

In J. Gajewski, V. Hacquard, B. Nickel, and S. Yalcin (eds.), *New Work on Modality*. MIT Working Papers in Linguistics, v. 51.

Assessor Sensitivity: Epistemic Modals and Predicates of Personal Taste *

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There are a number of parallels between predicates of personal taste (e.g., *taste good, be fun*) and epistemic modals. In particular, the difficulty in determining whose knowledge or beliefs are expressed by an epistemic modal mirrors the difficulty in determining whose opinion is expressed by a predicate of personal taste. To account for some of the puzzles with predicates of personal taste, Lasersohn (2004) invokes limited double context dependency. I show that a similar analysis can account for several similar puzzles with epistemic modals.

1. Parallels between Epistemic Modals and Predicates of Personal Taste

1.1 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's 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 et al. (2004) give counterexamples to this constraint. The main thing that seems to be generally agreed on is that it's not obvious how to figure out who the relevant "knowers" will be for any particular example.

I'd like to begin, however, by looking at a certain class of examples where it's actually strikingly clear who the relevant "knowers" are. Specifically, I will look at cases where an epistemic modal such as *must* or *might* is embedded under a propositional attitude predicate such as *think*, as in (1)-(2).

- (1) John thinks it might be raining.
- (2) John thinks it must be raining.

In (1)-(2), it's intuitively John's mental state that is being reported, not only by *thinks* but also by the embedded modal *might* or *must*. At least as a first pass, (1) is true iff John's beliefs do not exclude the possibility that it's raining, and (2) is true iff John's beliefs exclude the possibility that it's not raining. More generally, in these kind of examples, the subject of the attitude verb is always understood as the person whose mental state is being reported by the embedded modal. This extends to cases where the grammatical subject of *think* is a quanti-

* I'd like to thank Pranav Anand, Ezra Keshet, John MacFarlane, Robert Stalnaker, and the editors and reviewers of this volume for useful discussion and comments. All errors are my own.

fier, as in (3). (Indices are used just as a shorthand to indicate the intended reading and are not meant to have theoretical status.)

- (3) a. [Every boy]_i thinks he_i must be stupid.
- b. [Every contestant]_i thinks they_i might be the winner.¹

The sentences in (3) have a “bound” reading where the “knowers” range along with the subject. That is, on the relevant reading, (3.a) says that for each boy, his own beliefs entail that he himself is stupid, and (3.b) says that for each contestant, their own beliefs do not exclude the possibility that they themselves are the winner. Of course, the bound pronoun need not be the subject of the embedded clause, as illustrated in (4). (Underlining indicates the “knower” for a particular modal.)

- (4) 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.

When 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 (5)-(6).

- (5) a. Mary thinks that John thinks it might be raining.
- b. Mary thinks that John thinks it must be raining.
- (6) a. Mary thinks that John might think it’s raining.
- b. Mary thinks that John must think it’s raining.

In (5.a), for example, the content of Mary’s belief is that John’s beliefs don’t exclude the possibility that it’s raining. On the other hand, (6.a) says that Mary’s beliefs don’t exclude the possibility that John thinks it’s raining.

The adverbial clause *as far as x knows* has the same effect as an attitude predicate, as illustrated in (7)-(8).

- (7) As far as John knows, it might be raining.
- (8) Mary thinks that as far as John knows, it might be raining.

Again, the modal in (7)-(8) is clearly reporting John’s beliefs, not the beliefs of the speaker or anyone else.

¹ These examples are from Speas (2004).

1.2 Predicates of personal taste in attitude reports

Lasersohn (2004) looks at a different kind of item that turns out to have remarkably parallel behavior, namely what he calls “predicates of personal taste.” The paradigm cases are predicates like *taste good* and *be fun*. It’s 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*.) I take the essential property of personal taste to be a lack of liability. That is, people face relatively few social consequences for finding something tasty that other people don’t, compared to, say, considering something moral that others consider immoral. To the extent that this is the case for a particular predicate, I’ll call it a predicate of personal taste.

Because predicates of personal taste like *taste good* and *be 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. However, as with epistemic modals, it becomes completely clear whose experience or state is being reported if these predicates are embedded under a verb like *think*. For example, in (9)-(10) it’s clearly John’s experience that is being reported.

- (9) John thinks the dip tastes good.
- (10) John thinks that the roller coaster is fun.

Similarly, when the subject of *think* is a quantifier that binds a pronoun in the embedded clause, the “experiencer” co-varies with it. This is illustrated in (11). (Underlining indicates the “judge” of a predicate.)

- (11) [Every boy]_i thinks his_i dinner tastes good.

Finally, as with epistemic modals, the “experiencer” always matches the subject of the *think*-clause that most immediately embeds it, as illustrated in (12).

- (12) a. Mary thinks that John thinks the dip tastes good.
b. Mary thinks that John thinks that the roller coaster is fun.

As with epistemic modals, the same effect is achieved with certain adverbial phrases, as Lasersohn points out. Some of these are illustrated in (13).

- (13) a. The roller coaster is fun for John.
b. As far as John is concerned, the roller coaster is no fun.
c. The cake tastes good to me.

Given this parallel between epistemic modals and predicates of personal taste, I suggest that we ought to see if we can shed light on both with the same kind of

analysis. Before I do this, I want to explore some more parallels in order to help motivate the particular analysis I will pursue.

1.3 Contradictions and Disagreements

In Section 1 I mentioned the problem of determining who the “knower” is in sentences with epistemic modals. Part of the puzzle comes from the fact that speakers can seemingly contradict each other and have disagreements about statements containing epistemic modals. For example, in the discourse in (14), Sue can use *nuh-uh* to signal that she’s disagreeing with John, just as she can in the similar discourse in (15) where John’s statement doesn’t contain an epistemic modal.

(14) Mary: Where’s Bill?
John: I’m not sure. He might be in his office.
Sue: Nuh-uh, he can’t be. He never works on Fridays.

(15) Mary: Where’s Bill?
John: He’s in his office.
Sue: Nuh-uh, he’s at home! He doesn’t work on Fridays.

The puzzling thing about discourses like (14) is this: if the *might* reflects John’s mental state, as it seems to do, then Sue’s response ought to be saying that John is wrong about his own mental state, and thus be odd. For example, in (16), where John’s statement explicitly refers to his knowledge, it seems odd for Sue to respond this way.

(16) Mary: Is Bill in his office?
John: I don’t know.
Sue: # Nuh-uh, he’s at home! He doesn’t work on Fridays.

The contrast between (14) and (16) is thus somewhat unexpected.

One might object that while a person can’t be wrong about their own beliefs, they can be wrong about their own *knowledge*, for example if they think they know something that is actually false (under the assumption that knowledge is factive). However, a person may have failed to exclude the possibility that *p* without having any false beliefs, but simply by having incomplete knowledge. For example, even if John were completely ignorant of Bill’s work schedule, Sue’s response in (14) would still be natural and her response in (16) would be odd.

Once again, the behavior of predicates of personal taste is very similar, as illustrated in (17)-(18).

