunt mice, and says:]
 Look! I guess hunting mice is fun.

Now consider the case where both arguments are made explicit, as in (76) and (73). The structure and predicted meaning for (76) is given in (81a–b).

- (81) (a) [Joe Playing baseball] [is fun₂ for Lucy]
 (b) $\llbracket (a) \rrbracket^{w,t,j} = \llbracket \text{fun}_2 \rrbracket^{w,t,j} ([\lambda w' . [\lambda t' . [\lambda j' . \llbracket \text{Joe playing baseball} \rrbracket^{w',t',j'}]]])$
 (Lucy)
 = 1 iff it is fun for Lucy in w at t if Joe plays baseball in w at t

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This says that it is fun for Lucy if Joe plays baseball, which again seems to be correct.

Finally, to complete the paradigm, we need to look at cases where the subject of the non-finite clause is made explicit and the argument of the predicate of personal taste is left implicit, as in (83).

(82) ?? Joe playing baseball is fun.

The prediction is that (82) should be able to mean that it's fun for the judge when Joe plays baseball. For some reason, (82) sounds a bit odd to me; however, to the extent that it is acceptable it clearly has this meaning, rather than meaning that Joe enjoys playing baseball. Some better examples are given in (83).

(83) (a) It's fun for the Yankees to get beaten so thoroughly.

(b) ? The Yankees getting beaten so thoroughly is fun.

(Kai von Fintel, p.c.)

Notice that (83a) is ambiguous (as was (72)), between a masochistic reading where the Yankees enjoy being beaten (perhaps within the fantasy world of their rival Red Sox fans) and a second one where seeing the Yankees lose is fun for the judge. The first reading comes from a structure where the two arguments of *fun* are *for the Yankees* and *to get beaten so thoroughly*, and the second reading comes from a structure where the two arguments of *fun* are PRO_J and the sentential expression *for the Yankees to get beaten so thoroughly*. The second reading is the intended one, and is clearly the more plausible one in this case. On this reading, the prediction is that a speaker could assert (83a) provided that it's fun for them for the Yankees to get beaten, and a hearer could object if it isn't fun for them. This is borne out, as seen in (84).

(84) Sam: It's fun for the Yankees to get beaten so thoroughly.

Sue: No, it's not. It's much more fun when there's a close game.

For some reason, the version with a *to*-infinitival still sounds better than the version with a gerund in (83b), but again to the extent that (83b) is acceptable it clearly has the same meaning.

To sum up, then, while non-obligatory control cannot generally be reduced to cases of PRO_J, Epstein's examples do seem to be amenable to this analysis. I leave it to future work to investigate whether any other cases of non-obligatory control can be analyzed along similar lines.

5. Multiple occurrences of PRO_J

5.1. An Apparent Problem

In the preceding sections I have proposed that the same mechanism used for predicates of personal taste – judge dependency, in the form of PRO_J – can also be used to explain the obligatory *de se* interpretation in control structures. Specifically, for at least a subset of control structures, I have proposed that what has been called PRO is actually the same as the item PRO_J that I posited to be a possible implicit argument of predicates of personal taste. If judge dependency in predicates of personal taste uses the same mechanism as these cases of control, we might expect them to interact in a seamless way. For example, we should expect to find sentences of the general form in (85), where the subject of the infinitive clause and the implicit argument of the predicate of personal taste are both PRO_J, and thus where it is intuitively clear that they corefer.

$$(85) \quad X \left\{ \begin{array}{l} \text{tried} \\ \text{wants} \end{array} \right\} \text{PRO}_J \text{ to be } \left\{ \begin{array}{l} \text{fun} \\ \text{tasty} \end{array} \right\} \text{PRO}_J$$

It turns out to be difficult to construct such examples, because things that have the potential to be tasty or fun – cakes, cat food, parties, roller coasters, games, and so on – don't tend to be the kind of entities that have either attitudes (*de se* or otherwise) or sensory and psychological experiences such as taste and enjoyment. For this reason, it is not surprising that (86) is odd.

$$(86) \quad \# \text{ The cake wants to be tasty.}$$

However, relevant examples can be constructed if we are creative enough with the context. In some types of fiction and fairy tales all sorts of normally inanimate objects can walk, talk, and have feelings. We might imagine something along the lines of the

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animated kitchen utensils in Disney's *Beauty and the Beast*, or one of the more obscure "Oz" books by L. Frank Baum, where a magician creates a powder that will bring to life any object it is sprinkled on (giving rise to, among other things, a talking, flying sofa). In my experience of these stories, typically these sorts of odd creatures don't eat, but if they can magically develop the kind of vocal apparatus needed to produce spoken human language, presumably they could magically develop some kind of digestive system as well. Given this creative license, then, we can construct appropriate examples.

First, imagine a magical living cake named Cakey. Cakey is able to walk, talk, think, feel, and even eat; his diet consists mainly of flour, sugar, and eggs, as you might imagine, or instant cake mix when he's on the run, plus regular leavening supplements. Fortunately for Cakey, it doesn't hurt him at all if someone cuts a slice of him and eats it – it causes more of a tickling sensation – and he can regenerate the missing piece provided he eats an adequate diet. In fact, he needs to regularly have pieces eaten and regenerated in order to stay fresh and moist and generally in good health. This means that if no one is around to take a slice, he has to cut off pieces of himself, and either eat them or throw them away. One might expect him to be squeamish about self-cannibalism, but actually he objects much more strongly to having dried-up pieces of his own body lying around, and thus usually goes for the option of eating pieces of himself even though, oddly enough, they always taste terrible to him. Now consider the story in (87).²⁴

(87) [Context: Cakey woke up one morning and realized that no one had taken a slice of him in almost a week. He was starting to get stale and was feeling achy and lethargic. He called his friends to see if they would come by and have a slice, but none of them were home except Sam, who had just gone on a diet. Since he had no other choice, Cakey went to the kitchen and cut off a few small pieces of himself, which he then ate. As usual, the pieces tasted terrible to him. This was very frustrating because all of his friends who had tasted slices of him had always enjoyed them.]

- (a) # This was very frustrating. Cakey wanted to be tasty!
- (b) This was very frustrating. Cakey wanted to taste good to himself!

²⁴ For readers familiar with the work of Douglas Adams (of *Hitchhiker's Guide to the Galaxy* fame), Kai von Fintel (p.c.) pointed out that Adams's *Restaurant at the End of the Universe* contains a similar story of a genetically engineered cow who offers itself eagerly to diners. However, from what I can gather from a brief survey of secondary sources, there is no mention in this story of the cow eating itself, which is a crucial part of the scenario here.

Sentence (87a) sounds odd in this context. It seems to mean that Cakey wants to taste good to someone else (or perhaps to other people in general), which is infelicitous given the fact that he already knows he tastes good to everyone who has ever tried a slice of him, besides himself. In this case, the problem is not that it's pragmatically implausible for Cakey to taste himself, since, for one thing, we have set up a context where he actually does so, and, for another, the sentence is perfectly acceptable with an explicit *to himself* as in (87b).

A less exotic example can be constructed with the predicate *fun*, since people are sometimes described as being fun in a way similar to games or parties. If other people can find someone fun, then there seems to be no reason why they can't find themselves fun. However, consider (88).

- (88) [Context: Sue hates spending time alone. When she's with other people, they always seem to enjoy her company, appreciating her stories and laughing at her jokes, but she just can't ever seem to entertain herself, and wishes that she could.]
- (a) # Sue wants to be fun.
- (b) (?) Sue wants to be fun for herself.

Again, (88a) sounds odd in this context. It could mean that Sue wants other people to find her fun, but in the context it's given that she already knows that they do. When an explicit *for herself* is added as in (88b), the sentence sounds much better.²⁵

So far, nothing in my analysis would predict that (87a) and (88a) cannot have the reading where *tasty* or *fun* takes PRO_J. My view predicts that one possible structure for (88a), for example, is (89a), which would have the meaning in (89b).

- (89) (a) Sue [wants [PRO_J to be fun PRO_J]]
- (b) $\llbracket (89a) \rrbracket^{w,t,j} = \llbracket \text{want} \rrbracket^{w,t,j}$
 $([\lambda w'' . [\lambda t'' . [\lambda j'' . \llbracket \text{PRO}_J \text{ to be fun PRO}_J \rrbracket^{w'',t'',j''}]]]) (\text{Sue})$
 $= 1 \text{ iff } \forall \langle w', t', x \rangle \in \text{Want}_{w,t,\text{Sue}}: x \text{ is fun for } x \text{ in } w' \text{ at } t'$

²⁵ For some reason, (88b) doesn't sound perfect to me either, although it's better than (88a). This may be because it is more difficult to add an explicit argument to *fun* on the meaning that applies to people than on the meaning that applies to parties and roller coasters. For example, it seems easier to say *The roller coaster is fun for Sue* than *Sam is fun for Sue*.

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It seems to be an unexplained generalization, then, that in control sentences of the form “x wants to be tasty/fun,” the predicate of personal taste cannot be interpreted in a judge-dependent way, which is to say it cannot take PRO_J. For the moment, I will refer to this as the “double-PRO_J restriction,” given in (90).

- (90) Double-PRO_J Restriction: In a clause of the form [PRO_J be PRED X], where PRED is a predicate of personal taste such as *tasty* or *fun* and X is the (silent or overt) argument of PRED, X ≠ PRO_J.

Below I will develop an explanation of the double-PRO_J restriction.

5.2. Solution

On the face of it, the double-PRO_J restriction seems to be a problem for my proposal that PRO in these examples is PRO_J. If the implicit subject of the control clause and the implicit argument of the predicate of personal taste are the same expression (PRO_J), refer to the same object, and use the same semantic mechanism, they ought to go together in a straightforward dovetailing way. However, there is another way to look at it. Notice that in a structure of the form in (89a), the two instances of PRO_J are co-arguments of *tasty*, and accordingly the first PRO_J c-commands the second within the clause (assuming that the presence of the copula *be* is irrelevant). This is just the kind of configuration that gives rise to Principle B violations.²⁶ Therefore we can explain the double-PRO_J restriction as an instance of Principle B.²⁷ For simplicity I will assume a version of Principle B given in (91).

