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RETHINKING THE SEMANTICS OF ATTITUDE REPORTS

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RETHINKING THE SEMANTICS OF ATTITUDE REPORTS

by

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Abstract

RETHINKING THE SEMANTICS OF ATTITUDE REPORTS

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In response to John Locke's death in 1704, Pierre Coste (1824) penned a letter containing the following passage:

> [H]e was naturally somewhat choleric. But his anger never lasted long...I remember, that two or three weeks before his death, as he was sitting in a garden, taking the air in a bright sunshine, whose warmth afforded him a great deal of pleasure...; we happened to speak of Horace, I know not on what occasion, and having repeated to him these verses, where **that Poet says of himself, that he was**
>
> ***Solibus aptum;***
>
> ***Irasci celerem, tamen ut placabilis essem:***
>
> **"That he loved the warmth of the sun, and that tho' he was naturally choleric, his anger was easily appeased."** Mr. Locke replied, that if he durst presume to compare himself with Horace in any thing, he thought he was perfectly like him in **those two respects**. (170, bold emphasis mine)

This passage loosely contains a sentence of the form $\ulcorner x$ says of y that $p \urcorner$ and ends with an anaphoric reference to "two respects" that, at face value, are designated by clausal

complements, viz. 'that he loved the warmth of the sun' and 'that tho he was naturally choleric, his anger was easily appeased.' This dissertation concerns the semantics of these and related constructions, with an emphasis placed on those of the form ⌜x believes about y that p.⌝ These *belief-about reports* have received less attention than reports of the form ⌜x believes that p,⌝ but the former – along with their syntactically derived forms – are just as much a part of present-day, natural language English as the latter. Indeed, once I started studying 'about'-constructions systematically, I immediately began to notice their regular appearance "in the wild." This dissertation represents my attempts at taming this small corner, replete with philosophical significance, of the English language.

There are three chapters, and they all concern the semantics of attitude verbs with clausal complements; I focus on 'believes' for ease of exposition. Chapters 1 and 3 can be read as standalone works. Chapter 2 should be read after Chapter 1.

In Chapter 1, "A Puzzle about Belief-about," I argue that certain valid inferences involving belief-about reports are prima facie inconsistent with orthodox views of the belief relation as binary and propositional. In response, I propose a conservative departure from orthodoxy according to which certain 'that'-clauses designate novel devices of semantic type $<e,t>$ called *open propositions*; the view of belief as binary and propositional is retained. I give some reasons for thinking that open propositions are properties of a certain kind, give a bridge principle between belief-about and belief simpliciter, and formally implement the resulting view in accordance with contemporary theories of syntax and compositional semantics. The upshot is that theorists committed to orthodoxy must complicate their account of certain 'that'-clauses in surprising ways.

In Chapter 2, "Belief is a Ternary Relation," I object to the semantic complexity required by the proposal advanced in Chapter 1 and investigate a more radical departure from orthodoxy, viz. that belief is a ternary relation between subjects, objects ("targets"), and properties ("contents"). After showing how the resulting *Target and Content View* can be formally implemented, I respond to a variety of objections that

fall roughly into one of two categories: semantic and metaphysical. Responding to the semantic objections requires developing accounts of truth, assertion, and related notions, while responding to the metaphysical objections requires defending a particular view on the nature of propositions. The upshot is that if theorists are unwilling to countenance the semantic complexity required to save orthodoxy in the way proposed in Chapter 1, then the Target and Content View is an attractive alternative with theoretical benefits that are significant in their own right.

The formal implementation of the view proposed in Chapter 2 presupposes an intensional semantic framework attributable to the linguistic development of *variable-based theories of intensionality*, which purport to explain the transparency of determiner phrases in the context of attitude reports. In Chapter 3, "Variable-based Intensionality for Structured Propositions," I argue that these theories in their simple, traditional forms are not available to advocates of structured propositions, and that the only attempt so far to unify these approaches is unsuccessful. So, I develop an improved variable-based theory of intensionality for structured propositions. Due to the underappreciated generality of the intensional phenomena at issue, however, it turns out that all theories face further challenges still. The upshot is that advocates of structured propositions might even be in a stronger position than other theorists when it comes to tackling these challenges purely semantically, but the complications required also suggest that non-semantic explanations of transparency are worth investigating now more than ever.

I'll end with a note on methodology. This dissertation is couched within the theoretical framework of generative grammar and compositional semantics. One of its guiding principles is, accordingly, that truth-conditions for English sentences in context must be compositionally derived on the basis of syntactically respectable logical forms. This dissertation is also strongly influenced by the methods and tools of contemporary analytic metaphysics. So, another one of its guiding principle is that we ought to take seriously the nature of the entities appealed to by our best scientific theories, including

the science of language. A recurring theme is therefore the dovetailing of considerations from formal semantics, on the one hand, and philosophical argumentation pertaining to the metaphysical natures of compositional semantic values (in context), on the other. I've tried to treat linguistic and philosophical considerations as on a par with one another throughout, conceiving of their distinction ultimately as an arbitrary matter – or, at least, as one that can be safely bracketed for present purposes.

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Chapter 1: A Puzzle about Belief-about

[Note: A modified version of this chapter was originally published under the same title by the author of this dissertation in *Mind* (2021), vol. 130, no. 520, pp. 1129-1157.]

The *standard view* is that reports of the form ⌜S believes that p⌝ are true in a context c if and only if the referent of S in c stands in the relation semantically expressed by 'believes' in c to the proposition designated by ⌜that p⌝ in c.[1] This work concerns the following two core commitments of this view:

(a) 'that'-clauses designate propositions in the context of belief reports.

(b) The relation semantically expressed by 'believes' in these contexts, i.e. *the belief relation*, is binary and obtains between subjects and propositions.

Advocates of the standard view include Burge (1980), Fodor (1981), Salmon (1986a), Stalnaker (1987), Braun (1998), Schiffer (1992, 2003), King (2014), Soames (2014), and Speaks (2014b), as well as many others who don't bother to endorse it explicitly.[2] Among these advocates, there is significant disagreement concerning the structure, representational properties, and fineness of grain of propositions. Still, it is widely agreed, and so I will assume, that propositions are non-mental and non-linguistic bearers of truth that serve as the contents of beliefs and sentences (in context).[3] Ultimately, I will argue that a collection of valid inferences involving a certain kind of belief report pushes advocates of the standard view towards forfeiting (a) in order to preserve (b).