(17) Mary: How’s the cake?
John: It tastes good.
Sue: Nuh-uh, it doesn’t taste good at all!
[OR] No it doesn’t, it tastes terrible!

- (18) Mary: How was the party?
 John: It was fun.
 Sue: Nuh-uh, it wasn't fun at all!
 [OR] No it wasn't, it was no fun at all!

Again, if John makes explicit that he is expressing his own judgment, Sue's responses then become odd, as illustrated in (19)-(20).

- (19) Mary: How's the cake?
 John: It tastes good to me.
 Sue: # Nuh-uh, it doesn't taste good at all!
 [OR] # No it doesn't, it tastes terrible!

- (20) Mary: How was the party?
 John: 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!

1.4 Vagueness vs. personal taste

Before we look at a particular analysis of predicates of personal taste, we should consider whether they should be given a special treatment at all. One important motivation for this comes from discourses like (17) and (18), where people seem to be having a disagreement even though there doesn't seem to be any fact of the matter. As a reviewer pointed out, a similar situation can arise with vague predicates, as in (21).

- (21) Mary: What color is George's jacket?
 John: It's red.
 Sue: Nuh-uh, it's not red, it's burgundy!
 [OR] No it isn't, it's burgundy!

Imagine that the color of George's jacket is intermediate between bright red and burgundy. In that case there's no obvious fact of the matter about whether the jacket is red or not, yet John and Sue appear to be disagreeing on just that. If this is no different from the situation in (17), where they disagree on whether the cake in question tastes good, then we ought to just treat the behavior of predicates of personal taste as run-of-the-mill vagueness. However, there are important ways that the situations differ, as I'll argue.

First, the predicate *red* is scalar. There may be more than one way in which we could manipulate the pigmentary properties of the jacket (e.g., either making it reflect less blue light or more red light), but if we picked one, we could set up a scale of redness, with clearly red things in one section of the scale and clearly non-red things in another, and the jacket would occupy some particular point in between. Now, if we gradually changed the color of the jacket towards the "clearly red" side, we would expect John to continue calling it red. Furthermore, we would expect Sue to eventually switch and agree that it's red. In other words, there's a clear sense in which Sue is being stricter than John in applying the predicate *red* in (21). This property of *red* can be captured by an

account of vagueness using supervaluation, for example: on some valuations, the jacket is classified as red, and on others it's classified as non-red, but any valuation that classifies the jacket as red will also classify something closer to the "clearly red" part of the scale as red.

With a predicate like *taste good* this is not the case. If John claims that a cake tastes good and Sue claims that it tastes terrible, we don't expect to be able to, say, keep making it sweeter until they both agree that it tastes good. It could be that Sue just doesn't like sweet things, and John loves sweet things, and so the more sugar we add, the more John will like it and the more Sue will hate it. (Of course, the same goes for any other property of cake flavor.) In other words, we can't set up a scale over which Sue is being stricter than John in applying the predicate *taste good*. This means that an account of vagueness developed especially to capture the properties of predicates like *red* is likely to be unilluminating when extended to predicates like *taste good* that lack these properties. Supervaluation, for example, will shed no light on a predicate like *taste good*, because we would have to admit as valuations the judgment of every potential taster. Since different individual's tastes don't necessarily bear any relation to each other, neither will the valuations, and we'll be back to the original puzzle about disagreements of the type in (17)-(18). Of course this doesn't mean that there couldn't be some other analysis of vagueness that did shed light on predicates like *taste good*, but it would be up to the proponent of the personal-taste-as-vagueness account to develop one.

On the other hand, predicates like *taste good* do share properties with another class of predicates – namely, two-place predicates. As observed in (13) above, the "experiencer" can be made explicit as in (22).

- (22) (a) The cake tastes good to John.
- (b) The cake tastes good to Sue.

(22.a) and (22.b) are more or less equivalent to (23.a) and (23.b), respectively.

- (23) (a) John likes the cake.
- (b) Sue likes the cake.

The difference between (23.a) and (23.b) is clearly not due to vagueness in the meaning of *like*, but rather to the fact that *like* is taking a different individual as its subject argument, who may or may not stand in the *like*-relation to the cake. A similar parallel could be drawn between *fun* and *enjoy*. If only as a methodological consideration, then, it makes sense to focus on the argument-like properties of the *to*-phrases in (22) rather than a dubious similarity to vagueness.

2. Lasersohn's Analysis of Predicates of Personal Taste

Faced with puzzles about epistemic modals, MacFarlane (2003) and Egan et al. (2004) propose a kind of double context sensitivity for determining the truth of utterances. They propose that the truth of an utterance depends not only on the

context of utterance (which gives the values for indexicals such as *I* and *now*) but also on a “context of assessment.”² Under this view, a particular utterance may be true as assessed in one context but false as assessed in another. When a speaker utters a statement that contains an assessment-sensitive item, they can be challenged and forced to withdraw the assertion if it’s found to be false even with respect to a different context of assessment.

What Lasersohn proposes for predicates of personal taste is essentially a version of this double context dependency, but one that’s more restricted in an interesting way. Specifically, the only thing that is, so to speak, allowed to vary between the context of utterance and the context of assessment is the judge, that is, a *single individual* whose judgment the truth value of the utterance depends on. Other elements of the context such as time and place remain the same in the context of assessment.

There are a few points that should be made clear before I go on. First, when I say the judge is a single individual I don’t mean that it can’t be a plural or group entity, just that a lexical item can’t depend on two independent judges. Second, judge-dependent items such as predicates of personal taste in a sense don’t just depend on the identity of the judge, but on the judge’s opinions at a given time (since opinions can change). The claim, however, is that the relevant opinions of the judge will always be those held at the evaluation time. In other words, the “time of assessment” doesn’t vary *independently*. Finally, it’s important to distinguish the context of assessment – a formal object used in the semantic theory – from the context (in a more general sense) in which somebody actually assesses the truth value of an utterance. Under Lasersohn’s view, what I’m calling the context of assessment is a rather hybrid object that includes the speaker, time, place and so on corresponding to the actual context of utterance, but a different judge individual, regardless of where, when, and even whether the judge actually assesses the truth of the sentence.³

2.1 The analysis

Now let me sketch Lasersohn’s analysis of predicates of personal taste. In Section 3 I’ll show how it can be naturally extended to cover epistemic modals. I’ll be recasting Lasersohn’s analysis in somewhat different terms than he presented it, but the main ideas are his. First, assume that the meaning of a sentence is a function from tuples $\langle w, t, i, u \rangle$ (“contexts”) to a truth value. In $\langle w, t, i, u \rangle$, “*w*” is the world of evaluation, “*t*” is the time of evaluation, “*i*” is a catch-all for the speaker, addressee, and any remaining aspects of a context of utterance that might be called part of the “index.” Finally, “*u*” is the judge of the context, an individual of type $\langle e \rangle$. I’ll use “*c*” as a variable for entire tuples of this form. The meaning of an expression α applied to context *c*, or as I will sometimes say, the extension of α with respect to *c*, will be written as $[[\alpha]]^c$. I will assume the two rules of semantic interpretation in (24):

² MacFarlane uses the term “context of assessment” and Egan et al. use the term “context of evaluation” for the same concept, as far as I can tell. I will adopt MacFarlane’s terminology and use “context of assessment” for this.