- (91) Principle B: A non-reflexive nominal expression cannot be a co-argument of the same predicate as a coreferential nominal expression.

Along with more well-known facts, Principle B predicts that (92) cannot have an interpretation where *him* refers to Cakey; to get that interpretation the reflexive *himself*

²⁶ Readers unfamiliar with Principles A, B, and C of the Binding Theory may refer to any syntax textbook in the Government/Binding framework, such as Haegeman (1994, Ch. 4). Essentially, though, Principle B is postulated to capture the fact that in a sentence like (i), *he* and *him* cannot refer to the same person, and that for this interpretation, the reflexive *himself* must be used as in (ii).

(i) * He_i likes him_i.

(ii) He_i likes himself_i.

²⁷ This was suggested to me by Irene Heim (p.c.).

must be used instead, as in (92b). The case of (93a–b) is exactly parallel (*her* cannot refer to Sue).

- (92) (a) * Cakey_i tastes terrible to him_i.
 (b) Cakey_i tastes terrible to himself_i.
- (93) (a) * Sue_i wants to be fun for her_i.
 (b) (?) Sue_i wants to be fun for herself_i.

The structure that would be needed to get the double-PRO_J interpretation in (87a) and (88a) are given in (94) and (95), respectively.

- (94) * Cakey wanted [PRO_J to be tasty PRO_J]
 (95) * Sue wants [PRO_J to be fun PRO_J]

The embedded clauses in (94)–(95) are exactly analogous to the sentences in (92a) and (93a) in that the two instances of PRO_J are coreferential (for any world-time-judge triple $\langle w, t, j \rangle$, they both refer to *j*) and are co-arguments of *tasty* or *fun*.

Note that two instances of PRO_J can occur in the same clause when they are not co-arguments. Example (96a), of the type based on Epstein (1984) and discussed in Section 4.4 above, is a case in point. On the relevant interpretation, it has the structure given schematically in (96b)

- (96) (a) Playing baseball is fun. [= (74)]
 (b) [PRO_J playing baseball] is [fun PRO_J]

In (96b), the first PRO_J is an argument of *play(ing)*, while the second is an argument of *fun*, so they are not co-arguments.

Similarly, (97a) has an interpretation on which it has roughly the structure in (97b). The first instance of PRO_J is an argument of *eat* whereas the second is part of an

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adjectival phrase modifying *cake*, and so is not itself an argument of *eat*. The situation is similar for (98)–(99).²⁸

- (97) (a) Sam wants to eat a tasty cake.
(b) Sam [_{VP} wants [_S PRO_J to eat [_{DP} a [tasty PRO_J] cake]]]
- (98) (a) Sam wants to eat a cake that's tasty.
(b) Sam [_{VP} wants [_S PRO_J to eat [_{DP} a cake [_{CP} that t is tasty PRO_J]]]
- (99) (a) Sam wants to bring a tasty cake to the potluck.
(b) Sam [_{VP} wants [_S PRO_J to bring [_{DP} a [tasty PRO_J] cake] [_{PP} to the potluck]]]

A possible interpretation of (97a) and (98a), indeed the most natural one, is that Sam wants to eat a cake that tastes good to him (Sam himself). A more obvious interpretation for (99a) might be that Sam wants to bring a cake to the potluck that will taste good to the guests in general, thus showing off his baking skills; on this reading *tasty* would take a silent argument referring to something like the group of guests at the party. However, we could also imagine that Sam knows that he has unusual taste (or that the other guests do) and thinks his cake might be the only thing at the potluck that he will like; in this context, he might only care about the cake tasting good to him, and (99a) could still be used in this context. Note that overt non-reflexive pronouns are also possible in these configurations, as shown in (100)–(101).²⁹

- (100) Sam_i wants to eat a cake that tastes good to him_i.
(101) Sam_i wants to bring a cake that tastes good to him_i to the potluck.

In the end, then, the restriction on having two occurrences of PRO_J is not surprising. In fact, if PRO in these constructions were not the same item as PRO_J, it is difficult to see what would rule out the relevant readings. The only remaining thing to explain is why

²⁸ The importance of these facts were pointed out to me by Irene Heim (p.c.).

²⁹ (100) has to stand in as the analogue to both (97) and (98) because *tasty* does not allow explicit arguments in prenominal position. (For example, **a tasty to me cake* is ungrammatical.)

PRO_J does not have a reflexive form, at least in English. (It would be interesting to see if there is evidence of such an item in any other languages.) I leave this question open.

Chapter 5

Imagination and Moorean Paradoxes

1. Introduction

In this chapter I will discuss puzzles related to Moore's paradox which crucially involve judge-dependent items and attitude reports using predicates like *imagine*. I will start by looking at the semantics of *imagine* in Section 2, where it will be treated as an attitude with some similarities to *think* or *believe*. Then in Section 3 I will introduce a puzzle brought up by Yalcin (2005) for epistemic modals, discuss Yalcin's proposed solution, and bring up a similar puzzle which is not helped by Yalcin's system. In Section 4, I propose a solution to both puzzles, which involves some changes to the semantics of *imagine* proposed in Section 2.

2. Imagine

I will start by looking at the meaning of *imagine*. I will focus on its use in things like daydreaming and fantasy, where the attitude holder is doing something like building up a fictional situation, perhaps thinking about the experiences they would have in that situation. Examples of this are given in (1) and (2).

(1) [Context: A recording of a guided meditation.]

Close your eyes. Imagine that you're in an open field. The sun is shining....

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(2) [Context: A teacher giving a lesson in living history.]

Imagine that you're the child of a peasant farmer. You live in a small cottage with your mother, father, some aunts and uncles, grandparents, and your brothers and sisters. ...

These use the imperative, so that the attitude holder is the addressee, and I will tend to use the imperative to evoke this interpretation. I will also focus on examples where the embedded clause is indicative rather than subjunctive (as in *imagine that you were in an open field*), but this is less crucial.

There is a second use of *imagine* that seems to mean something very close to *believe* or *conclude*. For example, if our friend Fred was scheduled to arrive at the airport three hours ago and has a short drive home, I might utter (3).

(3) I imagine Fred is home by now.

Unlike in (1)–(2), the speaker in (3) is not thinking about an experience involving Fred being home. Imagination seems to be involved instead in the process of coming to believe that Fred is at home (for example, by imagining the length of time it would take for Fred to get off the plane, collect his luggage, and drive home). I will put aside this second use. For the moment, I will also put aside the use of *imagine* where it takes a nominal argument, as in *imagine a bear*.

Going back to the use exemplified in (1)–(2), now let's look at what happens when a sentence containing a judge-dependent item is embedded under *imagine*. I will start with predicates of personal taste because their behavior is relatively clear, then look at epistemic modals. First consider (4)–(5).

(4) Imagine that you're eating a cake for dessert, and it tastes good.

(5) Imagine that the cake sitting in front of you tastes good.

The attitude holder (in this case, the addressee) is the person whose taste experience is relevant. That is, to imagine that a cake tastes good is to imagine that it tastes good to oneself, just as to think a cake tastes good is (roughly) to think it tastes good to oneself.

Note that, also as with *think*, the predicate of personal taste can be linked to a salient referent, as in (6).

(6) Imagine that your cat is eating cat food, and it tastes good.

I assume, as before, that *tastes good* in (4)–(5) takes PRO_J as its argument, and *tastes good* in (6) takes a silent argument referring to the cat.

It seems to be more difficult to embed epistemic modals. For example, the sentences in (7) seem a bit odd out of the blue.

(7) (a) ?? Imagine that it might be raining.

(b) ?? Imagine that the butler must be the murderer.

My suspicion is that imagining something usually requires conjuring up a vivid image or experience, and knowledge states are hard to have a vivid experience of. (Something more may need to be said to capture this, but I'll put this aside.) If more material is added that brings out the importance of the mental state, as in (8), the sentences become more natural.

(8) (a) Imagine that it might be raining, but you're not sure.

(b) Imagine that the butler must be the murderer, but you have no way to prove it.

In (8a–b), the epistemic modals *might* and *must* are clearly linked to the attitude holder. For example, roughly speaking, (8b) tells the addressee to imagine knowing that the butler is the murderer but not being able to prove it to others.

As expected, epistemic modals cannot be linked to a salient referent under *imagine*, such as Mary in (9a) or Sherlock in (9b). For example, the addressee cannot comply with (9a) while also imagining that he or she knows that it isn't raining.

(9) (a) Imagine that it might be raining, but Mary isn't sure.
[might ≠ compatible with Mary's knowledge]

(b) Imagine that the butler must be the murderer, but Sherlock can't prove it.
[must ≠ follows from Sherlock's knowledge]

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Thus *imagine* seems to manipulate the judge parameter in the same way that *think* does, so it makes sense to treat them in similar ways. For *think*, I exploited the self-locating nature of doxastic alternatives to manipulate the judge parameter. I would like to do the same thing for *imagine*. I will define the “imagination alternatives” of a person x in a world and time w and t as the set of world-time-individual triples $\langle w', t', y \rangle$ such that it is compatible with what x is imagining in w at t that x is y in w' at t' . This is repeated in (10), and a lexical meaning for *imagine* using this notion is given in (11).

- (10) Imagination alternatives:
 $\text{Imagine}_{w,t,z} = \{ \langle w', t', x \rangle : \text{it is compatible with what } z \text{ is imagining in } w \text{ at } t \text{ that he/she/it is } x \text{ in } w' \text{ at } t' \}$
- (11) $\llbracket \text{imagine} \rrbracket^{w,t,j} = [\lambda p_{\langle s, \langle i, et \rangle \rangle} . [\lambda z_e . \forall \langle w', t', x \rangle \in \text{Imagine}_{w,t,z} : p(w')(t')(x) = 1]]$

In a sense, of course, this doesn't tell us very much about what it means to imagine something, except that it bears formal similarities to belief. But it does predict that judge-dependent items embedded under *imagine* will be linked to the attitude holder. For example, “Sam imagines that the cake is tasty” (where *tasty* combines with PRO_j) has the meaning in (12).