But first, consider that the most well-known argument for the standard view is that it best explains the validity of arguments involving belief reports in ordinary lan-

[1] The intended notion of designation comes from King (2002):

> An occurrence of expression e in sentence S designates o iff this occurrence of e is via some semantic mechanism associated with o and as a result S, in virtue of containing this occurrence of e, expresses a proposition P whose truth or falsity at a circumstance depends on the properties of o and the relations it stands in at that circumstance. (342)

[2] Anyone who rejects the existence of propositions will reject the standard view. Detractors from the standard view who countenance propositions are rare but include Bach (2006) and Buchanan (2012).

[3] Hereafter I omit references to context unless they are required for clarity.

guage.[4] Its advocates ask us to consider valid arguments like the following:

Familiar Argument

P1. Lewis believes that London is pretty.

P2. Peter believes that London is pretty.

C. Lewis believes something Peter believes.

Then it's claimed that the best way to explain the validity of these arguments is to represent them as having a logical form like the following, which is model-theoretically valid in standard first-order logic:

Fac

Fbc

$\therefore \exists x(Fax \ \& \ Fbx)$

On the intended interpretation, a is assigned to Lewis, b to Peter, c to the proposition that London is pretty, and the predicate F to the belief relation. If logical forms like these are more plausible than any alternative, as advocates like Speaks (2014a, p. 12-19) argue, then there is strong evidence that the standard view is true. Their methodological principle is that valid arguments involving belief reports in ordinary language should be explained by regimentation into valid logical forms.

Here is the plan. In §1.1, I'll present some valid arguments involving belief reports that generate a puzzle for the standard view when the aforementioned principle is upheld. In §1.2, I'll propose a conservative departure from the standard view that explains the validity of these arguments by taking certain 'that'-clauses to designate novel devices of semantic type $<e, t>$ that I call *open propositions*; this proposal conserves the orthodox commitment to the belief relation being binary and propositional. In §1.3, I'll outline some desiderata that any theory of open propositions must satisfy, and in §1.4, I'll provide some reasons on this basis for advocates of the standard view to treat open propositions as properties of a certain kind. In §1.5, I'll give a bridge principle between the core notions of belief and belief-about and show how the resulting view can

[4]See, e.g., Horwich (1990, p. 86), Higginbotham (1991, p. 346), Schiffer (2003, p. 42), McGrath (2012, §3.1), Richard (2013, ch. 8), and Speaks (2014b, p. 10).

be implemented in accordance with formal theories of syntax and semantics. In §1.6, I'll draw out some of the consequences this investigation has beyond our semantic theorizing and conclude, more generally, that any response to the puzzle requires paying some surprising cost or another.

§1.1 The puzzling arguments

According to van Inwagen, 'one of the things you can say about the Taj Mahal is that it is white, and you can say that about the Lincoln Memorial, too' (van Inwagen 2004, p. 132). It seems to me that what van Inwagen rightly claims about speech acts like saying can also be rightly claimed about mental states like belief. One of the things you can believe about the Taj Mahal is that it's white, and you can believe that about the Lincoln Memorial, too. What's more, certain arguments in ordinary language involving this way of speaking are plainly valid. Consider, for example, the following puzzling arguments:

Puzzling Argument 1

P1. What Lewis believes about London is that it's pretty.

P2. What Peter believes about Paris is that it's pretty.

C. What Lewis believes about London is what Peter believes about Paris.

Puzzling Argument 2

P1. Lewis believes about London that it's pretty.

P2. Peter believes about Paris that it's pretty.

C. Lewis believes about London something Peter believes about Paris.

These arguments involve belief reports that are, or are otherwise syntactically derivable from, reports of the form $\ulcorner S$ believes about x that $p\urcorner$. Let's call them *belief-about reports* and remain neutral for now as to their proper analysis.[5] In order to remain principled, advocates of the standard view should explain the validity of the puzzling arguments by regimentation into valid logical forms.

The problem is that the standard view entails that these arguments are invalid

[5]Kaplan (1986, p. 268) and Taylor (2003, p. 220) call them *syntactically de re belief reports* and *truncated fulsomely de re belief reports*, respectively.

under assumptions that are plausible by its advocates' own lights. Suppose that the premises of the first argument are true.[6] By the standard view, the 'that'-clauses in the first and second premises designate some propositions, P and Q, respectively. Since the premises are true identity claims under this assumption, 'what Lewis believes about London' designates P, and 'what Peter believes about Paris' designates Q. But P is not Q, and so what Lewis believes about London is not what Peter believes about Paris, because the embedded pronouns in the 'that'-clauses that designate these propositions anaphorically refer to different cities, and the semantics of 'that'-clauses obey modest constraints on compositionality. Therefore, the standard view entails that this argument is invalid under the plausible assumptions that its 'that'-clauses designate different propositions and that it features the 'is' of identity.

The second argument poses the same difficulty without assuming anything about the semantic contribution of 'is'. For illustrative purposes, I'll consider this argument from the perspective of an advocate of the standard view who endorses a structured, Russellian approach to singular propositions designated by 'that'-clauses containing pronouns. According to Salmon (1998, p. 281), the logical forms of the premises are better revealed by rewriting them as follows:

(1) About London, Lewis believes that it is pretty.

(2) About Paris, Peter believes that it is pretty.

These are then taken to be true just in case the corresponding open sentences

(3) Lewis believes that it is pretty.

(4) Peter believes that it is pretty.

are true under the assignments of London to 'it' and Paris to 'it', respectively. As a

[6]This argument prominently features pseudo-clefts, about which there are competing syntactic and semantic analyses, as outlined by Brogaard (2009, §4). I assume a broadly movement-based analysis on which reports of the form ⌜What S believes about x is that p⌝ are syntactically derived from those of the form ⌜S believes about x that p⌝. As the second puzzling argument makes clear, however, nothing essential to my argument hinges on the proper analysis of pseudo-clefts. For an argument directed against the standard view that does make essential use of pseudo-clefts, see Moltmann (2003). Thanks to an anonymous referee at *Mind* for this point.

result, both (3) and the first premise of the argument are true in the relevant context if and only if Lewis stands in the belief relation to the singular proposition that London is pretty, and both (4) and the second premise of the argument are true in the relevant context if and only if Peter stands in the belief relation to the singular proposition that Paris is pretty.

There are two problems preventing this view from capturing the validity of the argument. First, it provides no explicit guidance on how to interpret the conclusion. More specifically, it assigns no semantic role to 'about'-phrases beyond providing embedded pronouns with anaphoric referents, as in (1) and (2), but 'about'-phrases clearly play an additional semantic role in belief-about reports that have no anaphora, such as the conclusion of the argument. Nevertheless, it is clear that Salmon takes belief-about reports to report that subjects stand in the belief relation to singular propositions, so we might charitably interpret the conclusion in such a way that it entails that Lewis and Peter stand in the belief relation to at least one of the same singular propositions. For example, if Lewis and Peter both stand in the belief relation to the singular proposition that London and Paris are pretty, then there might be a sense in which, on Salmon's view, Lewis believes about London something Peter believes about Paris.