³ Under MacFarlane’s and Egan et al.’s accounts, it’s not necessary to make this distinction, and in fact MacFarlane (p.c.) rejects it.

(24) **Rules of semantic interpretation:**⁴

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

Intensional Functional Application (IFA): If α is a complex expression formed by combining two expressions β and γ , and $[\lambda c'$
 $\cdot \llbracket \gamma \rrbracket^c]$ is in the domain of $\llbracket \beta \rrbracket^c$, then $\llbracket \alpha \rrbracket^c = \llbracket \beta \rrbracket^c ([\lambda c' \cdot \llbracket \gamma \rrbracket^c])$

In lexical entries, I will follow the convention of leaving off contextual parameters which are not relevant for the interpretation of an expression. Thus if an expression α is purely extensional, I will write its lexical entry as $\llbracket \alpha \rrbracket$; if it depends on a world and time but not an index or a judge, I will write $\llbracket \alpha \rrbracket^{w,t}$, and if it just depends on the judge, I will write $\llbracket \alpha \rrbracket^i$. When some parameters are left off in this way, this is to be understood as saying that the meaning of the expression is a constant function with respect to those parameters.

Under these assumptions, the meanings of indexicals such as *I* and *you* depend on the relevant elements of the “index” as illustrated in (25).

- (25) $\llbracket I \rrbracket^i =$ the speaker of i
 $\llbracket you \rrbracket^i =$ the addressee of i

The meaning of a predicate such as *be a doctor* can be written as in (26).

- (26) $\llbracket \text{be-a-doctor} \rrbracket^{w,t} = [\lambda x \cdot x \text{ is a doctor in } w \text{ at } t]$

Notice that this predicate is only dependent on the world and time, not the index or the judge. That is, under the convention explained above, (26) is equivalent to (26').

- (26') $\llbracket \text{be-a-doctor} \rrbracket^{w,t,i,u} = [\lambda x \cdot x \text{ is a doctor in } w \text{ at } t]$

Now, the meaning of a predicate of personal taste such as *fun* or *taste good* is not only dependent on the world and time, but also on the judge. This can be captured by giving *fun* and *taste good* the following lexical entries:

- (27) $\llbracket \text{fun} \rrbracket^{w,t,u} = [\lambda x \cdot x \text{ is fun for } u \text{ in } w \text{ at } t]$
 $\llbracket \text{taste good} \rrbracket^{w,t,u} = [\lambda x \cdot x \text{ tastes good to } u \text{ in } w \text{ at } t]$

On the other hand, a modified predicate of personal taste such as *fun for John* is no longer dependent on the judge, since it makes the judge explicit. This means that *fun for John* should end up with the meaning in (28).

- (28) $\llbracket \text{fun for John} \rrbracket^{w,t} = [\lambda x \cdot x \text{ is fun for John in } w \text{ at } t]$

⁴ These rules are based on those in Heim & Kratzer (1998), except that I've made them more general in terms of assumptions about syntax and the organization of the grammar.

This can be achieved if *for* has the lexical meaning in (29).

$$(29) \quad \llbracket \text{for} \rrbracket^{w,t,i,u} = [\lambda y . [\lambda P_{\langle c,et \rangle} . P(w,t,i,y)]]$$

In other words, the *for* that appears in *fun for John* is an intensional operator, no different from other intensional operators such as tense or modals, except that it manipulates the judge parameter instead of the world or time parameter. This will presumably have to be a different *for* than the one that appears in *a present for John*, which would have a meaning along the lines of (30).

$$(30) \quad \llbracket \text{for}_2 \rrbracket^{w,t} = [\lambda y . [\lambda x . x \text{ is for } y \text{ in } w \text{ at } t]]$$

Similarly, the *to* that is used in *tastes good to John* should have the lexical entry in (31).

$$(31) \quad \llbracket \text{to} \rrbracket^{w,t,i,u} = [\lambda y . [\lambda P_{\langle c,et \rangle} . P(w,t,i,y)]]$$

Again, this will be different from the normal prepositional meaning of *to*. Of course, something more would also need to be said to account for the fact that we say *fun for John* and *tastes good to John* in English, and not **fun to John* or **tastes good for John*. However, these sorts of idiosyncrasies are not the topic of this paper, so I will leave them aside.

As observed above, propositional attitude verbs such as *think* have the same effect as *for*-clauses on the interpretation of sentences containing predicates of personal taste. However, since a verb like *think* clearly takes a sentence (or proposition) as its argument rather than just a predicate, its meaning has to be somewhat different. The idea is to give a sentence of the form *A thinks that B is fun* a meaning corresponding to (32).

$$(32) \quad \text{“A thinks that B is fun”} \approx \text{A thinks that B is fun for A}$$

(Under certain conditions, “A thinks that B is fun for A” will turn out to be equivalent to “B is fun for A,” but I’ll get to this in a moment.) We will get the kind of meaning in (32) if we give *think* the lexical meaning in (33):

$$(33) \quad \llbracket \text{think} \rrbracket^{w,t,i,u} = [\lambda p_{\langle c,t \rangle} . [\lambda x . \text{for all worlds } w' \text{ compatible with } x' \text{'s beliefs in } w \text{ at } t, p(w',t,i,x) = 1]]$$

The reason “A thinks that B is fun for A” is equivalent to “B is fun for A” is because, as Lasersohn points out, people operate from a position of “epistemic privilege” when they judge the truth value of a sentence such as “B is fun” with respect to themselves. That is, if someone believes that something is fun for them, then it is, and vice versa. Lasersohn formalizes this principle a bit more, but I think the intuitive characterization suffices for present purposes. For concreteness, the observation is summarized in (34).

$$(34) \quad \textbf{Epistemic privilege with predicates of personal taste}$$

If ϕ is *fun*, *taste good*, etc. [a predicate of personal taste],
then for any x , $\llbracket \phi \rrbracket^{w,t,i,u}(x) = \llbracket \text{think} \rrbracket^{w,t,i,u}(u) ([\lambda c . \llbracket \phi \rrbracket^c(x)])$

There are cases where epistemic privilege breaks down. For example, one could imagine a person who was so absent-minded that (35) could be used truly about them.

- (35) She thinks sea urchin tastes good to her, but whenever she eats it, she realizes that she can't stand the stuff.⁵

It's possible for someone to forget what their own internal states have been, and so to be mistaken about whether something has a judge-dependent property with themselves as judge. In such cases, "A thinks that B is fun" will no longer be equivalent to "B is fun for A." Note, though, that "A thinks that B is fun" is still always equivalent to "A thinks that B is fun for A," which is a crucial point of this analysis. Nothing in the analysis relies crucially on epistemic privilege except in contexts where it clearly holds.

2.2 Agreement and disagreement

One more assumption is needed to account for the puzzles about disagreement discussed in Section 1.3. Lasersohn's view of this is that people tend to assess sentences with themselves as judge, and therefore they can disagree on the truth of a sentence containing a predicate of personal taste solely on the basis of their differing judgments. I would like to express this idea slightly differently, and say instead that two speakers agree about the truth of an utterance just in case they both think it's true or they both think it's false, where *think* is the same judge-dependent item defined in (33). This principle is formalized in (36).