- (12) $\llbracket \text{Sam imagines that the cake is tasty } \text{PRO}_j \rrbracket^{w,t,j} = \llbracket \text{imagine} \rrbracket^{w,t,j} (\llbracket \text{the cake is tasty } \text{PRO}_j \rrbracket^{w,t,j}) (\text{Sam})$
 $= 1 \text{ iff } \forall \langle w', t', x \rangle \in \text{Imagine}_{w,t,\text{Sam}} : \llbracket \text{the cake is tasty } \text{PRO}_j \rrbracket^{w',t',x} = 1$
 $= 1 \text{ iff } \forall \langle w', t', x \rangle \in \text{Imagine}_{w,t,\text{Sam}} : \text{the cake tastes good to } x \text{ in } w' \text{ at } t'$

This says that Sam imagines that the cake is tasty iff every triple $\langle w', t', x \rangle$ compatible with what Sam is imagining (i.e., with the fictional situation he is building up) is such that the cake tastes good to x in w' at t' – in other words, if Sam imagines that the cake tastes good to him.

Let me finish by noting that I have focused on examples in the imperative in order to bring out a particular interpretation of *imagine*, but this interpretation is also generally available in declarative contexts, as illustrated in (13).

- (13) (a) Whenever Sam feels tense, he imagines that he's back in his home town.
 (b) Mary was bored and tired of working, so she leaned back in her chair and imagined that she was a world-famous gymnast.

3. The Puzzles

In this section I will introduce the two puzzles to be addressed. In Sections 3.1 and 3.2, I discuss the puzzle brought up by Yalcin (2005) and his proposed solution. Then in Section 3.3 I introduce a second puzzle that Yalcin's system does not solve.

3.1. Yalcin's Puzzle

The starting point for Yalcin's puzzle is Moore's paradox, exemplified by sentences like (14).

- (14) # It's raining but I don't know that it's raining.¹

The notable fact about sentences like (14), known as Moore's paradox, is that they're not logically contradictory (it's perfectly possible for it to be raining without the speaker knowing it), and yet they sound contradictory. Moore's paradox is well known, and so is its solution: although a sentence of the form "p but I don't know that p" is not logically contradictory, it cannot be felicitously asserted in any context because it violates the norm of assertion for a speaker to assert p while also asserting that they don't know that p. This follows from any reasonable norm of assertion (including the one I have proposed), along with the assumption that asserting a conjunction involves asserting its conjuncts.

Yalcin (2005) discusses sentences like (15), which are also odd and contradictory-sounding.²

- (15) # It isn't raining but it might be raining.

¹ I've changed *and* to *but* when this leads to a more natural sentence (or might be expected to do so). I assume that the truth-conditional content of *but* is the same as *and*, or at least includes the meaning of *and* (as well as possibly other content).

² This is further evidence against a simple contextualist view of epistemic modals where the relevant knowledge is simply that of some salient individual or group. As long as that individual or group does not include the speaker, (15) ought to be perfectly acceptable on such a view.

3.2. Yalcin's Account of Epistemic Modals

Yalcin (2005) proposes a theory of epistemic modals that is dynamic and probabilistic.⁴ It's dynamic in the sense that the meaning of sentences is given in terms of the effect they have on the context set in a conversation, i.e., as context change potentials, but the probabilistic nature of the account is more crucial. On Yalcin's view, the context set is a set of "credence functions" rather than a set of worlds or of indices. A credence function maps propositions (including worlds) to probability values, and the set of them in the context set together determine the degree to which different propositions are accepted in the context. For example, if it is completely open in a context whether a proposition p holds, then for every value n between 0 and 1, there will be some credence function in the context set that maps p to n . On the other hand, if p is completely accepted in a context, then all of the credence functions in the context set will map p to the probability value 1. (If a proposition p is completely ruled out, then all of the credence functions in the context set will map p to 0, which is the same as "not p " being completely accepted.) The content of an attitude such as *imagine* is treated similarly as a set of credence functions.

Yalcin treats epistemic modals essentially as modulators of force. On his view, normal, non-modal assertions contain a silent assertion operator, and a successful assertion of p restricts the context set to credence functions that map p to 1. In declarative utterances with epistemic modals such as *might*, on the other hand, the modal takes the place of the assertion operator. A successful declarative utterance of "might p " restricts the context set to credence functions that map p to a probability value greater than 0. Similarly, a successful declarative utterance of "probably p " restricts the context set to credence functions that map p to a probability value greater than 0.5.

On Yalcin's view, then, the reason that it is impossible to make a declarative utterance of the form "not p but might p " is not because it violates a conversational norm but because it would lead to an empty context set. For example, in (15), repeated in (18), the first part of the utterance has the form [assert [not [it be raining]]], which restricts

⁴ Yalcin cites views of epistemic modals as modulators of assertoric force (e.g., Wittgenstein, 1953; Toulmin, 1956), Bayesian models of belief (e.g., Jeffrey, 1987; Kaplan, 1996), and Veltman's (1996) dynamic account of epistemic modals as precursors to his view.

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the context set to credence functions that map the proposition that it's raining to 0. The second part has the form [might [it be raining]], which restricts the context set to credence functions that map the proposition that it's raining to a value greater than 0. These restrictions are contradictory – that is, they will always lead to the empty context set – and so the utterance is impossible.

(18) # It isn't raining but it might be raining.

It is impossible to imagine something of the form “not p but might p” for a similar reason since the content of a propositional attitude is also treated as a set of credence functions. Imagining “not p” restricts this set to credence functions that map p to 0, and imagining “might p” restricts this set to functions that map p to a value greater than 0, and so both cannot be imagined together.⁵ This explains the impossibility of (17), for example, repeated in (19).

(19) # Imagine that it isn't raining but it might be raining.
(based on Yalcin, 2005, no. 5)

For traditional Moore-paradoxical sentences such as (14), repeated in (20), Yalcin retains a standard pragmatic explanation. In this case the two conjuncts do not put conflicting requirements on the context set, but it would violate the norm of assertion to assert that it's raining but that the speaker doesn't know it.

(20) # It's raining but I don't know that it's raining.

When a Moore-paradoxical sentence is embedded under *imagine* as in (16), repeated in (21), there are no relevant norms of conversation to be violated, and so the sentences become acceptable.

(21) Imagine that it's raining but you don't know that it's raining.
(based on Yalcin, 2005, no. 4)

⁵ There is a technical problem with Yalcin's system here. Propositions themselves do not put requirements on credence functions – only the assertion operator and epistemic modals do that. Thus putting “not p” under *imagine* should not by itself restrict the set of credence functions representing what is imagined. Yalcin could get around this by assuming that the assertion operator is embedded under *imagine*, but it is not clear if he makes that assumption.

3.3. A New Moorean Puzzle

Given my semantic and pragmatic analysis of predicates of personal taste, we can also construct apparently Moore-paradoxical cases like (22).

(22) # The cake tastes good but it doesn't taste good to me.

Provided *tastes good* is given the interpretation where it takes PRO_J, the sentence does indeed sound contradictory when asserted. (This judgment is complicated somewhat by the fact that *tastes good* could also potentially take a silent referential argument, but I think it's clear that the judge-dependent reading also exists, and is contradictory.) This is expected on my view of the norm of assertion, since in order for a speaker to assert (22), they would have to believe that the cake tastes good to them and also believe that it doesn't.

Like Yalcin's cases, though, (22) remains contradictory when it is embedded under *imagine* (or, I should say, there remains a relevant reading that is contradictory). We can see this in (23).

(23) # Imagine that the cake tastes good but it doesn't taste good to you.

As I discussed in Section 2, it seems that to imagine that a cake tastes good is to imagine that it tastes good to oneself; thus (23) seems to be instructing the addressee to imagine that the cake both tastes good to them and does not taste good to them, which is impossible.

To summarize, then, we have considered three types of sentences that are potentially examples of Moore's paradox, which I'll call types I-III. Type I is standard Moore-paradoxical sentences such as *It's raining but I don't know that it's raining* or *It's raining but I think it isn't raining*. Type II is Yalcin's sentences, where *p* is replaced with its negation and the attitude report is replaced with an epistemically modalized sentence. Type III is like Yalcin's cases except that the epistemically modalized sentence is replaced with one containing a predicate of personal taste (with PRO_J as its argument) and the simple sentence is replaced with a sentence containing a predicate of personal taste with an explicit argument. The three cases are rendered schematically in (24)–(26),

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respectively. (“**PRED**” stands for a predicate of personal taste and “&” indicates any conjunction including *but*.)

(24) **Type I: p & I don’t know that p** (Moore’s paradox)

Example:

It’s raining but I don’t know that it’s raining.

(25) **Type II: not p & might p** (Yalcin’s puzzle)

Example:

It isn’t raining but it might be raining.

(26) **Type III: X PRED + X not PRED to me**

Example:

The cake tastes good but it doesn’t taste good to me.

We have seen that the three cases show two different patterns: Type I sentences become acceptable when embedded under *imagine*, while types II and III do not.

4. Proposal

In this section I will try to solve both puzzles together. I will start in Section 4.1 by giving what I believe is the correct empirical generalization. In Sections 4.2–4.3, I discuss a distinction that is often drawn between two ways of imagining which can be characterized as objective (or “from the outside”) and subjective (or “from the inside”). I propose that *imagine* is ambiguous between a subjective and objective reading, and that subjective and objective *imagine* take different kinds of propositions as arguments. In Section 4.4, I add assumptions about pronouns that appear with *imagine* and *dream* with a particular kind of *de se* interpretation. Then in Section 4.5 I show how my analysis and assumptions help lead us towards a unified solution to the two puzzles. I close in Section 4.6 by connecting my discussion of Moorean puzzles with my judge-dependent approach to control constructions from Chapter 4.