The second problem, however, is that the premises don't necessitate the conclusion under any such charitable interpretation. Supposing the premises were true, the conclusion could still be false if Lewis didn't believe anything about Paris, as would be the case were he to have lived before its establishment or somehow in complete isolation from it.[7] And on Salmon's view, if Lewis doesn't believe anything about Paris, then he doesn't believe anything Peter believes about Paris; a fortiori, Lewis doesn't believe anything about London that Peter believes about Paris.

[7] According to Salmon,

> *de re* belief about an object x is nothing more or less than belief of the corresponding *singular proposition* (singular *dictum*)—a proposition that is about x by including x directly as a constituent. (Salmon 1998, p. 281, emphasis in original)

While Salmon takes belief-about reports to be a kind of de re belief report, my arguments don't require this to be the case. I discuss the relationship between belief-about and singular belief in §1.5.

It is not difficult to see how other views concerning the nature of propositions face analogous difficulties in accounting for the validity of these arguments.[8] Beyond showing that the standard view is problematic in some respect, the puzzling arguments reveal more specifically that the root of the problem lies in taking 'that'-clauses to univocally designate propositions in the context of belief reports. Once this commitment is taken on board, it's only natural to interpret the 'that'-clauses in the premises as designating different propositions. But then the premises don't necessitate there being a shared object of belief between the subjects, which the conclusions seem to require.

§1.2 Baking up a solution

Although the puzzle I've raised appears in a particularly striking form for the standard view, similar puzzles can be found throughout ordinary language. Arguments like the following provide useful analogies for how to think about the range of responses to the puzzling arguments:

Cake Argument 1

P1. What Lewis baked is a birthday cake.

P2. What Peter baked is a birthday cake.

C. What Lewis baked is what Peter baked.

Cake Argument 2

P1. Lewis baked a birthday cake.

P2. Peter baked a birthday cake.

C. Lewis baked something Peter baked.

To the extent that these arguments are deemed to be valid, they pose a challenge to the view that indefinite noun phrases univocally designate particulars, such as tokens of a given type of cake. Someone who endorses this view might even reject the validity of the cake arguments on the basis of their prior semantic commitments. Aside from following an objectionable semantic methodology, however, such a flat-footed response

[8] Works in the Fregean tradition, such as Kaplan (1968) and Yalcin (2015), similarly fail to capture the validity of the puzzling arguments. These views treat the premises as involving covert existential quantification over modes of presentation at logical form, and this additional layer of complexity provides no explanatory advantage.

to the puzzling arguments isn't as readily available to advocates of the standard view, since one of the most powerful motivations for their view, as we've seen, requires taking the validity of similar arguments at face value. The validity of the cake arguments can be explained instead in terms of a semantic type-shifting operation that makes 'a birthday cake' designate a type of cake in this context. This suggests a way forward for the puzzling arguments.[9]

The obvious extension of this analogy is to treat the 'that'-clauses of belief-about reports as designating types of propositions. But let's first call the objects designated by these 'that'-clauses *open propositions* and remain as neutral as possible with respect to their nature.[10] The puzzling arguments provide strong reasons for thinking that open propositions are not themselves propositions, but there are still reasons for thinking that open propositions are very closely related to propositions. This is because we are somehow able to recover the proposition that the subject of a belief-about report must believe in order for the report to be true, despite this proposition not being designated by any expression thereof.[11] A plausible explanation of this ability is that we grasp open propositions that either are or determine functions from objects, which are semantically contributed by the 'about'-phrases of these reports, to propositions. The open proposition designated by 'that it's pretty' in the context of belief-about reports, for example, uniquely determines the proposition that London is pretty when combined with London and the proposition that Paris is pretty when combined with Paris. This is how we know that these are the propositions that Lewis and Peter must stand in the

[9]One may be tempted to explain away the apparent validity of the puzzling arguments instead of proceeding down this line, but doing so risks generalizing into methods for explaining away the apparent validity of the arguments that initially motivated the standard view itself.

[10]See Vendler (1971) for a somewhat similar use of the term 'open propositions' and Cresswell (1973) for a somewhat dissimilar use. I owe a great deal of thanks to an anonymous referee and editor at *Mind* for the incorporation of open propositions into this work.

[11]Someone might suggest that, in Puzzling Argument 2, 'about London that it's pretty' is a syntactic constituent that designates a proposition, but standard tests for syntactic constituency rule this out:

(i) *What Lewis believes is about London that it's pretty.
(ii) *It's about London that it's pretty that Lewis believes.
(iii) Q: What did Lewis believe? A: *About London that it's pretty.

belief relation to, respectively, in order for the premises of the puzzling arguments to be true. There are many ways to understand what open propositions could be given these constraints, e.g. as propositional functions in the sense of Russell (1903), as proposition radicals in the sense of Bach (1994), as types of propositions in the sense of Buchanan (2012), or as properties in the sense of van Inwagen (2004). But glossing over these metaphysical distinctions, the open proposition designated by ⌜that he/she/it is F⌝ in the context of a belief-about report is a novel device of semantic type $<e, t>$ that either is or determines the function that maps an object o to the proposition designated by ⌜that o' is F⌝, where o' refers to o.

Now we can explain the validity of the puzzling arguments by maintaining that a belief-about report of the form ⌜S believes about x that p⌝ is true in a context c if and only if the referent of S in c stands in the relation semantically expressed by 'believes about' in c to the referent of x in c and the open proposition designated by ⌜that p⌝ in c. Let's call this relation *the belief-about relation* and remain neutral for now as to its proper analysis.[12] At a high level of abstraction, the second puzzling argument can then be given a logical form like the following:

$Fabc$

$Fdec$

$\therefore \exists x(Fabx \ \& \ Fdex)$

On the intended interpretation, a, b, d, and e are assigned to Lewis, London, Peter, and Paris, respectively, c to the open proposition designated by 'that it's pretty' in the context of belief-about reports, and the predicate F to the belief-about relation. The logical form of the first puzzling argument can be given at an even higher level of abstraction as follows:

$a = c$

[12]This is not to be confused with the relation that Speaks (2014c, p. 216) calls by the same name, viz. a binary relation that obtains between a subject and object just in case the subject stands in the belief relation to a proposition that contains the object as a constituent. In my terminology, Speaks's relation would be more appropriately called *the believes-something-about relation*, since it corresponds to the open sentence 'x believes something about y', whereas what I am calling *the belief-about relation* corresponds to the open sentence 'x believes about y (that) z'.