- (36) **Principle of agreement and disagreement**
- a. Two people A and B **agree** about sentence S in context **c**
 iff $\llbracket A \text{ thinks } S \rrbracket^c = \llbracket B \text{ thinks } S \rrbracket^c$
 i.e., iff $\llbracket \text{think} \rrbracket^c (A) (\llbracket \lambda c' . \llbracket S \rrbracket^c \rrbracket) = \llbracket \text{think} \rrbracket^c (B) (\llbracket \lambda c' . \llbracket S \rrbracket^c \rrbracket)$
 - b. Two individuals A and B **disagree** about sentence S in context **c**
 iff $\llbracket A \text{ thinks } S \rrbracket^c \neq \llbracket B \text{ thinks } S \rrbracket^c$
 i.e., iff $\llbracket \text{think} \rrbracket^c (A) (\llbracket \lambda c' . \llbracket S \rrbracket^c \rrbracket) \neq \llbracket \text{think} \rrbracket^c (B) (\llbracket \lambda c' . \llbracket S \rrbracket^c \rrbracket)$

I think it's certainly intuitively reasonable to say that agreements and disagreements about the truth of an utterance have to do with whether different people believe the content of the sentence, so the trick here is just in making *think* a judge-dependent item in the first place.

The formulation in (36) carries over straightforwardly to agreements and disagreements about the truth of sentences that don't contain predicates of personal taste. In such cases, S will not depend on the judge argument, so of course it won't matter that *think* is intensional with respect to the judge. Thus whether two people agree or disagree about the truth of S will depend only on the factual content of their beliefs. Of course there is an important difference between two people disagreeing about a judge-dependent sentence and disagreeing about a non-judge-dependent sentence: in the former case, no amount of new

⁵ This example is due to Robert Stalnaker (p.c.).

knowledge about the world can resolve the disagreement, since it's not based on facts, whereas in the latter case it's possible in principle to resolve the disagreement by finding out enough new facts about the world. Put another way, when people disagree about sentences that are not judge-dependent, it must be the case that one of them is right and the other is wrong (putting aside cases of vagueness), whereas this is not the case with a judge-dependent sentence. But my claim (and I think Lasersohn's as well) is that the essential nature of disagreement is the same either way.

We should still ask why disagreement can be characterized this way. That is, I've only claimed that certain linguistic behavior, such as the use of *nuh-uh* or constructions like *no it isn't* with their accompanying intonation, is licensed just in case the conditions in (36.b) hold. But why would just these conditions be the ones where we feel like there is intuitively a disagreement? I'd like to answer this in terms of the purpose of conversation. I take the view that at least one purpose of conversation is to establish and update a common ground (see, for example, Stalnaker 2002). Furthermore, I assume that the common ground has an associated judge, an abstract entity representing the shared judgments of the conversational participants. Let's call this judge the "common judge." In effect, then, the common ground can have opinions and judgments the same way a person can. Thus in establishing a common ground, I suggest, people are essentially setting up the mental state of an imaginary individual.

Now, in the course of conversation, speakers negotiate what will go into the common ground. This can include simple facts like the fact that Joe is in Boston. Some simple facts may relate to the judgments of individuals, for example the fact that marshmallows taste good to Sue. Since there is also a common judge, by assumption, the common ground can also include the fact that marshmallows taste good to the common judge – but since the common judge is the judge specially associated with the common ground, this amounts to putting into the common ground the "fact" that marshmallows taste good, period.

A disagreement, in my sense, thus occurs when there is a conflict about whether to put something into the common ground. This can happen either because two participants have different beliefs about factual matters or because they have different judgments on matters of taste. In either case conversational participants are taken to share the mental state represented by the common ground, and so they want to establish a common ground that's compatible with their own mental states. For example, if the common ground includes the fact that Joe is in Boston, all the participants in the conversation are taken to believe that Joe is in Boston; if the common ground includes the fact that marshmallows taste good (to the common judge), then all the participants in the conversation are taken to believe that marshmallows taste good (to them). So if some participant, let's call her Sue, doesn't think that Joe is in Boston, she will resist allowing "Joe is in Boston" into the common ground, and similarly if marshmallows don't taste good to Sue, she will resist letting "marshmallows taste good" into the common ground. The fact that it's actually verifiable whether or not Joe is in Boston, but not (arguably) whether marshmallows taste good, has nothing to do with it.

2.3 Predictions

Equipped with the lexical entries, rules, and principles given in this section, we can now see how Lasersohn's type of analysis can account for various phenomena involving predicates of personal taste. First of all, let's see how two people can disagree about the truth of the sentence *the cake tastes good* uttered in a certain context. Take the relevant part of dialogue (17), slightly modified and repeated in (37).

- (37) John: The cake tastes good.
 Sue: No, the cake doesn't taste good.

Intuitively, it seems that Sue is disagreeing with John in this dialogue. That is in fact what the principle in (36) predicts, as I'll show. Suppose John's utterance was made in context $c^* = \langle w^*, t^*, i^*, u \rangle$ (where u is any arbitrary judge). Then we can check whether John and Sue disagree in the sense of (36) by checking if $\llbracket \text{John thinks the cake tastes good} \rrbracket^{c^*}$ has the same truth value as $\llbracket \text{Sue thinks the cake tastes good} \rrbracket^{c^*}$. Assuming that both of them speak sincerely (i.e., they believe what they say), it will turn out that these have different truth values, as shown in (38). Assume that $\llbracket \text{the cake} \rrbracket = k$.

- (38) a. $\llbracket \text{think} \rrbracket^{c^*} (\llbracket \lambda c' . \llbracket \text{the cake tastes good} \rrbracket^{c'} \rrbracket)$ (John)
 = $[\lambda p_{\langle c, t \rangle} . [\lambda x . \text{for all worlds } w' \text{ compatible with } x \text{'s beliefs in } w^* \text{ at } t^*, p(w', t^*, i^*, x) = 1]] (\lambda c' . \llbracket \text{the cake tastes good} \rrbracket^{c'})$ (John)
 = 1 iff for all worlds w' compatible with John's beliefs in w^* at t^* , $\llbracket \text{the cake tastes good} \rrbracket^{w', t^*, i^*, \text{John}} = 1$
 = 1 iff for all worlds w' compatible with John's beliefs in w^* at t^* , $\llbracket \text{taste good} \rrbracket^{w', t^*, i^*, \text{John}} (\llbracket \text{the cake} \rrbracket^{w', t^*, i^*, \text{John}}) = 1$
 = 1 iff for all worlds w' compatible with John's beliefs in w^* at t^* , $[\lambda x . x \text{ tastes good to John in } w' \text{ at } t^*] (k) = 1$
 = 1 iff for all worlds w' compatible with John's beliefs in w^* at t^* , k tastes good to John in w' at t^*
 = 1 [by (34), assuming that John is speaking sincerely]
- b. $\llbracket \text{think} \rrbracket^{c^*} (\llbracket \lambda c' . \llbracket \text{the cake tastes good} \rrbracket^{c'} \rrbracket)$ (Sue)
 = 1 iff for all worlds w' compatible with Sue's beliefs in w^* at t^* , $\llbracket \text{taste good} \rrbracket^{w', t^*, i^*, \text{Sue}} (\llbracket \text{the cake} \rrbracket^{w', t^*, i^*, \text{Sue}}) = 1$
 = 1 iff for all worlds w' compatible with Sue's beliefs in w^* at t^* , k tastes good to Sue in w' at t^*
 = 0 [by (34), assuming that Sue is speaking sincerely]

On the other hand, recall the oddness of the dialogue in (19). The relevant parts are repeated in (39).