4.1. The Generalization

On a view like Yalcin’s, there is no reason to expect a sentence like *It isn’t raining but it might be raining* (Type II) to have the same behavior as one like *The cake tastes good but*

it doesn't taste good to me (Type III). The two have no obvious feature in common other than their similar behavior. In the system that I have proposed, though, Type II and III sentences do share a property that distinguishes them from Type I sentences, namely that of expressing judge-dependent propositions. To see this, first recall that a non-judge-dependent proposition is simply one that is a constant function with respect to the judge parameter. For example, *it's raining* does not depend on the judge parameter, since it's true at $\langle w, t, j \rangle$ iff it's raining in w at t . Second, note that if two independent, non-tautologous, non-contradictory propositions are conjoined with truth-functional *and*, the conjunction will be judge-dependent if even one of the conjuncts is judge-dependent, and will be non-judge-dependent only if both of the conjuncts are non-judge-dependent.⁶

Now, in the examples of Type I that we have considered (and that Yalcin considers), the first conjunct is always non-judge-dependent (for example, *it's raining*). All belief and knowledge reports are non-judge-dependent as well, even if the embedded clause is judge-dependent, because of the way the attitude predicates manipulate the judge parameter of the embedded clause. This means that Type I sentences are conjunctions of two non-judge-dependent propositions, and so they are non-judge-dependent. On the other hand, any sentence with an unembedded judge-dependent item, such as an epistemic modal or a predicate of personal taste taking PRO_I , is judge-dependent (for example, *it might be raining* or *the cake tastes good*). This means that Type II and Type III sentences have one judge-dependent conjunct, and so are themselves judge-dependent. (In both cases the other conjunct is non-judge-dependent.)

As an empirical hypothesis, then, I suggest that given a sentence that is potentially Moore-paradoxical, whether it will become acceptable when embedded under *imagine* depends on whether it is judge-dependent. If it is non-judge-dependent, it will become acceptable, and if it is judge-dependent it will not.

⁶ Proof: **[Part I]** Suppose p and q are non-judge-dependent propositions. Then for any world w , time t , and individuals j_1 and j_2 , $p(w)(t)(j_1) = p(w)(t)(j_2)$ and $q(w)(t)(j_1) = q(w)(t)(j_2)$, from which it follows that $[p\&q](w)(t)(j_1) = [p\&q](w)(t)(j_2)$. **[Part II]** Now suppose p and q are independent propositions, and p is judge-dependent. Then there is some world w , time t , and individuals j_1 and j_2 such that $p(w)(t)(j_1) = 1$ and $p(w)(t)(j_2) = 0$. Since q is independent of p , there must be some such choice of w , t , and j_1 such that $q(w)(t)(j_1) = 1$. It follows that $[p\&q](w)(t)(j_1) = 1$ and $[p\&q](w)(t)(j_2) = 0$, therefore $[p\&q]$ is judge-dependent.

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4.2. Two Ways of Imagining

It is common in philosophy to draw a distinction between imagining “from the inside” and “from the outside.”⁷ The distinction is often illustrated using examples like (27)–(28).

(27) I imagined skiing down the hill.
(Ninan, 2007, no. 2a)

(28) I imagined that I was skiing down the hill.
(Ninan, 2007, no. 3a)

In the case of (27), what the speaker imagines is the experience of moving down the hill, complete with sensory perceptions of the way the hill looks and feels as well as the internal sense of fear or excitement. There is an interpretation of (28), on the other hand, where the speaker might be imagining what it would look like, say, in a movie, if they were skiing down the hill.

Here’s another way to get at the distinction: in English, *imagine* can take DPs as arguments, as in (29), as well as subjectless gerunds, as in (30a–b), in addition to propositional CP arguments as in (31) and the cases we have looked at so far.

(29) Imagine a cat.

(30) (a) Imagine climbing up a tree.

(b) Imagine being a cat.

(31) Imagine that a cat is climbing up a tree.

When you imagine a thing, as in (29), you normally do something like build up a mental image of that thing, looking at it from the outside. When you imagine doing something, as in (30), you think of what the experience of doing that thing would feel like, from the inside. When *imagine* takes a DP or subjectless gerund as an argument, the perspective seems to be linked to the type of argument, with an external perspective going with DP

⁷ This has been discussed recently by, e.g., Ninan (2007) and Recanati (2007). (Also see, e.g., B. Williams, 1966; Nagel, 1974; Peacocke, 1985; Walton, 1990; Shoemaker, 1994; Velleman, 1996; Hill, 1997; M. Martin, 2002; Higginbotham, 2003, all cited by Ninan.)

arguments and an internal perspective going with gerund arguments. I suggest that with CP (*that*-clause) arguments, either type of perspective is in principle available.

I assume that the two different kinds of perspectives reflect a real ambiguity in the meaning of *imagine*. On one reading, which I will call the objective interpretation, a person thinks about what a situation would look like from the outside. On the other reading, which I will call subjective, they think about what it would be like to be a particular individual in the situation. It's important here that the relevant difference is not between imagining having an experience as yourself and imagining that you're somebody else having the experience. If you imagine being a cat who is climbing up a tree, you are still taking an internal perspective. The relevant difference is between imagining experiencing a situation as an individual (yourself or someone else), and imagining a situation completely from the outside. I assume further that the difference between the subjective and objective interpretations of *imagine* has to do with the way they interact with the judge parameter: subjective *imagine* is essentially the version of *imagine* defined in Section 2, which crucially involves the judge; objective *imagine*, in contrast, crucially does *not* involve the judge. (This is very similar in spirit to Ninan, 2007.)

4.3. Formalization of Objective and Subjective *Imagine*

Let me start with objective *imagine*, which I have suggested crucially does not involve the judge parameter. To formalize this, I will start by defining an “objectivized” version of a proposition, “ p^{OBJ} ,” in (32).

(32) Objectivized Propositions:

For a proposition p ,

p^{OBJ} is defined iff $\forall w, t, j_1, j_2, p(w)(t)(j_1) = p(w)(t)(j_2)$

If defined, $p^{\text{OBJ}} = [\lambda w . [\lambda t . \text{for all individuals } j, p(w)(t)(j) = 1]]$

The objectivized version of a proposition p is only defined if p is non-judge-dependent; if defined, it is simply the corresponding function from worlds and times – that is, what the proposition would be on a standard view without the judge parameter. (In set terms, this is a set of world-time pairs rather than world-time-individual triples.)

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I propose that objective *imagine* crucially involves the objectivized version of its propositional argument. Since objectivized propositions are sets of world-time pairs, then, we need to define a new notion of objective imagination alternatives. This is given in (33). A lexical entry for objective *imagine* to go with this is given in (34).

(33) Objective imagination alternatives:

Imagine- $\text{OBJ}_{w,t,z} = \{ \langle w', t' \rangle : \text{it is compatible with the situation that } z \text{ is imagining in } w \text{ at } t \text{ that it takes place in } w' \text{ at } t' \}$

(34) $\llbracket \text{imagine}_{\text{OBJ}} \rrbracket^{w,t,j} = [\lambda p_{\langle s, \langle i, et \rangle \rangle} : p^{\text{OBJ}} \text{ is defined} . [\lambda z_e . \forall \langle w', t' \rangle \in \text{Imagine-}\text{OBJ}_{w,t,z} : p^{\text{OBJ}}(w')(t') = 1]]$

In (33), I use “situation” to mean a situation or event in an intuitive sense. This could perhaps be construed in Kratzer’s (1989) sense as parts of worlds (with temporal extensions), but I will not take a position on that. Taken together, what (33)–(34) say is that “z imagines that p,” on an objective interpretation, means that z is imagining a situation or event, and all the world-time pairs compatible with that situation or event are such that the objectivized version of p is true. It is a semantic presupposition of objective *imagine* that the propositional argument must be non-judge-dependent.

Now I will turn to subjective *imagine*. The notion of imagination alternatives to be used will be essentially the same as the one defined in (10) (Section 2), repeated in (35). I will call these subjective imagination alternatives.

(35) Subjective imagination alternatives:

Imagine- $\text{SUBJ}_{w,t,z} = \{ \langle w', t', x \rangle : \text{it is compatible with what } z \text{ is imagining in } w \text{ at } t \text{ that he/she/it is } x \text{ in } w' \text{ at } t' \}$

The lexical entry for subjective *imagine* is given in (36). This is essentially the same meaning from (11) in Section 2 except that it has a semantic presupposition that the propositional argument cannot be objectivized – i.e., that it is judge-dependent.

(36) $\llbracket \text{imagine}_{\text{SUBJ}} \rrbracket^{w,t,j} = [\lambda p_{\langle s, \langle i, et \rangle \rangle} : p^{\text{OBJ}} \text{ is NOT defined} . [\lambda z_e . \forall \langle w', t', x \rangle \in \text{Imagine-}\text{SUBJ}_{w,t,z} : p(w')(t')(x) = 1]]$

This says that “z imagines p” (on a subjective interpretation) means, roughly speaking, that z imagines being a person x in a situation where p is true as judged by x, with the extra requirement that it must potentially make a difference who the judge is.

I should mention that it may look like I have done the same work twice by defining two kinds of imagination alternatives and then giving two lexical entries for *imagine*, but this is only a matter of exposition. The definitions of imagination alternatives could be built right into the lexical entries instead. (Similarly, the notion of doxastic alternatives could be built into the meaning of *think*.) Of course, it is crucial that there are two different lexical entries.

My view of subjective *imagine* immediately makes one prediction that seems far too strong: it predicts that it is impossible to imagine any non-judge-dependent proposition subjectively, or “from the inside.” I propose, though, that non-judge-dependent propositions can be taken as an argument of subjective *imagine* if they are converted into judge-dependent propositions in a particular way. Specifically, I suggest that any typical, non-judge-dependent proposition p can be systematically shifted to a proposition that is true at a world-time-judge triple $\langle w, t, j \rangle$ iff j knows that p is true. For example, the proposition that it’s raining, which is true at $\langle w, t, j \rangle$ iff it’s raining in w at t, would be changed to a proposition that is true at $\langle w, t, j \rangle$ iff j knows that it’s raining in w at t. I will call the shifted version a “subjectivized” proposition, on analogy with the objectivized propositions discussed above. The notion of a subjectivized proposition is defined in (37); it involves epistemic alternatives, the definition of which is repeated in (38).