$b = c$

$\therefore\ a = b$

where a symbolizes 'what Lewis believes about London', b symbolizes 'what Peter believes about Paris', and c symbolizes 'that it's pretty'. On the intended interpretation, all three constants are assigned to the open proposition designated by 'that it's pretty' in the context of belief-about reports. Both arguments are clearly model-theoretically valid in standard first-order logic.

Importantly, this account of the logical form of belief-about reports does not itself entail anything novel about the logical form of belief reports of the form $\ulcorner S$ believes that $p\urcorner$. These familiar reports can still be given the standard, propositional semantics. Consider the following pair of belief reports as an illustration:

(5) Lewis believes that it's pretty.

(6) Lewis believes about London that it's pretty.

The proposal is that when (5) is uttered in a context c in which London is contextually salient, 'that it's pretty' still designates in c the proposition that London is pretty, but that when (6) is uttered in any context c', 'that it's pretty' designates in c' the open proposition that, when combined with London, determines the proposition that London is pretty. I take up the formal implementation of this proposal in later sections, but before delving into these details, we should more clearly understand the theoretical roles that open propositions are supposed to play.

§1.3 Roles for open propositions

My goal in this section is to identify some of the desiderata that any theory of open propositions must satisfy. Then we'll have a better sense of what kind of things they can be before incorporating them into our semantics. First, whatever open propositions might be, it's plausible that they have the same fineness of grain as propositions. This is because the standard arguments used to determine the fineness of grain of propositions have clear analogues for open propositions, and we would need strong reasons to treat these analogous arguments differently. Consider, for example, argu-

ments for the non-extensionality of propositions based on the apparent failure to substitute co-referential names salve veritate (as in Frege (1892)). Here is an analogous argument:

Superman Argument

P1. Lois believes about Lex that he killed Superman.

P2. Superman is Clark Kent.

C. Lois believes about Lex that he killed Clark Kent.

Fregeans might explain the apparent invalidity of this argument by appealing to finely-grained open propositions, while non-Fregeans might insist that the argument is valid and explain away appearances to the contrary. Now consider arguments for the hyper-intensionality of propositions based on the apparent failure to substitute necessarily equivalent sentences in belief reports salve veritate (as in Soames (1987)). Analogously, if the 'that'-clauses that designate open propositions create intensional contexts, then the following two sentences semantically express necessarily equivalent propositions:

(7) Lewis believes about London that it's identical with itself.

(8) Lewis believes about London that it's identical with itself if and only if arithmetic is undecidable.

Detractors from the possible worlds views of propositions might explain the apparent non-equivalence of these sentences in terms of structured open propositions, while its advocates might reply along the lines of Stalnaker (1984). Unless we are given a reason to treat the arguments concerning open propositions differently from those concerning propositions, there is a strong reason to take open propositions to have the same fineness of grain as propositions themselves.

Next, some advocates of the standard view, such as Speaks (2014b, p. 206), take further ordinary language arguments to show that propositions are the shared contents of various attitudes, the bearers of truth-values, and the bearers of modal properties. Now consider a valid argument from ordinary language that is analogous to the one Speaks provides:

Ordinary Language Argument

P1. What Lewis believes about London is what Peter said of Paris.

P2. What Lewis believes about London is true of other cities.

P3. If the war had never happened, what Peter said of Paris would have been true of it, too.

C. There is something which Lewis believes about London, which Peter said of Paris, which is true of other cities, and which could have been true of Paris.

Premises like these can plausibly be true together, and the conclusion carries a commitment to entities that are believed of, said of, true of, and possibly true of things.[13] The existential quantification in the conclusion removes the risk of equivocation and shows that a single kind of entity must play these roles by being the shared objects of various attitudes, the bearers of truth-values, and the bearers of modal properties, all relative to an additional index, viz. an object.[14]

Next, open propositions must determine functions not just from single objects to propositions but from multiple objects to propositions. Consider, for example, the following valid argument:

Plurality Argument

P1. What I believe about Lewis and Stephanie is that they are married.

P2. What I believe about Peter and Nancy is that they are married.

C. What I believe about Lewis and Stephanie is what I believe about Peter and Nancy.

Here 'that they are married' must designate an open proposition that either is or determines a function that maps Lewis and Stephanie to the proposition that Lewis and

[13] I had previously taken sentences of the form ⌜What S believes about x is true/false⌝ to be elliptic for ⌜What S believes about x is true/false of x⌝. This presents an obstacle, however, for the interpretation of sentences of the form ⌜What S believes is true⌝. Perhaps even these sentences are elliptic for ⌜What S believes about contextually relevant subject matter M is true of M⌝. But if someone isn't satisfied with this suggestion, they could posit the existence of the following two truth predicates in English: the monadic ⌜x is true$_1$⌝ and the binary ⌜x is true$_2$ of y⌝. If someone is still unsatisfied with this proposal, I sympathetically refer them to Chapter 2.

[14] Advocates of the neo-Quinean meta-ontology outlined by van Inwagen (1998) can also understand this as a novel argument for the existence of open propositions on a par with those for the existence of propositions.

Stephanie are married. The functions determined by open propositions might then also need to operate on sequences of objects in order to accommodate non-symmetric predicates and on pluralities of objects in order to accommodate collective predicates, as the following arguments make clear, respectively:

Relational Argument[15]

P1. What I believe about Lewis and Stephanie is that he loves her.

P2. What I believe about Peter and Nancy is that he loves her.

C. What I believe about Lewis and Stephanie is what I believe about Peter and Nancy.

Collective Predicate Argument

P1. What I believe about Lewis and Stephanie is that they collectively weigh over 300 pounds.

P2. What I believe about Peter, Nancy, and Amanda is that they collectively weigh over 300 pounds.

C. What I believe about Lewis and Stephanie is what I believe about Peter, Nancy, and Amanda.

These arguments suggest that open propositions must either be or determine functions from multiple objects (or pluralities) to propositions.

Finally, open propositions play a surprising role in our talk of virtues and essences. Consider, for example, what I will call *the virtue arguments*:

Virtue Argument 1

P1. One of Socrates's virtues is that he's wise.

P2. Any virtue of Socrates is a virtue of Plato.

C. One of Plato's virtues is that he's wise.

Virtue Argument 2

P1. What's essential to Socrates is that he's wise.

[15]I've since come to believe that the premises of the Relational Argument are ungrammatical, and that all grammatical constructions in the vicinity can be treated as involving 'that'-clauses that designate monadic properties of pluralities. See Chapter 2.

P2. What's essential to Socrates is what's essential to Plato.