- (39) John: The cake tastes good to me.
 Sue: # No, it doesn't taste good.

This time, John and Sue's utterances do not represent a disagreement about the truth of the sentence uttered by John, *the cake tastes good to me*. This is shown

in (40). Note that the denotation of *me* in this context is John, since he's the speaker. (This comes from the index parameter i^* .)

- (40) a. $\llbracket \text{think} \rrbracket^{c^*} (\llbracket \lambda c' . \llbracket \text{the cake tastes good to me} \rrbracket^{c'} \rrbracket) (\text{John})$
 $= [\lambda p_{\langle c, t \rangle} . [\lambda x . \text{for all worlds } w' \text{ compatible with } x \text{'s beliefs in } w^* \text{ at } t^*, p(w', t^*, i^*, x) = 1]] (\text{John})$
 $(\lambda c' . \llbracket \text{the cake tastes good to me} \rrbracket^{c'})$
 $= 1 \text{ iff for all worlds } w' \text{ compatible with John's beliefs in } w^* \text{ at } t^*,$
 $\llbracket \text{the cake tastes good to me} \rrbracket^{w', t^*, i^*, \text{John}} = 1$
 $= 1 \text{ iff for all worlds } w' \text{ compatible with John's beliefs in } w^* \text{ at } t^*,$
 $\llbracket \text{to} \rrbracket^{w', t^*, i^*, \text{John}} (\llbracket \text{me} \rrbracket^{w', t^*, i^*, \text{John}}) (\lambda c' . \llbracket \text{taste good} \rrbracket^{c'})$
 $(\llbracket \text{the cake} \rrbracket^{w', t^*, i^*, \text{John}}) = 1$

[Note that $\llbracket \text{me} \rrbracket^{i^*} = \text{John}$]

- $= 1 \text{ iff for all worlds } w' \text{ compatible with John's beliefs in } w^* \text{ at } t^*,$
 $[\lambda y . [\lambda P_{\langle c, et \rangle} . P(w', t^*, i^*, y)]] (\text{John}) (\lambda c' . \llbracket \text{taste good} \rrbracket^{c'})$
 $(\llbracket \text{the cake} \rrbracket^{w', t^*, i^*, \text{John}}) = 1$
 $= 1 \text{ iff for all worlds } w' \text{ compatible with John's beliefs in } w^* \text{ at } t^*,$
 $\llbracket \text{taste good} \rrbracket^{w', t^*, i^*, \text{John}} (k) = 1$
 $= 1 \text{ iff for all worlds } w' \text{ compatible with John's beliefs in } w^* \text{ at } t^*,$
 $k \text{ tastes good to John in } w' \text{ at } t^*$
 $= 1 \text{ [by (34), assuming John is speaking sincerely]}$

- b. $\llbracket \text{think} \rrbracket^{c^*} (\llbracket \lambda c' . \llbracket \text{the cake tastes good to me} \rrbracket^{c'} \rrbracket) (\text{Sue})$
 $= 1 \text{ iff for all worlds } w' \text{ compatible with Sue's beliefs in } w^* \text{ at } t^*,$
 $\llbracket \text{the cake tastes good to me} \rrbracket^{w', t^*, i^*, \text{Sue}} = 1$
 $= 1 \text{ iff for all worlds } w' \text{ compatible with Sue's beliefs in } w^* \text{ at } t^*,$
 $\llbracket \text{to} \rrbracket^{w', t^*, i^*, \text{Sue}} (\llbracket \text{me} \rrbracket^{w', t^*, i^*, \text{Sue}}) (\llbracket \lambda c' . \llbracket \text{taste good} \rrbracket^{c'} \rrbracket)$
 $(\llbracket \text{the cake} \rrbracket^{w', t^*, i^*, \text{Sue}}) = 1$

[Note that $\llbracket \text{me} \rrbracket^{i^*} = \text{John}$]

- $= 1 \text{ iff for all worlds } w' \text{ compatible with Sue's beliefs in } w^* \text{ at } t^*,$
 $[\lambda y . [\lambda P_{\langle c, et \rangle} . P(w', t^*, i^*, y)]] (\text{John})$
 $(\llbracket \lambda c' . \llbracket \text{taste good} \rrbracket^{c'} \rrbracket) (k) = 1$
 $= 1 \text{ iff for all worlds } w' \text{ compatible with Sue's beliefs in } w^* \text{ at } t^*,$
 $\llbracket \text{taste good} \rrbracket^{w', t^*, i^*, \text{John}} (k) = 1$
 $= 1 \text{ iff for all worlds } w' \text{ compatible with Sue's beliefs in } w^* \text{ at } t^*,$
 $k \text{ tastes good to John in } w' \text{ at } t^*$

In order for Sue to disagree with John in the sense of (36), she would have to not believe that the cake tastes good *to John*, but that's not what she's saying in (39). There she's presenting herself as believing that the cake doesn't taste good *to her*. Of course, if Sue did express the belief that the cake doesn't taste good to John, this would count as a disagreement, but the only way this could happen would be if Sue thought that John was speaking insincerely, or if this were a case when epistemic privilege had broken down. This accounts for the fact that Sue's response in (39) sounds odd.

For parallel reasons, two speakers will not normally be able to disagree about a sentence that has a predicate of personal taste under a verb like *think*. Note that this doesn't mean that a speaker will never be able to respond in a way that sounds like they're disagreeing.

- (41) John: I think the cake tastes good.
 Sue: Nuh-uh, it doesn't taste good at all!

Here Sue is disagreeing not with John's statement *I think the cake tastes good*, but rather with the content of his belief, *the cake tastes good*. In this case, John is explicitly saying that he thinks the cake tastes good, and Sue is presenting herself as thinking that it tastes bad, so they're still disagreeing in the sense of (36), but only about the sentence *the cake tastes good*, not about the sentence that John actually uttered. In terms of the common ground, we can say that an utterance of the form *I think that p* does two things. First, it acts as a proposal to add the proposition that the speaker thinks that *p* to the common ground. Second, since it's generally understood that speakers want to add their relevant beliefs to the common ground, it also serves as a proposal to add the proposition that *p* to the common ground. In (41), Sue doesn't object to the first proposal, but does object to the second.⁶ Note that this is only the case when the speaker is reporting their own beliefs. If the speaker is reporting someone else's beliefs, then there's no general assumption that they want to add that other person's beliefs to the common ground, so it becomes odd to disagree with the content of the belief. This is illustrated in (42).