(37) Subjectivized Propositions:

For a proposition p,

$$p^{\text{SUBJ}} = [\lambda w . [\lambda t . [\lambda j . \forall \langle w', t', x \rangle \in \text{Epist}_{w, t, j}: p(w')(t')(x) = 1]]]$$

(38) Epistemic alternatives:

$$\text{Epist}_{w, t, z} = \{ \langle w', t', x \rangle : \text{it's compatible with what z knows in w at t that he/she/it is x in } w' \text{ at } t' \}$$

This means that it is possible to imagine subjectively that it’s raining. In this case, the argument of subjective *imagine* is not the regular proposition that it’s raining, but the

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subjectivized proposition that it's raining; thus to imagine subjectively (or from the inside) that it's raining is to imagine knowing that it's raining. Of course, it is also possible to imagine objectively that it's raining, which is to imagine a situation or event of rain. Note that on the formulation I have given, the notions of objectivized and subjectivized propositions are not quite used in a parallel way (although this could perhaps be changed). Objective *imagine* always takes a regular proposition (set of world-time-individual triples), which must be non-judge-dependent, and then says something about its objectivized version. On the other hand, subjective *imagine* can either take a regular proposition that is judge-dependent or a proposition that has already been subjectivized. In other words, on my view there needs to be something like an operator in the grammar that applies to sentences to give them subjectivized meanings, whereas an analogous operator for objectivized propositions is not needed.

4.4. Dream Pronouns and the Imagination-Self

I have just two more crucial assumptions to make, which have to do with the interpretation of pronouns in sentences like *Imagine that you don't know that p*. To motivate these assumptions, I need to start with a small digression on dream reports. Examples like (39) were discussed by Lakoff (1972), and more recently by Percus & Sauerland (2003b), Anand (2006), and others. (Lakoff's version involved Brigitte Bardot.)

(39) I dreamt that I was James Dean and I kissed me.

Let's suppose that (39) is spoken by Sue. Then what it means is that Sue had a dream where James Dean kissed Sue, but where the dream was from the perspective of James Dean. In this kind of example, James Dean (the one doing the kissing) is sometimes referred to as Sue's "dream self" and Sue (the one being kissed) as her "bodily counterpart." Pronouns referring to the dream self can be called "dream pronouns." For my purposes, the crucial observation about such examples is simply that in the clause *I*

kissed me, first-person pronouns are used to refer both to the dream self (James Dean) and to the bodily counterpart (Sue).⁸

Notice that similar examples can also be constructed with *imagine*. For example, (40) can have an interpretation roughly equivalent to (41).⁹

(40) Imagine that you're James Dean and you're kissing you.

(41) Imagine being James Dean and kissing you.

In this case, we can say that the “imagination self” is again James Dean, and the bodily counterpart of the imaginer is the addressee (“you”). Again, the crucial point for my purposes is that *you* is used to refer to both the imagination self and the bodily counterpart of the imaginer. I will call pronouns that refer to the imagination self “imagination pronouns.”

Now let's look again at an example of what I called Type III, from (26), repeated in (42).

(42) # Imagine that the cake tastes good but it doesn't taste good to you.

The sentence becomes much more coherent in a context where the imagination self is not the same as the bodily counterpart of the imaginer. For example, consider (43).

(43) Imagine that you're James Dean, and the cake tastes good but it doesn't taste good to you.

(43) is acceptable provided that the underlined pronoun refers to the bodily counterpart of the imaginer rather than the imagination self. For example, if (43) were addressed to Sue, it would instruct her to conjure up a situation where the cake tastes good to James Dean but doesn't taste good to Sue, and to imagine this from the perspective of James Dean.

⁸ I will not be able to do justice here to the full range of phenomena and restrictions related to dream pronouns. I refer the reader to Percus & Sauerland (2003a, 2003b) and Anand (2006, 2007), and leave it to future work to see how their observations could be captured in a system like mine, and to what extent their approaches to dream reports could be carried over to it.

⁹ Anand (2006) also suggests that *imagine* and *dream* may have similar behavior, though he focuses on the case of *dream*, as much of the literature seems to do.

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The correct generalization about Type III sentences, then, is that they remain unacceptable under *imagine* when they involve an imagination pronoun.

I will not give a formal account of imagination pronouns here, or dream pronouns for that matter, and leave that to future work. All I will do here is make the following two assumptions, with the hope that the foregoing discussion lends them some plausibility. First, I assume that imagination pronouns only occur with subjective *imagine*. Second, I assume that imagination pronouns satisfy the semantic principle in (44), where *pro_{imag-self}* stands for an imagination pronoun (one that refers to the imagination self). As before, I am putting aside details of the interpretation of pronouns, and in particular I'm putting aside how imagination pronouns come to refer to the imagination self.

(44) Imagination Self Principle:

For any world w' time t' , and index k , $\exists x: \langle w', t', x \rangle \in \text{Imagine-SUBJ}_k \leftrightarrow \langle w', t', [\text{pro}_{\text{imag-self}}]^k \rangle \in \text{Imagine-SUBJ}_k$.¹⁰

This says that if it is compatible with what z is (subjectively) imagining in w at t that they are in world w' at time t' (i.e., that they are some individual x in w' at t') then the triple consisting of the world w' , the time t' , and the individual referred to by an imagination pronoun must also be among their (subjective) imagination alternatives. (The converse follows trivially, since the imagination self is an individual.) This is just another way of saying that the imagination self is the individual that the imaginer is imagining themselves to be. Again, I will not attempt to derive (44) from other principles, but simply take it as a basic assumption.

One might think that I could achieve the same effect more straightforwardly by simply assuming that imagination pronouns are morphological variants of PRO_j , that is, that pronouns such as *I*, *you*, *he*, *she*, etc. are ambiguous between a regular version and one that refers to the judge. The reason I have not suggested this is because imagination pronouns do not have the same behavior as PRO_j and other judge-dependent items. In particular, although they are obligatorily *de se* in an obvious sense, they are not subject to the immediateness requirement that I discussed in Chapter 4. Recall, for example, that in

¹⁰ As in Chapter 3, Section 4, I use k as a variable for a world-time-individual triple.

(45), the implicit subject of the lowest VP (*to go to the party*) is not only obligatorily *de se*, but also must refer to Bill, not Sue. In other words, the subject of the lowest clause (which I proposed is PRO_j), must be interpreted *de se* with respect to the most immediate attitude holder.

(45) Sue wants Bill to want ___ to go to the party.

Imagination pronouns do not have this property. Consider (46), for example.

(46) I imagined that I was George Lakoff and that I dreamt that I was Brigitte Bardot and I kissed me.

Suppose that (46) is uttered by Sue. Then it can mean that Sue imagined a situation s_1 , in which George Lakoff dreamt about a situation s_2 , in which what happened was that Brigitte Bardot kissed George Lakoff, where Sue was imagining s_1 from the perspective of George Lakoff and George Lakoff was dreaming about s_2 from the perspective of Brigitte Bardot. (This is admittedly confusing, but presumably we have to do something like this in order to interpret a sentence like *I imagined that I was Brigitte Bardot and I kissed me*.)

Now, on this interpretation of (46), the two underlined pronouns (*I* and *me*) are both imagination pronouns; they refer to the person who the speaker is imagining themselves to be, that is, George Lakoff. First look at the first one, *I* (in *I dreamt that...*). This pronoun actually is in a position that is consistent with the immediateness requirement: the most immediate attitude holder is the speaker, but the speaker is imagining themselves to be George Lakoff, and so *I* refers *de se* to the most immediate attitude holder. However, now consider the second underlined pronoun, *me* (in *I kissed me*). The most immediate attitude holder is George Lakoff, but George Lakoff is dreaming from the perspective of Brigitte Bardot, and thus *me* does not refer *de se* to the most immediate attitude holder. Rather, it refers *de se* to the attitude holder one step higher – that is, the speaker, imagining themselves to be George Lakoff.

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4.5. Explaining the Pattern

Given the analysis and assumptions from Sections 4.3–4.4 above, we can begin to make sense of the contrast between Type I (Moore-paradoxical) cases on the one hand and Type II (Yalcin’s examples) and Type III cases on the other. (I won’t call my explanation a real solution because it has one significant problem related to compositionality, as I will explain below.)

My basic claim is this: all three types of examples we have been discussing that sound contradictory as assertions (including Moore-paradoxical sentences, Yalcin’s cases, and the rest) also create contradictions when imagined subjectively, i.e., when embedded under subjective *imagine*. When imagined objectively, they do not necessarily create contradictions; however, in all but the Moore-paradoxical cases, it is not possible to use objective *imagine* in the first place because the embedded propositions are judge-dependent. I will show this one case at a time.

Recall that Type III sentences are only contradictory under *imagine* if any relevant pronouns are interpreted as imagination pronouns. Therefore, whenever I discuss subjective *imagine*, I will assume that any such pronouns are imagination pronouns.

First consider a Moore-paradoxical case (Type I) such as (47).

(47) **[Type I]**

Imagine that it’s raining but you don’t know that it’s raining.

(47) expresses a non-judge-dependent proposition, so in order for it to be embedded under subjective *imagine*, it must be subjectivized. For this case, it won’t matter whether each conjunct is subjectivized separately or if the entire sentence is subjectivized as a single unit, but in later cases it will be crucial that subjectivization always happen at the lowest level. (This is where the compositionality problem will come in.) Thus I will do the two conjuncts separately. Assuming *you* is an imagination pronoun, then according to the definition from (37) above (Section 4.3), the subjectivized version of the two conjuncts are the propositions given in (48). I use $\llbracket \phi \rrbracket_c^{\text{SUBJ}}$ to stand for the subjectivized version of the proposition expressed by sentence ϕ , and $\text{Self}_{\text{Imagine}}$ to stand for the imagination self. As a reminder that *you* is to be interpreted as an imagination pronoun, I

will again subscript it with “imag-self.” Note also that I will be leaving out irrelevant details of the internal composition of clauses.