C. What's essential to Plato is that he's wise.

Just like the puzzling arguments, the virtue arguments are plausibly invalid if their 'that'-clauses designate propositions, but we can explain their validity by taking their 'that'-clauses to designate open propositions. These arguments show, at the very least, that open propositions play a non-trivial role in explaining some of our talk about virtues and essences.

In this section, I've appealed to ordinary language arguments suggesting that open propositions, whatever they are, satisfy the following desiderata:

(a) They must have the same fineness of grain as propositions.

(b) They must bear alethic and modal properties, while serving as the contents of various speech acts and mental states, relative to objects.

(c) They must either be or determine functions from multiple objects (or pluralities) to propositions.

(d) They must play a non-trivial role in explaining some of our talk about virtues and essences.

I have no doubt that entities of various kinds can consistently satisfy these desiderata if put under enough strain, but the objects that do so most easily, while offering a high degree of unity to our overall theorizing, should be preferred.

§1.4 Open propositions as properties

While there aren't going to be any considerations that answer entirely by themselves the question of what open propositions are, there are notable reasons for advocates of the standard view to treat open propositions as properties. This line of thought isn't meant to convince otherwise someone who already believes that open propositions are not properties. Instead, it provides a conservative answer to the question of what open propositions might be for advocates of the standard view who are unsure about, or simply lack the interest in developing, a metaphysical account of them. Deeper theoretical commitments can surely be accommodated by extending or modifying the basic

idea.

Most, if not all, advocates of the standard view already include properties in their ontologies alongside propositions. In fact, many of them take propositions to be properties of a certain kind, e.g. Speaks (2014b), Soames (2014), Hanks (2011), Bealer (1982), Menzel (1993), and Zalta (1988).[16] They incur no additional ontological cost by treating open propositions as properties, and doing so conveniently allows them to maintain that all 'that'-clauses in belief reports, without exception, designate some property or another. Beyond this, properties are generally well-suited to play the theoretical roles for open propositions outlined in the previous section. First, there are various views on their fineness of grain, whether they are taken to be extensional functions from objects to truth-values, intensions, or structured, hyper-intensional entities. However finely-grained one takes propositions to be, there is a corresponding case to be made that properties have the same fineness of grain.[17] Second, properties can be taken to stand in relations of entailment, as in Jubien (1993, p. 111), so they are natural candidates to bear alethic and modal properties relative to objects. Third, by expanding our conception of properties to include n-ary relations, it is trivial to understand them as determining functions from multiple objects to propositions.[18] Fourth, properties are by far the most popular kind of entity that philosophers identify with virtues and essences, and they are popularly taken to play a major role in our talk about virtues, e.g. as the referents of proper names like 'wisdom'. These considerations suggest that properties are strong candidates for being open propositions, but they provide no answer to the question of which property a given open proposition might be.

An attractive answer to this question draws inspiration from the following re-

[16]For Speaks, propositions are properties instantiated by everything or nothing. For Soames, they are cognitive act types. For Hanks, they are speech act types. (Here I assume that types are properties.) For Bealer, Menzel, and Zalta, they are 0-adic relations.

[17]Considerations of fineness of grain are never uncontroversial, and it's possible for someone to enter this discussion with a prior commitment to properties being more or less finely-grained than propositions. For them, this consideration weighs against treating open propositions as properties. On my view, however, the strongest position is one on which propositions and properties have the same fineness of grain, and for anyone in agreement, this consideration weighs in favor of identifying open propositions with properties.

[18]I've come to believe that functions from pluralities to propositions are sufficient.

mark:

> What is the property whiteness but something we, in speaking of things, occasionally predicate of some of them? And what is predicating something of something but saying the former of the latter? (van Inwagen 2004, p. 134)

As before, van Inwagen's remark generalizes to mental states like belief. What is the property whiteness but something we, in forming beliefs about things, occasionally mentally predicate of some of them? And what is mentally predicating something of something but believing the former of the latter?[19] If this is right, then we can treat the open proposition designated by 'that it's white' in the context of belief-about reports as the property of being white, i.e. whiteness. We can treat open propositions, more generally, as properties that correspond to open sentences formed by replacing terms of closed sentences in ordinary language with variables. In the context of a belief-about report, for example, 'that he is wise' designates the property corresponding to 'x is wise', i.e. wisdom. The plausibility of this proposal increases when we consider that in the context of the virtue arguments, substituting 'that he's wise' with 'wisdom' preserves both the truth-values of the sentences and the validity of the arguments.

Notoriously, however, belief reports do not exhibit the same degree of freedom in substitution, and belief-about reports are no exception:

(9) Lewis believes about London [that it's pretty]/*[the property of being pretty]/ *prettiness.

Thankfully, the resources provided by King (2002) in his defense of the standard view from analogous substitution failures, as raised by Bach (1994) and McKinsey (1999), are transferable to belief-about reports mutatis mutandis. The analogous response, roughly, is that determiner and noun phrase complements trigger an alternative reading of the attitude verb. For example, sentences like

[19]Not everyone will be satisfied with this way of putting it. Soames (2014), for example, takes mental predication to be a judgment-less cognitive act that falls short of belief. For Soames, 'mental affirmation' might be a more appropriate phrase than 'mental predication'.

(10) Who Lewis believes about London is Stephanie/[the woman he loves].

(11) Lewis believes Stephanie/[the woman he loves] about London.

may be taken to mean that Lewis believes what Stephanie or the woman he loves claims when it comes to matters concerning London. Supposing that noun and determiner phrases trigger this alternative reading of the verb, the marked examples in (9) can be explained by the strangeness of asserting that Lewis believes what a property claims when it comes to matters concerning London. This is a complex debate, the full details of which fall outside the scope of this work.[20] However, there is little reason to think that adopting my proposal introduces a new substitution problem for advocates of the standard view, especially for those who already take propositions to be designated by determiner phrases of the form ⌜the property of being φ⌝.[21]

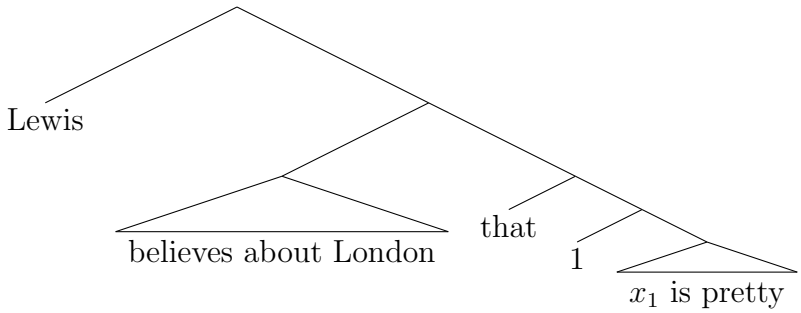
By design, treating open propositions as properties corresponding to open sentences makes for a straightforward formal implementation. In §1.2, I gave logical forms for belief-about reports in the language of first-order logic, the expressive limitations of which forced a high degree of abstraction. These logical forms provide us with target truth-conditions but remain to be legitimized by being systematically derived on the basis of a responsible syntax and compositional semantics. I adopt the standard framework of Heim and Kratzer (1998) for this purpose and begin by focusing on the semantics of the relevant 'that'-clauses.[22] We can initially represent the logical form of belief-about reports at the relevant level of abstraction with a syntax tree like the following:

[20]One might notice, for example, that in the surface form of (9), the 'about'-phrase is the first argument of the verb, but that in the surface form of (11), it's the second. Perhaps the clausal complement in (9) is the first argument at LF but gets moved to the right at surface form.