- (42) John: Mary thinks the cake tastes good.
 Sue: # Nuh-uh, it doesn't taste good at all!

In this case, John's statement doesn't serve as a proposal to add the proposition that the cake tastes good to the common ground, so Sue can't object to such a proposal. Of course, she could object to adding the proposition that Mary thinks the cake tastes good to the common ground, but then she would have to give a response like that in (43).

- (43) John: Mary thinks the cake tastes good.
 Sue: Nuh-uh, she doesn't think it tastes good at all!

A question remains here: it's not obvious at first glance why a statement of the form *I think that p*, as in (41), can serve as a proposal to add *p* to the common ground, whereas one of the form *p to me*, as in (39), cannot.⁷ My analysis does distinguish between *think* and *to me* in that *think* actually takes a (possibly judge-dependent) proposition as an argument, whereas *to me* takes a judge-dependent predicate and yields a derived, non-judge-dependent predicate, before a proposition is ever formed. It's not surprising under this view that that a statement of the form *I think that p* can make *p* "available" in the discourse in a way

⁶ Thanks to a MITWPL reviewer for discussion of this point.

⁷ A MITWPL reviewer pointed this out.

that *p to me* cannot. On the other hand, this is a bit of a technicality, so I'll leave the question open.

3. Extending the Analysis to Epistemic Modals

I suggest that we can use Lasersohn's apparatus developed for predicates of personal taste to account for epistemic modals. Specifically, I propose that epistemic modals like *might* and *must* are dependent on the judge parameter for their interpretation, and that the judge is always the "knower." That is, the lexical entries for epistemic *might* and *must* are as shown in (44).

$$(44) \quad \llbracket \text{might} \rrbracket^{w,t,i,u} = [\lambda p_{\langle c,t \rangle} . \text{there is some world } w' \text{ compatible with } u\text{'s knowledge in } w \text{ at } t \text{ such that } p(w',t,i,u) = 1]$$

$$\llbracket \text{must} \rrbracket^{w,t,i,u} = [\lambda p_{\langle c,t \rangle} . \text{every world } w' \text{ compatible with } u\text{'s knowledge in } w \text{ at } t \text{ is such that } p(w',t,i,u) = 1]$$

Note that, as modals, these are intensional with respect to the world parameter. For now I'm simplifying the modal semantics to include just a modal base but no ordering source. (See Kratzer 1977, 1981, 1991 for justification of the doubly-modalized analysis.) Let's also assume that *it's raining* is a single lexical item with the entry in (45).

$$(45) \quad \llbracket \text{it's raining} \rrbracket^{w,t} = 1 \text{ iff it's raining in } w \text{ at } t$$

Given the lexical entries in (44) together with the lexical entry given for *think* in Section 2, we can account for the different behavior of *might* and *must* depending on whether they're in the matrix clause or embedded under a propositional attitude verb. Specifically, a sentence like *it might be raining* is dependent on the judge parameter, as shown in (46). On the other hand, a sentence like *John thinks that it might be raining* is not, as shown in (47).

$$(46) \quad \llbracket \text{it might be raining} \rrbracket^{w,t,i,u} = \llbracket \text{might} \rrbracket^{w,t,i,u} ([\lambda c . \llbracket \text{it's raining} \rrbracket^c])$$

$$= [\lambda p_{\langle c,t \rangle} . \text{there is some world } w' \text{ compatible with } u\text{'s knowledge in } w \text{ at } t \text{ such that } p(w',t,i,u) = 1]$$

$$([\lambda c . \llbracket \text{it's raining} \rrbracket^c])$$

$$= 1 \text{ iff there is some world } w' \text{ compatible with } u\text{'s knowledge in } w \text{ at } t \text{ such that } \llbracket \text{it's raining} \rrbracket^{w',t,i,u} = 1]$$

$$= 1 \text{ iff there is some world } w' \text{ compatible with } \mathbf{u's knowledge} \text{ in } w \text{ at } t \text{ such that it's raining in } w' \text{ at } t.$$

$$(47) \quad \llbracket \text{John thinks it might be raining} \rrbracket^{w,t,i,u}$$

$$= \llbracket \text{think} \rrbracket^{w,t,i,u} ([\lambda c . \llbracket \text{it might be raining} \rrbracket^c]) (\llbracket \text{John} \rrbracket^{w,t,i,u})$$

$$= 1 \text{ iff for all worlds } w' \text{ compatible with John's beliefs in } w \text{ at } t,$$

$$\llbracket \text{it might be raining} \rrbracket^{w',t,i,John} = 1$$

$$= 1 \text{ iff for all worlds } w' \text{ compatible with John's beliefs in } w \text{ at } t,$$

$$\llbracket \text{might} \rrbracket^{w',t,i,John} ([\lambda c . \llbracket \text{it's raining} \rrbracket^c]) = 1$$

- = 1 iff for all worlds w' compatible with John's beliefs in w at t , there is some world w'' compatible with John's knowledge in w' at t such that $\llbracket \text{it's raining} \rrbracket^{w'',t,i,\text{John}} = 1$
- = 1 iff for all worlds w' compatible with **John's beliefs** in w at t , there is some world w'' compatible with **John's knowledge** in w' at t such that it's raining in w'' at t .

Thus speakers can disagree about a matrix sentence with an epistemic modal simply by having different factual beliefs, just as they could disagree about a matrix sentence with a predicate of personal taste just by having different taste. However, they can only disagree about a statement with an epistemic modal embedded under *think* if at least one of them is mistaken about the subject's beliefs.

Recall that the “knower” for *might* can also be made explicit by adding something like *as far as John knows*. Since trying to derive this kind of phrase compositionally would take me too far afield (and since it's probably some sort of constructional idiom anyway), I will assume the ad hoc lexical entry in (48), where the first argument is somehow inserted in the position of the blank space.

$$(48) \quad \llbracket \text{as far as } _ \text{ knows} \rrbracket^{w,t,i,u} = [\lambda x . [\lambda p_{\langle c,t \rangle} . p(w,t,i,x)]]$$

For example, the meaning of sentence (49.a) is computed in (49.b).

- (49) a. As far as John knows, it might be raining.
- b. $\llbracket \text{As far as John knows, it might be raining} \rrbracket^{w,t,i,u}$
 $= [\lambda x . [\lambda p_{\langle c,t \rangle} . p(w,t,i,x)]] (\llbracket \text{John} \rrbracket^{w,t,i,u})$
 $([\lambda c . \llbracket \text{it might be raining} \rrbracket^c])$
 $= \llbracket \text{it might be raining} \rrbracket^{w,t,i,\text{John}}$
 $= \llbracket \text{might} \rrbracket^{w,t,i,\text{John}} ([\lambda c . \llbracket \text{it's raining} \rrbracket^c])$
 $= 1$ iff there is some world w' compatible with John's knowledge in w at t such that $\llbracket \text{it's raining} \rrbracket^{w',t,i,\text{John}} = 1$
 $= 1$ iff there is some world w' compatible with John's knowledge in w at t such that it's raining in w at t .