- (48) (a) $\llbracket \text{it's raining} \rrbracket_{\epsilon}^{\text{SUBJ}} = [\lambda w . [\lambda t . [\lambda j . \forall \langle w', t', x \rangle \in \text{Epist}_{w,t,j} : \text{it's raining in } w' \text{ at } t']]]$
- (b) $\llbracket \text{you don't know that it's raining} \rrbracket_{\epsilon}^{\text{SUBJ}} = [\lambda w . [\lambda t . [\lambda j . \forall \langle w', t', x \rangle \in \text{Epist}_{w,t,j} : \text{Self}_{\text{imagine}} \text{ doesn't know (in } w' \text{ at } t') \text{ that it's raining in } w' \text{ at } t']]]$

When the conjunction of these is taken as the argument of subjective *imagine*, the predicted meaning is given in (49).

- (49) $\llbracket (47) \rrbracket^{w^*, t^*, j}$ [when addressed to H and interpreted subjectively] =
 [H is to make it so that]
 $\forall \langle w', t', x \rangle \in \text{Imagine-SUBJ}_{w^*, t^*, H} :$
 $\forall \langle w'', t'', y \rangle \in \text{Epist}_{w', t', x} : \text{it's raining in } w'' \text{ at } t'' \text{ and}$
 $\text{Self}_{\text{imagine}} \text{ doesn't know (in } w' \text{ at } t') \text{ that it's raining}$

What this says is that (47) (on a subjective interpretation) instructs the hearer to make it so that in all of their imagination alternatives $\langle w', t', x \rangle$, x knows in w' at t' that it's raining but the imagination self doesn't know in w' at t' that it's raining. But if $\langle w', t', x \rangle$ is among the hearer's imagination alternatives, then $\langle w', t', \text{Self}_{\text{imagine}} \rangle$ is also among them, and so the imagination self must also know in w' at t' that it's raining. This contradicts the requirement of the second conjunct, and so the sentence yields a contradiction.

However, (47) can also be interpreted with objective *imagine*, since the embedded proposition is non-judge-dependent. In this case it will not create a contradiction. The objectivized version of the embedded proposition is given in (50), using the definition from (32) (Section 4.3). I use $\llbracket \phi \rrbracket_{\epsilon}^{\text{OBJ}}$ to stand for the objectivized version of the proposition expressed by sentence ϕ .

- (50) $\llbracket \text{It's raining but you don't know that it's raining} \rrbracket_{\epsilon}^{\text{OBJ}} = [\lambda w . [\lambda t . \text{it's raining in } w \text{ at } t \text{ but you don't know that it's raining in } w \text{ at } t]]$

When this is taken as the argument of objective *imagine*, the resulting meaning is (51).

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- (51) $\llbracket(47)\rrbracket^{w^*,t^*,j}$ [when addressed to H and interpreted objectively] =
 [H is to make it so that]
 $\forall \langle w',t' \rangle \in \text{Imagine-Obj}_{w^*,t^*,H}$: it's raining in w' at t' but H doesn't know
 (in w' at t') that it's raining

On the objective interpretation, (47) instructs the hearer to make it so that in all of their objective imagination alternatives $\langle w',t' \rangle$, it's raining in w' at t' but they don't know that it's raining. In other words, the hearer is to conjure up a situation or event where it's raining but their bodily counterpart doesn't know this. Such a situation is perfectly imaginable, and so this is not a contradiction and the sentence is acceptable.

Now let's turn to Type II cases (Yalcin's examples). Consider the sentence in (52).

- (52) **[Type II]**
 # Imagine that it isn't raining but it might be raining.

First, note that the embedded proposition is judge-dependent (since the second conjunct is), and thus (52) cannot be embedded under objective *imagine*. That means that *imagine* must be interpreted subjectively. Note that the first conjunct of the embedded sentence is non-judge-dependent. I will assume that this means that this conjunct must be subjectivized before it is conjoined with the second conjunct. This gives the proposition in (53).

- (53) $\llbracket \text{it isn't raining} \rrbracket_{\epsilon}^{\text{SUBJ}} = [\lambda w . [\lambda t . [\lambda j . \forall \langle w',t',x \rangle \in \text{Epist}_{w,t,j}$: it isn't raining in w' at t']]]

Recall that the proposition expressed by *it might be raining* is that in (54). (I will use a $\llbracket \phi \rrbracket_{\epsilon}$ to indicate the proposition expressed by the sentence ϕ .)

- (54) $\llbracket \text{it might be raining} \rrbracket_{\epsilon} = [\lambda w . [\lambda t . [\lambda j . \exists \langle w',t',x \rangle \in \text{Epist}_{w,t,j}$: it's raining in w' at t']]]

When the propositions in (53) and (54) are conjoined and embedded under subjective *imagine*, the resulting meaning is given in (55).

- (55) $\llbracket(52)\rrbracket^{w^*,t^*,j}$ [when addressed to H and interpreted subjectively] =
 [H is to make it so that]
 $\forall \langle w',t',x \rangle \in \text{Imagine-SUBJ}_{w^*,t^*,H}$:

$$\forall \langle w'', t'', y \rangle \in \text{Epist}_{w', t', x}: \text{it isn't raining in } w'' \text{ at } t'' \text{ and}$$

$$\exists \langle w'', t'', y \rangle \in \text{Epist}_{w', t', x}: \text{it's raining in } w'' \text{ at } t''$$

This says that (52) instructs the hearer to make it the case that in all of their imagination alternatives $\langle w', t', x \rangle$, x knows that it isn't raining and at the same time it's compatible with x 's knowledge that it's raining. This is a straightforward contradiction, and so this interpretation is not possible. Since it is not possible in this case to use objective *imagine* instead, the sentence is simply deviant.

My assumption that the first conjunct, *it isn't raining*, is subjectivized separately before being conjoined with the second conjunct is crucial, and rather troubling. The assumption is crucial because the entire conjunction expresses a judge-dependent proposition, and so (without the additional assumption) it ought to be possible to embed it, as is, under subjective *imagine*. If this happened, then the requirement of knowing that it isn't raining would not be introduced, and the sentence would not be contradictory. The assumption is troubling because it seems to require that *imagine* "know" what kind of proposition is denoted by each conjunct, rather than by its sentential argument as a whole. This is a blatantly non-compositional requirement, equivalent to the generalization in (56).

(56) Local Subjectivization Requirement: If z imagines subjectively that $p \ \& \ q$, then z must imagine subjectively that p and imagine subjectively that q .

I certainly hope that we can explain these phenomena related to Moorean paradoxes without resorting to a non-compositional principle of this kind, but I leave it to future work to see if it is possible to derive the generalization (56) from principles or assumptions of a more compositional nature.

Finally, consider the Type III case in (57).

(57) **[Type III]**

Imagine that the cake tastes good but it doesn't taste good to you.

As with the Type I case, I assume that *you* is an imagination pronoun. I also assume that the argument of *tastes good* in the first conjunct is PRO_J. (If either of these did not hold,

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then the sentence would actually be acceptable, as discussed in Sections 3.3 and 4.4, and thus would not pose a puzzle in the first place.) Now, note that, as with Type II cases, the embedded proposition is judge-dependent, in this case because of the first conjunct.

Therefore the only possible interpretation of (57) is one using subjective *imagine*. As with the Type II cases, I assume that the non-judge-dependent conjunct must be subjectivized. The subjectivized version of this proposition is given in (58).

$$(58) \quad \begin{aligned} & \llbracket \text{the cake doesn't taste good to you} \rrbracket_{\mathcal{C}}^{\text{SUBJ}} \\ & = [\lambda w . [\lambda t . [\lambda j . \forall \langle w', t', x \rangle \in \text{Epist}_{w, t, j}: \text{the cake doesn't taste good to} \\ & \quad \text{Self}_{\text{Imagine}} \text{ in } w' \text{ at } t']]] \end{aligned}$$

When this is conjoined with the first conjunct and embedded under subjective *imagine*, the resulting meaning is in (59).

$$(59) \quad \begin{aligned} & \llbracket (57) \rrbracket^{w^*, t^*, j} \text{ [when addressed to H and interpreted subjectively] =} \\ & \text{[H is to make it so that]} \\ & \forall \langle w', t', x \rangle \in \text{Imagine-SUBJ}_{w^*, t^*, H}: \text{the cake tastes good to } x \text{ in } w' \text{ at } t' \text{ and} \\ & \forall \langle w'', t'', y \rangle \in \text{Epist}_{w', t', x}: \text{the cake doesn't taste good to } \text{Self}_{\text{Imagine}} \text{ in } w'' \text{ at } t'' \end{aligned}$$

This means that (57) instructs the hearer to make it so that all of their imagination alternatives $\langle w', t', x \rangle$ are such that the cake tastes good to x in w' at t' but at the same time x knows (in w' at t') that the cake doesn't taste good to the imagination self. By the Imagination Self Principle (44), this means that all of their imagination alternatives $\langle w', t', x \rangle$ must be such that the cake tastes good to x but x knows that the cake doesn't taste good to x , which is a contradiction.¹¹

In summary, then, all three types of sentences lead to contradictions when embedded under subjective *imagine*. Type II and III examples are judge-dependent, and thus are

¹¹ A difficulty arises with sentences like (i), which contains two epistemic modals, one of which is embedded in an attitude report.

(i) # Imagine that it might be raining but you think it must not be raining.

This seems to behave like a Type III example, which is expected given that it contains one judge-dependent conjunct and one non-judge-dependent conjunct. However, my proposal would predict that on a subjective interpretation, (i) instructs the hearer to conjure up a situation where it is compatible with their knowledge that it's raining but where they (know that) they believe that this is not compatible with their knowledge. This is not actually a contradiction; rather, it should simply be asking the hearer to imagine being wrong about their own knowledge, which is a perfectly coherent thing to imagine. Thus I do not have an explanation for the behavior of (i), and leave it as an open puzzle.

impossible with objective *imagine* as well. Type I examples, on the other hand, are non-judge-dependent, and so they are possible with objective *imagine*, and in fact they do not lead to contradictions when embedded under objective *imagine*.