[21]Speaks (2014b), for example, takes the proposition that Amelia talks to be designated by the determiner phrase 'the property of being such that Amelia talks'.

[22]In particular, for any variable assignment g, the function $[\![\cdot]\!]^g$ maps expressions to their semantic values relative to g. I omit the regular parameters for worlds and contexts because these will play no significant semantic role in what follows.

(12)



The node with the numeral '1' is adapted from Heim and Kratzer's (1998, p. 186) canonical account of quantification, but I hold no commitment as to the precise syntactic mechanism by which it appears. Whether by insertion over the course of movement or by some other means entirely, its appearance must also be explained in the context of various accounts of quantification. Interestingly, the complimentizer seems mandatory for belief-about reports, unlike other belief reports, as these examples show:

(13) *Lewis believes about London it is pretty.

(14) Lewis believes it is pretty.

This is to be expected if the syntactic function of the complimentizer is to introduce the numeral node at logical form, but I don't pursue this line of thought here.

The node immediately dominating the numeral is interpreted by the following rule:

Predicate Abstraction

Let α be a branching node with daughters β and γ, where β dominates only a numeral i. Then, for any variable assignment g,

$[\![\alpha]\!]^g = \lambda x [\![\gamma]\!]^{g[x_i \mapsto x]}$.[23]

As a result, the numeral and open sentence join at a node with the following semantic value relative to a variable assignment g:

(15) $\lambda x [\![x_1$ **is pretty**$]\!]^{g[x_1 \mapsto x]}$

[23]Predicate Abstraction is an ad hoc rule of composition, so the resulting semantics are not compositional by functional application alone. For a defense of rules of this kind, see Glanzberg and King (2020).

What kind of entity (15) is depends on how we interpret the functional terms of the lambda calculus. For example, if the functions picked out by terms of the lambda calculus are finely-grained enough to serve as properties, as suggested by Alama and Korbmacher (2018, §1.2), then we can take the complimentizer to be semantically vacuous; the property of being pretty will be passed up to the semantic value of the entire 'that'-clause by default. Otherwise, we might need to appeal to a modified version of Predicate Abstraction, which we might call *Property Abstraction*, the terms of which designate finely-grained properties by fiat, as in Fine (2012, p. 67-68).[24] Either way, the semantic value of the 'that'-clause relative to a variable assignment will be the property of being pretty, as desired.

This is, then, the core idea for how to semantically implement the view that 'that'-clauses in belief-about reports designate open propositions qua properties: the embedded pronoun is treated as a variable that gets implicitly bound by a lambda abstract, which shifts the type of the 'that'-clause to $<e, t>$ and yields the property intuitively corresponding to the open sentence as its semantic value. There are, of course, many further complications that arise when considering more complex belief-about constructions, so this core idea will need to be extended or modified to accommodate additional linguistic data. I'll mention a few examples in the remainder of this section in order to gesture at their broader theoretical significance.

First, the embedded pronoun of a belief-about report is not semantically contributory on this view, because it is implicitly bound by the numeral node at logical form. However, there is conflicting evidence that these pronouns are semantically contributory in virtue of anaphorically referring, as agreement in gender and number in the following examples makes clear:

[24]It's interesting to think about how Property Abstraction can be implemented compositionally. Suppose we introduce 'Πx_i' as a (fine grained) property forming operator; it attaches to an open sentence with a co-indexed variable to yield a term for the corresponding property. Then '$\Pi x(x$ is pretty)' and '$\Pi x(x$ is blue)' designate prettiness and blueness, respectively. Since '$\Pi x(x$ is pretty and x is blue)' needs to designate the conjunctive property of being pretty and blue, the compositional semantic value of 'and' within the context of 'Πx_i' will need to map two properties to their conjunctive property. This arguably requires a departure from the compositional behavior of logical words in ordinary English, but there is no reason why such senses could not be stipulated.

(16) What Lewis believes about Stephanie is that she/*he is pretty.

(17) What Lewis believes about Australians is that [they are]/*[he is] pretty.

What is needed for this account to succeed, therefore, is a syntactic mechanism by which, at some level of representation or derivation, an embedded subject term moves outside of its 'that'-clause, breaks the semantic binding relation between itself and its trace, and leaves behind certain syntactic features, such as gender and number. There is precedent for a syntactic movement operation with these properties that dates back to work by Heim (1994, p. 154) in the form of *res-movement*.[25] One will find the formal implementation provided here plausible to the extent that one is willing to entertain syntactic movement operations of a similar flavor.

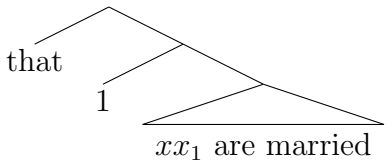
If one is not willing to entertain them, however, there is an alternative implementation worth considering. Jacobson (1999) proposes for unrelated reasons that the semantic value of any pronoun is the identity function, but one can imagine a restricted version of this view that only applies to the embedded pronouns of belief-about reports.[26] Supposing the embedded pronoun of a belief-about report semantically expresses the identity function, the semantic value of the embedded verb phrase becomes the semantic value of the entire 'that'-clause by functional application alone. Supposing further that the verb phrase 'is pretty' semantically expresses the property of being pretty, 'that it is pretty' will designate prettiness in the context of belief-about reports.

Another complication arises when we consider pluralities, which might require us to extend the lambda calculus and composition rules to accommodate plural variables (xx). 'that'-clauses like 'that they are married' in belief-about reports could then be represented by a syntax tree like the following:

[25]See Anand (2006, p. 21) and Maier (2009, p. 435) for proposals appealing to res-movement. See Charlow and Sharvit (2014) for arguments against res-movement.