Again, more would have to be said to account for the form and distribution of the various modifying phrases that can make the judge explicit for epistemic modals and predicates of personal taste. For example, *as far as x knows* seems to work much better with *might* than with *must*. Though ultimately important and possibly interesting, these fine details are outside the scope of this paper.

4. Predictions of the Analysis

The analysis of epistemic modals that I've presented here is actually fairly similar to the analyses proposed by MacFarlane (2003) and Egan et al. (2004). The difference is not in quality but in degree: in their analyses, the truth of an utterance is dependent on essentially two complete contexts, whereas in the analysis here, the only such double context dependency is in the single judge parameter. However, even this seemingly small difference makes nontrivial predictions that

can be tested. In this section, I will explore a few of these predictions and argue that they are favorable towards the kind of analysis I'm proposing.

There are two different kinds of predictions to consider. On the one hand, the analyses make specific predictions about the behavior of epistemic modals. On the other hand, they make general predictions about what kinds of context-dependent and doubly context-dependent expressions can occur in natural languages. I will look at these two kinds of predictions separately.

4.1 Predictions about epistemic modals

In Section 3 I showed how two speakers can disagree about a statement like *it might be raining* simply because their factual beliefs differ. However, as we can see from examples in MacFarlane (2003), when someone disagrees with a statement containing an epistemic modal, they sometimes go so far as to say that the person who uttered it was *wrong*. Similarly, faced with a disagreement, the person who uttered the original epistemic statement will sometimes do the same thing and say that they were wrong. Examples of these two situations are given in (50) and (51).

- (50) [Jane, a stranger, is hiding in the bushes.]
Sally: Joe might be in Chicago.
George: Oh, really? I didn't know that.
Jane (*sotto voce*): **Sally is wrong.** I saw Joe just a few minutes ago. (MacFarlane 2003, Dialogue 3)⁸

- (51) Sally: Joe might be in Chicago.
George: He can't be in Chicago. I saw him in the hall five minutes ago.
Sally: Oh, then I guess **I was wrong.** (MacFarlane 2003, Dialogue 1)

This is different from what happens with predicates of personal taste. Consider, again, a dialogue in which speakers have a disagreement involving a predicate of personal taste.

- (52) Mary: How's the cake?
John: It tastes good.
Sue: # You're wrong! It doesn't taste good at all!

- (53) Mary: How's the cake?
John: It tastes good.
Sue: No it doesn't, it tastes terrible!
John: # Oh, then I guess I was wrong.

Only a real curmudgeon would respond as Sue does in (52), and only someone who was pathologically meek would respond to Sue's challenge in (53) the way

⁸ *Boston* is changed to *Chicago* in MacFarlane's examples since I'm writing in Boston. Emphasis is added.

John does. The fact is, when we disagree about the extension of predicates of personal taste, we may call each other crazy, or weird, or unsophisticated, or snobby, but we don't call each other *wrong*. When we disagree about epistemic modals, however, we apparently do. So what's the difference?

First of all, it's important to distinguish the case of *might* from the case of *must*. It's unsurprising that people can be called wrong if they utter a sentence of the form "must p" and it turns out that p is false. In that case, they presented themselves as knowing that p, when they can't know that p if p is false (assuming that knowledge is factive). Of course, it's also possible for a *must*-statement to be false even when the embedded proposition happens to be true – that is, a person can be right for the wrong reason. But once again this entails claiming to know something that is actually false – not p itself in this case, but something that p would follow from.

In both of the cases just discussed, the *must*-statement is actually objectively false, and so the speaker made a false assertion. However, that doesn't necessarily mean that this is the reason they are "wrong." It could just as well be because by making this assertion they exposed the fact that they have a false belief, and that the false belief is what makes them "wrong." Notice that when people make their beliefs explicit, others can still say "you're wrong" if their beliefs are wrong. Consider (54), for example.

- (54) John: I think the moon has an atmosphere.
 Sue: You're wrong! It doesn't have an atmosphere.

Sue is not saying that John's assertion is false – she could know John very well and be familiar with his strange but perfectly sincere beliefs. Rather she is saying that the content of his belief about the moon is wrong. This is essentially what I claim is happening in the examples with *might*-statements. Look again at dialogue (51), repeated here in (55).

- (55) Sally: Joe might be in Chicago.
 George: He can't be in Chicago. I saw him in the hall five minutes ago.
 Sally: Oh, then I guess **I was wrong**.

How can Sally be wrong if she is simply unable to eliminate from her knowledge set those worlds where Joe is in Chicago? We don't normally say that we're wrong about things that we're simply ignorant about. To answer this question, it's necessary to bring in an extra complication in the semantics of modals that up to now I've been glossing over. Kratzer (1981, 1991) argues that in addition to a set of accessible worlds, or modal base, a modalized sentence also makes use of an ordering source – that is, a set of propositions (which may or may not be consistent) that creates a partial ordering among worlds in the modal base with respect to various properties. Thus (under certain simplifying assumptions that Kratzer herself does not make) we can not only talk about accessible worlds but about "best" accessible worlds. Ordering sources are needed to account for various phenomena such as deontic modals that depend on an inconsistent set of rules, as well as gradable possibility (as seen in expressions like *somewhat likely*, *very likely*, *more likely than*). In the case of an epistemic mod-

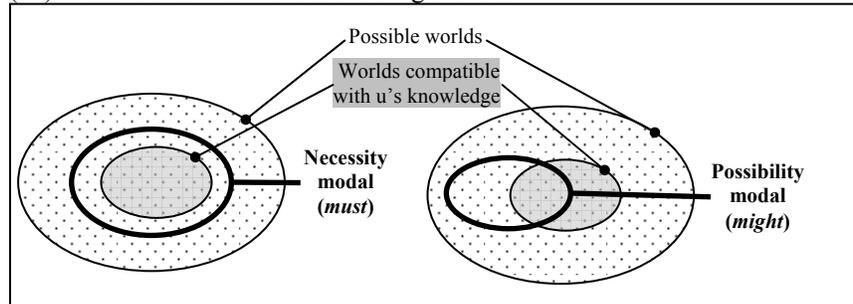
al like *might*, then, the modal base is still the set of worlds compatible with the judge’s knowledge; but these worlds are ordered in terms of which ones more closely match the typical course of events (a “stereotypical” ordering source). Thus the lexical entries for epistemic modals should actually be as in (56).

$$(56) \quad \llbracket \text{might} \rrbracket^{w,t,i,u} = [\lambda p_{\langle c,t \rangle} . \text{there is **some stereotypically best** world } w' \text{ compatible with } u\text{'s knowledge in } w \text{ at } t \text{ such that } p(w',t,i,u) = 1]$$

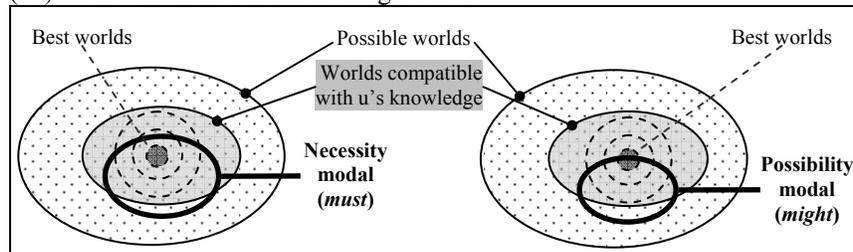
$$\llbracket \text{must} \rrbracket^{w,t,i,u} = [\lambda p_{\langle c,t \rangle} . \text{every **stereotypically best** world } w' \text{ compatible with } u\text{'s knowledge in } w \text{ at } t \text{ is such that } p(w',t,i,u) = 1.]$$

In pictures, the simplified meanings for *might* and *must* I assumed previously are represented in (57), and the new ones are represented in (58).