4.6. *Imagine with Non-Finite Complements*

I will close with a prediction that my proposal makes when combined with the judge-dependent view of control from Chapter 4. Consider example (60), alongside the regular Moore-paradoxical case in (61).

(60) Imagine being surrounded by rain but not knowing that it's raining.
(Irene Heim, p.c.)

(61) Imagine that it's raining but you don't know that it's raining.

Note that (60) closely resembles (61): in both cases, the first conjunct of the embedded sentence says something about the fact that it's raining, and the second conjunct says that the imaginer doesn't know this fact. Note also that (60) is perfectly acceptable. What it seems to do is ask the addressee to imagine being a person *x* such that *x* is surrounded by rain and *x* doesn't know it.

Recall from Section 4.5 that (61) created a contradiction if *imagine* was interpreted subjectively, but could be rescued by interpreting *imagine* objectively instead. It's possible to use objective *imagine* in this case because the embedded proposition is non-judge-dependent. Now, on my view from Chapter 4, the clauses *being surrounded by rain* and *not knowing that it's raining* have PRO_J as their subject; thus the propositions expressed by the two conjuncts are those in (62).

- (62) (a) $\llbracket \text{PRO}_J \text{ being surrounded by rain} \rrbracket_\epsilon = [\lambda w . [\lambda t . [\lambda j . j \text{ is surrounded by rain in } w \text{ at } t]]]$
- (b) $\llbracket \text{PRO}_J \text{ not knowing that it's raining} \rrbracket_\epsilon = [\lambda w . [\lambda t . [\lambda j . j \text{ does not know (in } w \text{ at } t) \text{ that it's raining}]]]$

These are judge-dependent propositions, and so of course the conjunction is as well. This means that in (60), unlike (61), *imagine* can only be interpreted subjectively. At first glance this seems to pose a problem: since Moore-paradoxical sentences create

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contradictions under subjective *imagine*, we might expect (60) to create a contradiction as well, contrary to fact. (This would also follow the generalization in Section 4.1.)

However, there is an important difference between the embedded clauses in (60) and (61). In (61), the two conjuncts in the embedded clause expressed non-judge-dependent propositions, and so they had to be subjectivized before they could be embedded under subjective *imagine*. This added a layer of knowledge to the propositions, so that *it's raining* became something like “you know that it's raining,” which is what led to the contradiction. In (60), in contrast, the two conjuncts express judge-dependent propositions on their own, and thus do not need to be subjectivized. The proposition taken as the argument of subjective *imagine*, then, is just the simple conjunction of (62a–b), which is shown in (63).

$$(63) \quad \begin{aligned} & \llbracket \text{PRO}_j \text{ being surrounded by rain and } \text{PRO}_j \text{ not knowing that it's raining} \rrbracket_{\epsilon} \\ & = [\lambda w . [\lambda t . [\lambda j . j \text{ is surrounded by rain in } w \text{ at } t \text{ and } j \text{ does not know (in } \\ & \quad w \text{ at } t) \text{ that it's raining}]]] \end{aligned}$$

When this is taken as the argument of subjective *imagine*, the resulting meaning is given in (64).

$$(64) \quad \begin{aligned} & \llbracket (60) \rrbracket^{w^*, t^*, j} [\text{when addressed to } H \text{ and interpreted subjectively}] = \\ & \quad [H \text{ is to make it so that} \\ & \quad \forall \langle w', t', x \rangle \in \text{Imagine-SUBJ}_{w^*, t^*, H}: x \text{ is surrounded by rain in } w' \text{ at } t' \text{ and } x \\ & \quad \text{does not know (in } w' \text{ at } t') \text{ that it's raining} \end{aligned}$$

This says that (60) instructs the addressee to make it so that, roughly speaking, all of their imagination alternatives are surrounded by rain but don't know that it's raining, which is not a contradiction.

Chapter 6

Conclusions

1. Recap

In this dissertation I have developed a semantic and pragmatic theory based on the premise that propositions are sets of world-time-individual triples, in contrast to standard views that take them to be sets of worlds or world-time pairs. Building on ideas of Lasersohn (2005, 2006), I motivated this view in Chapter 2 with a puzzle that has been observed separately for two classes of expressions: predicates of personal taste (Lasersohn, 2005; also to some extent Mitchell, 1986) and epistemic modals (DeRose, 1991; Egan, Hawthorne & Weatherson, 2005; MacFarlane, 2006; Egan, 2007). I then extended the approach to indicative conditionals in Chapter 3 and *de se* control constructions in Chapter 4. I also discussed how the judge-dependent system could be used to help solve puzzles related to Moore's paradox in Chapter 5.

There are two essential parts to my proposal, which are both introduced in Chapter 2. The first part is semantic: a sentence is evaluated for truth or falsity not just at a world and time but at a world, time, and individual, meaning that certain propositions are subjective in a way that is reflected in the formal semantics. (This individual parameter is mnemonically called the "judge," following Lasersohn's terminology.) For example, the sentence *the cake is tasty* (on one possible reading) is true at a world-time-individual triple $\langle w, t, j \rangle$ iff the cake tastes good to j in w at t . Informally, we can say that the cake is

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tasty iff it tastes good to “the judge.” This much comes from Lasersohn (though I make a few modifications to his view). As part of Chapter 2 I extend this approach to epistemic modals; for example, I propose that the sentence *it might be raining* is true at a world-time-individual triple $\langle w, t, j \rangle$ iff it is compatible with j 's knowledge in w at t that it's raining. If we take the view that indicative conditionals involve covert epistemic modals, this gives a natural way to extend the view to conditionals as well, as I do in Chapter 3. This turns out to provide solutions to a number of longstanding puzzles about conditionals, in particular involving the purported inference from “not ϕ or ψ ” to “if ϕ then ψ ” (which I claim is an illusion caused by the way epistemic modals interact with predicates of belief).

The second part of the proposal is pragmatic, and this part is essential for most of the explanatory force of the proposal. I propose a theory of conversation (adapted from Stalnaker, 1978, 2002) where the context set is a set of world-time-individual triples. The pragmatic proposal has two crucial pieces. First, in every world-time-individual triple $\langle w, t, x \rangle$ that is a member of the context set of a conversation, x is the plurality of the group of participants in the conversation. This means that we can talk about a “judge of the conversation,” which is always the entire group of conversational participants. The second crucial piece is the norm of assertion: in essence, a speaker is allowed to assert a proposition provided that it is true at the triple $\langle \text{world of utterance, time of utterance, speaker} \rangle$ – in other words, if the sentence is true as judged by the speaker themselves. (This follows in a straightforward way from the interaction of the semantics of belief with the view of propositions as sets of world-time-individual triples.) However, because the context set consists of triples whose individual parameter is the plurality of the group of conversational participants, if the speaker's assertion is accepted by their interlocutors, what becomes common ground, roughly speaking, is that the proposition is true as judged by the whole group. Therefore a hearer will only be willing to accept an assertion if the proposition asserted is true as judged by them.

This pragmatic view accounts for conversational stand-offs of the kind that occur in (1)–(2).

- (1) Sam: This cake is tasty.
Sue: No it isn't, it tastes terrible!
- (2) Sam: If the butler isn't the murderer, the cook is.
Sue: (No! / Nuh-uh!) If the butler isn't the murderer, the maid is.

In each case, both Sam and Sue are justified in making their assertions (since each assertion is true as judged by the speaker), but their interlocutor is not willing to accept their assertion, and so neither one can be added to the common ground. Since both are allowed to make their assertions anyway, the argument could continue in the same vein until the participants see its futility.

An additional theme that runs through this work has to do with the semantics of attitude predicates. I pay special attention to *think* in Chapters 2 and 3; *find* and *believe* (to a lesser extent) in Chapter 2; *want* in Chapter 4; *persuade*, *convince*, and *tell* (to a lesser extent) also in Chapter 4; and *imagine* in Chapter 5. I put a particular emphasis on accounting for the way attitude predicates interact with the expressions I look at such as epistemic modals and predicates of personal taste. I assume (following Lewis, 1979; Chierchia, 1989, and others) that the meaning of *think* or *believe*, for example, involves the notion of doxastic alternatives. An individual *z*'s doxastic alternatives in world *w* at time *t* are the set of triples $\langle w', t', y \rangle$ such that it's compatible with what *z* believes in *w* at *t* that *z* (him-/herself) is *y* in *w'* at *t'*. I also suggest analogous notions for other attitude predicates such as *want* and *imagine*.

Doxastic alternatives and analogous notions are independently needed to capture *de se* attitudes, which are attitudes that crucially involve the attitude holder's "self." For example, in (3) (based on an example by Chierchia, 1989), the desire expressed is not simply a desire for Pavarotti to be a genius, but a desire of Pavarotti to himself be a genius. In other words, for all the triples $\langle w, t, x \rangle$ such that it's compatible with what Pavarotti wants for him to be *x* in *w* at *t*, *x* is a genius.

- (3) Pavarotti wants to be a genius.

On my semantic view, sets of doxastic alternatives (and related notions) are the same kind of formal object as propositions, which allows them to dovetail naturally. In Chapter

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4, I observe that this correctly predicts a *de se* property of embedded epistemic modals, and show that another class of *de se* constructions including (3) can be straightforwardly captured in the same way. In particular, I propose that in (3), for example, the infinitive complement (*PRO*) *to be a genius* has a meaning that crucially depends on the individual “judge” parameter: that is, (*PRO*) *to be a genius* is true at a world-time-individual triple $\langle w, t, j \rangle$ iff j is a genius in w at t .

This means, then, that in certain cases, the implicit item that has traditionally been called PRO can be reclassified as an item that simply refers to the judge. I call this item PRO_J , and argue for it on independent grounds in Chapter 2 (to serve as an implicit argument of predicates of personal taste). At the end of Chapter 4, I discuss some of the implications of this approach for a traditional view of control.