[26]This restriction is essential to preserving the standard propositional semantics for reports of the form $\ulcorner S$ believes that $p\urcorner$ when p contains a pronoun.

(18)

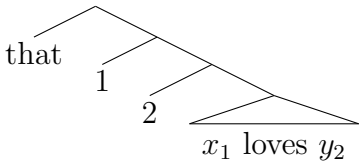


where the updated composition rule delivers the desired property of pluralities as the semantic value of the higher nodes relative to a variable assignment g:

(19) $\lambda xx[\![xx_1 \textbf{ are married}]\!]^{g[xx_1 \mapsto xx]}$

When sequences of objects are introduced, the syntax might require additional numeral nodes, as in the following tree:

(20)



That way, the open proposition designated by 'that he loves her' in the context of belief-about reports is the non-symmetric loving relation:

(21) $\lambda x \lambda y[\![x_1 \textbf{ loves } y_2]\!]^{g[y_2 \mapsto y][x_1 \mapsto x]}$

Strictly speaking, then, open propositions include properties and relations, but I omit detailed consideration of relations for simplicity.[27]

Finally, more complications arise when we probe into certain restrictions on what can occur inside the 'that'-clause of a belief-about report. For example, sentences like

(22) Lewis believes about London that it/*[the capital of England] is pretty.

suggest that these 'that'-clauses must contain a pronoun or some device of apparent anaphoric reference. But our intuitions in these cases are mixed, as the following example shows:

(23) ?Lewis believes about London that London is pretty.

[27] Although see footnotes 15 and 18.

Related to (23) are arguments that are strikingly similar to the puzzling arguments, such as the following:

Puzzling Argument 3

What Lewis believes about London is that London is pretty.

What Peter believes about Paris is that Paris is pretty.

So, what Lewis believes about London is what Peter believes about Paris.

My official stance on this argument is that its premises are necessarily false; the proposition that London is pretty cannot be what Lewis believes about London, because whatever Lewis believes about London can also be said of Paris, and it cannot be said of Paris that London is pretty. Under the assumption that this argument is non-trivially valid, however, I just take it to show that some secondary occurrences of names, and not just pronouns, are semantically non-contributory in belief-about reports as well.

§1.5 Belief-about and 'believes about'

With the 'that'-clauses of belief-about reports designating open propositions qua properties, all that remains is to give a philosophical analysis of the belief-about relation at a high enough degree of abstraction so as to be useful in a semantic account of the 'believes about' construction. As is well-known, there is a tradition of belief-about reports being 'commonly used by philosophers and semanticists when they wish to emphasize that a singular thought is at issue' (Hawthorne and Manley 2012, p. 53). If we take the usage of these philosophers and semanticists to be authoritative, then belief-about reports are a species of de re belief report, and the proper analysis of the belief-about relation depends on the proper analysis of singular thought. Hawthorne and Manley ultimately challenge this tradition, arguing that the truth of a belief-about report only requires that 'the relevant belief must be in some loose sense *about* the object(s) specified, but it is not obvious that they must be *singular* beliefs' (Ibid., p. 54, emphasis in original). It is unclear to me whether this is a genuine dispute or whether belief-about reports are context-sensitive and so admit of different truth-conditions in technical and colloquial contexts. Regardless, it is unsurprisingly agreed, given the pop-

ularity of the standard view, that the belief-about relation is to be analyzed in terms of some propositional relation or another.

A theory-neutral characterization of the belief-about relation can be given in propositional terms as follows, where the *R-relation* will vary by theorist depending on whether they take there to be a connection between belief-about and singular thought and, if they do, what they take the conditions of singular thought to be:

> **Propositional Belief-about:** A subject S stands in the belief-about relation to a thing x and a property P if and only if S stands in the belief relation to a proposition Q that bears the R-relation to P and x.

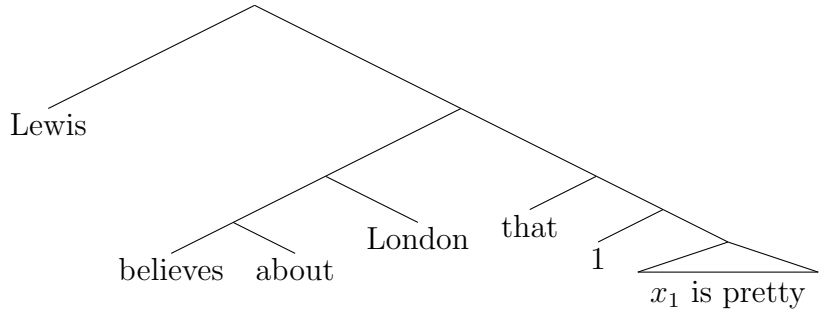
For example, a theorist in the Russellian tradition might take the R-relation to obtain between a proposition Q, property P, and thing x whenever Q is the singular proposition that attributes P to x in virtue of having them as its only constituents. A more Fregean treatment might take the R-relation to obtain between a proposition Q, property P, and thing x whenever Q attributes P to x under a mode of presentation that puts the subject in "acquaintance" with x (see Kaplan (1968, p. 201-204) and Yalcin (2015, p. 218-222)).[28] If there is any context-sensitivity to be accounted for in belief-about reports, then we may alternatively take there to be a family of belief-about relations, rather than just one, a given member of which will be selected for in each context. For ease of exposition, I will assume something like the non-context-sensitive, Russellian account moving forward.

In order to implement this view semantically, the primary task is to reconcile the propositional verb with its non-propositional complement. One way to do this is to take 'about' to modify 'believes' so that the complex expression 'believes about' can operate on a thing, like London, and a property, like prettiness. It is most natural to accomplish this result by taking 'believes about' to semantically express the belief-about relation. The lexical entry for 'about' will then simply map the belief relation to the belief-about relation. The logical form of belief-about reports can be represented

[28]In order to turn the R-relation into an acquaintance relation, it might require the attributee of the belief report as an additional argument.

accordingly at the relevant level of abstraction by a syntax tree like the following:[29]

(24)



We appeal to the semantics developed in §1.4 for the 'that'-clause, which designates the property of being pretty, i.e. prettiness. Semantic composition is then assumed to proceed by functional application:

> Functional Application
>
> If α is a branching node and $\{\beta, \gamma\}$ is the set of its daughters, then for any variable assignment g, α is in the domain of $[\![\cdot]\!]^g$ if both β and γ are, and $[\![\beta]\!]^g$ is a function whose domain contains $[\![\gamma]\!]^g$. In this case, $[\![\alpha]\!]^g = [\![\beta]\!]^g([\![\gamma]\!]^g)$.