(57) Modal semantics without ordering sources



(58) Modal semantics with ordering sources



Given this more complicated semantics, we can now make sense of how Sally could be “wrong” in (55). The stereotypical ordering source includes the proposition that people with travel plans follow them, and people without travel plans stay in their general area. So in all the best worlds (those in the smallest circles in (58)), everybody follows their travel plans and everybody without travel plans stays in their general area. This means that when Sally utters the sentence “Joe might be in Chicago” in (55), she doesn’t just mean that she hasn’t eliminated all the worlds where Joe is in Chicago, but that in fact there is at least one world where people follow their travel plans and Joe is in Chicago. So this probably

means that Sally thinks Joe has travel plans. The listener, in this case George, knows that Sally is using this stereotypical ordering source, and so he concludes that Sally thinks Joe has travel plans. Given the general assumption that speakers want to add their beliefs to the common ground, George can take this as a proposal to add the proposition that Joe has travel plans to the common ground.⁹ Now, if George knows that in fact Joe *doesn't* have travel plans, he will object to this proposal. That is, if Sally and George made more of their reasoning explicit, the dialogue might go like this:

- (59) Sally: Joe might be in Chicago.
George: He can't be. I saw him in the hall five minutes ago.
Why did you think he was in Chicago?
Sally: He was going to go there sometime this week.
George: Oh, no, he's going next week.
Sally: Oh, then I guess I was wrong.

In (59) it's fairly clear that what Sally is wrong about is her belief about Joe's travel plans, and my claim is that this is also the case in (55).

There is another possibility, of course, which is that Joe *did* have travel plans, but he cancelled them at the last moment, in which case it's much harder to see what Sally might be wrong about. But in this kind of situation, I think it's a bit odd for Joe to say that Sally is wrong. Consider the dialogue in (60), for example.

- (60) Sally: Joe might be in Chicago.
George: He can't be. I saw him in the hall five minutes ago.
Sally: I thought he was going there to visit his relatives this week!
George: Oh yeah, he was, but he changed his plans at the last minute.
Sally: # Oh, then I guess I was wrong.

It seems strange in this case for Sally to say that she was wrong. Under a view like MacFarlane's this is surprising, since given the new knowledge that Joe changed his travel plans, it would no longer be compatible with Sally's knowledge that Joe was in Chicago, and so she ought to assess her previous assertion, in her new context of assessment, as false. Under the view I've proposed, Sally's original sentence is always evaluated with respect to the judge's knowledge *at the time of evaluation* (in this case the time of utterance since the sentence is in the present tense), and thus shouldn't "become false" in the face of additional knowledge. When the possibility of false belief is factored out, as in

⁹ A MITWPL reviewer objects that if Sally's statement in (55) is not challenged, the proposition that Joe has travel plans isn't actually added to the common ground. It's not clear to me how to test this. Granting it for the sake of argument, though, the problem can be traced to an idealization in the ordering source: realistically, we don't assume that people only travel if they have travel plans, but rather that they only travel if they have some reason to do so. It seems reasonable to say that Sally's statement in (55), if unchallenged, does add to the common ground the proposition that Joe had some reason to travel (though of course I'm not sure how to test this either).

(60), this does indeed seem to be the way epistemic modals behave, and so my analysis makes the right prediction.

4.2 Predictions about context dependency in natural language

The analysis I've proposed here predicts that the only kind of double context dependency occurring in natural language appears as an individual parameter (the judge), not a time, world, etc. In particular, this means that a sentence cannot be assessed differently simply by virtue of being assessed at a different time. This is not the case with theories such as MacFarlane's that are fully doubly context-dependent. As MacFarlane himself observes, his analysis allows for the possibility of a hypothetical item *noy*, which is just like *now* except that it refers to the time of assessment instead of the time of utterance. That is, if John said *I'm sitting noy* at some time t_1 , Sue could challenge him at a later time t_2 on the basis of the fact that John wasn't sitting at t_2 , even if he was sitting at t_1 . MacFarlane goes on to say that "it is not surprising that there are no words in natural language that work like 'noy'" and dismisses it at that. To my mind, however, it's a weakness of his theory that it doesn't account for the fact that items like the putative *noy* don't exist. The analysis I'm proposing, in contrast, does account for the lack of expressions like *noy*. Under the version of double context dependency that I've adopted, the only time parameters that linguistic meanings could refer to are the evaluation time (the "t" argument) and a separate time of utterance (which would be part of the "index" argument). Items such as *then* pick out the evaluation time, and indexicals like *now* pick out the time of utterance, and there is simply no other option for a time-denoting item. There is no "time of assessment" under my view. Therefore *noy* can't exist.

It may seem obvious in some sense why we would have no use for an item like *noy*, but that doesn't mean we should dismiss it. A major task of linguistic theory is to account for seemingly obvious facts like this. Granted, no theory should be expected to account for every such universal that comes along, but given a choice between two otherwise adequate theories one of which accounts for such a universal and one of which does not, we should obviously prefer the one that does account for it. I would argue that this is just such a case: both the analysis here and MacFarlane's (or Egan et al.'s) can account for much of the behavior of epistemic modals (although in some cases they do it in different ways), but mine also accounts for the absence of items like the putative *noy* in natural languages.

The judge-dependent account does predict that there could be a pronoun *moy* which was just like *me* or *I* except that it referred to the judge instead of the speaker. That is, *John thinks that moy has a cold* would mean that John thinks he himself has a cold. It seems possible that certain so-called logophoric pronouns that occur in some languages may be amenable to this kind of analysis, but I'll leave this to be explored in future research.

5. Conclusions

The analysis I've proposed for epistemic modals is a less radical departure from standard notions of context dependence than that proposed by MacFarlane and Egan et al. The only double context dependence it requires is the judge param-

eter, which is independently motivated by predicates of personal taste. Since the judge parameter is an individual argument, it becomes natural to treat propositional attitude verbs like *think*, which take an individual as subject, as intensional over this parameter. By treating the “knower” associated with an epistemic modal as completely parallel to the judge associated with a predicate of personal taste, I can straightforwardly capture the striking parallel in their behavior, both in matrix sentences and in embedded contexts. This analysis of *think* also lets me give a precise definition of disagreement which is both intuitively plausible and makes sense of the fact that two people can disagree about statements containing predicates of personal taste or epistemic modals. Finally, my proposal has the advantage of ruling out certain kinds of double context dependency that do not occur in natural language, as in MacFarlane’s hypothetical *noy*.

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