In Chapter 5, I use the interaction of attitude predicates with the judge parameter to develop a particular way of looking at the distinction between imagining something “from the inside” and “from the outside.” I discuss ways that this can help to solve some puzzling facts that are broadly related to Moore’s paradox.

In extending the reach of judge dependency to epistemic modals, conditionals, and subjects of nonfinite clauses, my proposal goes well beyond any intuitive notion of a “judge.” While predicates of personal taste such as *tasty* and *fun* might seem intuitively to involve the judgment of an individual, it’s not at all obvious that this is true for these other expressions. They do all have another property in common, though: in every construction I have discussed that crucially involves the judge parameter, the judge always represents the locus of an internal mental or psychological state that is important for the interpretation of the construction in some way. Notice that I say every *construction*, not every *expression*. For example, in the *de se* control constructions discussed in Chapter 4, the judge-dependent lexical item involved is PRO_J , which simply refers to the judge and does not by itself have anything to do with mental or psychological states. Even the entire embedded infinitive clause need not say anything about a mental or psychological state. However, the kinds of expressions that take these infinitival sentences as arguments and operate on them in a way that crucially

manipulates the judge parameter – i.e., control verbs – always involve mental or psychological states held by the judge. My claim, then, is that in any place where the judge parameter is crucial for interpretation at the level of an entire utterance, the judge must represent the individual or group that has a particular mental or psychological state. However, this is not a requirement of a local or compositional kind, but something like a constraint that the grammatical system as a whole must conspire to satisfy. I leave it to future work to investigate whether this characterization of the judge parameter is the right one, and, if so, how to properly formulate this requirement.

2. Issues for Further Study

There are a number of questions and open problems which ought to be investigated in future research, so I will introduce a few of them.

2.1. Broadening the Domain

I have extended the reach of Lasersohn's judge parameter beyond predicates of personal taste like *fun* and *tasty* to epistemic modals, indicative conditionals, and certain infinitive complements, but there are a number of other types of expressions that might be fruitfully analyzed in similar terms. One example is vague scalar predicates; it seems plausible that the location of the cutoff point for a term like *red* is somehow linked to the judge. We would need to look at exactly how the cutoff point relates to the judge, and whether to treat these items as inherently judge dependent (like epistemic modals) or optionally so (as with predicates of personal taste, which are two-place predicates with the option of taking PRO_J). Also, since predicates of personal taste such as *fun* and *tasty* are probably also vague and scalar, in addition to being judge-dependent, we would need to see how the judge dependency of the cutoff point interacts with the basic judge dependency of the predicate.

Another example is raising predicates such as *seem*, *appear*, *sound*, and *look*. I suspect that these are exactly parallel to predicates of personal taste: they take an argument which can be made explicit (as in *seem to x*) or left implicit, and can either be referential or be filled by PRO_J. However, I leave it to future research to see if this makes

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all the right predictions, and to see what other implications this might have either for raising constructions or for the semantics of perception.

To give just one more example, I also think it's possible that other kinds of modality besides epistemic modality also have a component of judge dependency, particularly those that involve internal psychological states. This does not include purely deontic modals such as *can* and *may* (on their meanings denoting permission), *be allowed to*, and related expressions such as *allowed*, *permissible*, etc. These are generally understood with respect to a salient set of rules, and it is likely that the particular set of rules involved is determined purely according to context, as originally proposed by Kratzer (1977, 1981, 1991a). However, such items as *should* and *ought to* may involve reference to the value system or priorities of the judge. This judge-dependent component could potentially either take the place of or come in addition to a component of meaning giving it less than universal strength (as proposed, e.g., by von Stechow & Iatridou, 2006).

One class of expressions that I suspect are *not* amenable to an analysis using the judge parameter includes items with a spatial or temporal orientation such as *in front of*, *behind*, *local*, *prior*, and so on. These include many of the “perspectival” expressions discussed by Mitchell (1986) (though he places predicates of personal taste in the same class). This is consistent with my claim that crucial uses of the judge parameter always involve internal mental or psychological states. The empirical reason behind my suspicion, though, is that it is particularly difficult to imagine a coherent dialogue along the lines of (4).

(4) [Context: Sam and Sue are standing on opposite sides of a room facing each other. There is a table between them in the middle of the room, and a lamp on the side of the table closer to Sue.]

Sam: The lamp is behind the table.
Sue: # No, it isn't, it's in front of the table!

Sue's response seems odd in this context, unless perhaps she is deliberately misunderstanding Sam to make a joke. This contrasts with similar dialogues using predicates of personal taste such as (1), but it would be worth investigating to what extent the two classes are sharply distinct and to what extent this is a matter of degree.

2.2. Compositional Matters

I have assumed, for example, that *taste good* means the same thing as *tasty*, but have not said anything about how appropriate meanings for *taste* and *good* would combine compositionally to derive this meaning (and similarly for *taste great*, *taste terrible*, *smell good*, and so on). This is not trivial, since things can be said to taste good, sound good, smell good, etc. and also to *be* good. *Good* is a highly vague expression (in the everyday sense of “vague”) and also highly context-dependent, but its meaning seems to become much more specific when combined with something like *taste* or *smell*. It is not clear to start with, then, whether *taste* should take *good* as an argument (so that “good” is a way of tasting) or if *good* should take *taste* as an argument (so that tasting good is a way of being good). In addition, since most predicates of personal taste are scalar, a fuller view of their semantics should be put together with an appropriate semantics of degree-denoting expressions.

2.3. Factivity and Double-Access Sentences

Lasersohn (2006) observes that when a predicate of personal taste is embedded under a factive verb such as *recognize*, as in (5), the factive presupposition comes out as a requirement on the taste of the speaker. (This is so even though the assertion involves the taste of the subject.)

(5) Sam recognizes that licorice is tasty.

(Lasersohn, 2006)

For (5) to be true and felicitous, licorice must taste good both to Sam and to the speaker, and Sam must be aware that it tastes good to him. According to Lasersohn, this is predicted by his system. It is also predicted by my pragmatic view under obvious assumptions. Assuming that “x recognizes that p” presupposes that p, and that presupposing p involves treating it as already being in the common ground, then a speaker who utters (5) must agree that licorice is tasty. In fact, my view predicts that the speaker must be assuming that the other participants in the conversation also think that licorice is tasty, which seems to be correct.

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On the other hand, there are similar cases involving attitude predicates commonly thought to be factive where there is no such requirement on the speaker. One example is (6), which uses *discover*.

(6) Last summer Sam discovered that rollerblading was fun.

It seems to me (and other English speakers I have consulted) that (6) does not commit the speaker to thinking that rollerblading is fun (or even that it used to be fun last summer). Here we can only infer that rollerblading was fun for Sam – that is, for (6) to be true and felicitous, it only needs to be the case that (last summer, at least) rollerblading was fun for Sam, and Sam discovered this. For the moment, I will refer to the kind of factivity that applies to (5) as “full factivity” and the kind that applies to (6) as “partial factivity.” (This does not necessarily have any connection to notions of “strong” and “weak” factivity that have sometimes been proposed, which is why I have avoided using these terms.)

I should note that the “partial” factivity that shows up in (6) does not itself pose a problem for my view, in fact quite the contrary. We could simply analyze *discover* in terms of epistemic alternatives, so that “x discovers p” is true iff p is true at all of x’s epistemic alternatives (as a result, perhaps, of some kind of event of observation). Epistemic alternatives have a built-in notion of factivity that is only partial in the sense above: the epistemic alternatives of an individual z in world w at time t must always include the triple $\langle w, t, z \rangle$ itself (I referred to this as the “factivity principle” in Chapter 3), but they need not include any other triples of the form $\langle w, t, y \rangle$ for any y not identical to z. In other words, we could treat the full factivity of *recognize* in (5) as a true pragmatic presupposition, which treats the content of the complement clause as already being in the common ground; and at the same time we could treat the partial factivity of *discover* in (6) as arising purely from the lexical semantics of the predicate. (This should probably not be conflated with notions of “pragmatic presupposition” and “semantic presupposition” that are sometimes used.) In fact, then, my view predicts that we should find these two different types of factivity.

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However, there is a twist. Consider what happens if the embedded past tense in (6) is changed to present tense, as in (7), making a so-called “double-access” construction (see Abusch, 1988, 1991; Ogihara, 1995).

(7) Last summer Sam discovered that rollerblading is fun.

To assert (7), the speaker must again share the opinion that rollerblading is fun. Compare this to a run-of-the-mill double-access sentence such as (8a). (I am using an example with a factive predicate to make things simpler.)

(8) (a) Sam found out that Mary is pregnant. (Ogihara, 1995, no. 27)

(b) Sam found out that Mary was pregnant. (Ogihara, 1995, no. 28)

The sentence in (8a) carries the additional requirement that Mary’s pregnancy be ongoing at the time of utterance; this requirement does not hold for (8b).

It seems intuitively plausible that the extra level of factivity that arises in (7) is somehow related to the extra temporal requirement that arises in (8a), but it is not immediately obvious how to make the connection formally. It would be interesting to investigate further exactly what the relationship is between judge dependency, factivity, and the temporal and aspectual properties of embedded clauses in attitude reports.

2.4. Final Remarks

I will close by drawing attention to what I see as the two crucial ways that my proposal alters basic standard assumptions about the semantics and pragmatics of natural language. First, sentences no longer have truth conditions as normally construed: knowing what a sentence means is not just a matter of knowing what the world has to be like for it to be true, but may also require knowing what one’s own internal mental or psychological state must be like. Similarly a group of people engaging in a conversation of the typical, information-exchanging sort can no longer be seen as simply narrowing down what world they’re in and what time it is; they must also, in a sense, be narrowing down who they are, as a group, and what sorts of internal mental or psychological states they have in

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common. On one way of thinking, these changes constitute a trivial formal extension of existing systems; on another way of thinking, they represent a fundamentally different way of looking at meaning and conversation. My thoughts are still mixed about which way to look at it.

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