We assign compositional semantic values relative to a variable assignment g, where 'BEL' is a two-place predicate of type $<t,<e,t>>$ that stands for the belief relation, and 'R' is a three-place predicate of type $<t,<<e,t>,<e,t>>>$ that stands for the R-relation:

$[\![\textbf{Lewis}]\!]^g$ = Lewis

$[\![\textbf{believes}]\!]^g$ = BEL

$[\![\textbf{about}]\!]^g = \lambda Q_{<t,<e,t>>} \lambda x_e \lambda P_{<e,t>} \lambda y_e \exists z(Q(z)(y) = \mathrm{R}(z)(P)(x) = 1)$[30]

$[\![\textbf{London}]\!]^g$ = London

As a first step, the semantic value of 'about' maps the belief relation, i.e. BEL, to the belief-about relation:

[29]Here I treat 'believes about', rather than 'about London', as a syntactic constituent. Nothing important depends on this assumption, although it does allow us to conveniently identify the belief-about relation with the semantic value of 'believes about'. If one thinks instead that 'about London' is a syntactic constituent, the compositional derivation provided below requires swapping the order of the first two lambda binders in the semantic value of 'about'. I leave it to the reader to verify that standard syntactic constituency tests do not clearly settle this issue.

[30]The lexical entry for 'about' and the remainder of the semantic derivation exploit the equivalence between $\ulcorner f(x) = g(y) = 1 \urcorner$ and $\ulcorner f(x) = 1 \ \& \ g(y) = 1 \urcorner$, for arbitrary functions f, g and variables x, y.

$$[\![\textbf{believes about}]\!]^g = \lambda x_e \lambda P_{<e,t>} \lambda y_e \exists z(\textsc{bel}(z)(y) = \mathrm{R}(z)(P)(x) = 1)$$

This is then applied to London, resulting in what we might call the *belief-about-London relation*:

$$[\![\textbf{believes about London}]\!]^g = \lambda P_{<e,t>} \lambda y_e \exists z(\textsc{bel}(z)(y) = \mathrm{R}(z)(P)(\mathrm{London}) = 1)$$

which obtains between a property and a subject when the subject stands in the belief relation to a proposition that stands in the R-relation to that property and London. When this is applied to prettiness and Lewis in that order, the desired truth-conditions result:

$$[\![\textbf{Lewis believes about London that it is pretty.}]\!]^g = 1 \text{ if and only if}$$
$$\exists z(\textsc{bel}(z)(\mathrm{Lewis}) = \mathrm{R}(z)(\mathrm{prettiness})(\mathrm{London}) = 1)$$

Less formally, 'Lewis believes about London that it is pretty' is true just in case Lewis stands in the belief relation to a proposition that stands in the R-relation to prettiness and London.

Note that since we still treat 'believes' as semantically expressing the belief relation, which is propositional, this account does not require a lexical ambiguity in the attitude verb.[31] While I've remained agnostic as to whether belief-about reports are a species of de re belief report, it is nevertheless interesting that these semantics provide a theory-neutral way, if desired, to secure some form of de re truth-conditions without resorting to lexical ambiguity, so long as the R-relation is appropriately defined. Ultimately, I suggest that in order to explain the validity of the puzzling arguments while preserving a univocal, binary, and propositional semantics for 'believes', we adopt a more complicated semantics for the 'that'-clauses of belief-about reports and a compositional semantic derivation for their truth-conditions driven by a rather complicated

[31] Others, such as Cresswell and von Stechow (1982), Maier (2009), and Charlow and Sharvit (2014), posit a lexical ambiguity in 'believes' in order to account for certain de re readings of belief reports. Whether these readings require a lexical ambiguity is a complicated question that falls outside the scope of the present work. But if belief-about reports are a species of de re belief report, then they constitute novel linguistic data that these theorists must accommodate. Doing so might prove especially problematic for in situ approaches to the de re, since the res of a belief-about report appears outside of the 'that'-clause.

lexical entry for 'about'. The alternatives are either unsatisfactory or have yet to be produced, viz. to either flat-footedly deny the validity of the puzzling arguments or else to wait for an alternative solution.

§1.6 Concluding remarks

My goal in this section is to bring out some of the wider-reaching consequences of the preceding investigation before recapitulating a few key points. First, while the semantic account I provide for belief reports is conservative in important ways with respect to the standard view, the appeal to open propositions also endangers the popular view of propositions as a theoretically unifying category of objects. According to some advocates of the standard view, such as King et al. (2014), propositions earn their keep in our theories by uniformly playing a variety of theoretical roles, e.g. by being the semantic values of sentences, the contents of assertions, and the designations of 'that'-clauses. This understanding of propositions has been challenged by Dummett (1973, 1993), Lewis (1980), Stanley (1997a,b), Ninan (2010, 2012), and Rabern (2012a,b), all of whom provide reasons for thinking that propositions can't simultaneously play two or more of these roles.[32] In a similar vein, the puzzling arguments may be taken to show that propositions can't uniformly play the role of being designated by the 'that'-clauses of belief reports across contexts. While none of these considerations are by themselves knock-down arguments against the existence of propositions, we should nevertheless keep track of their collective weight.

Given all this, it is perhaps unsurprising that we can find historical precedents for rejecting the existence of propositions while offering a view of belief that parallels our account of belief-about. For their own reasons, Russell (1910) and Quine (1956) were skeptical of propositions and accordingly took belief to hold between between subjects, objects, and (respectively) properties and open sentences. Their shared error was to do away with propositions and force 'believes' to function as a variably polyadic predicate at logical form. But their shared insight was that a doxastic relation of adicity greater

[32]See a strong response to at least some of these earlier worries in King (2003).

than two would prove theoretically useful in understanding the nature of belief and the semantics of certain belief reports. In many ways, the account of belief-about I provide is a descendent of these historical, relational analyses of belief, although it is refined for a philosophical landscape friendly to propositions.[33]

Finally, it is noteworthy that ordinary language contains devices that express this kind of ternary doxastic relation. Let's say that a *doxastic similarity* is a similarity between subjects that obtains partly in virtue of the belief-involving states and activities of the subjects. Then belief-about reports allow us to report a kind of doxastic similarity that is not the result of shared objects of belief. These similarities do not concern the accidental manner in which subjects believe what they believe, like when Lewis and Peter believe different propositions on the same day or on the basis of the same evidence. Nor are they doxastic similarities between subjects who believe distinct propositions with similar modal profiles. Instead, belief-about reports uniquely enable us to report non-accidental, finely-grained doxastic similarities between subjects that are not the result of shared objects of belief, and it is surprising, especially from the perspective of the standard view, that ordinary language contains devices dedicated to this purpose.

Ultimately, in this work, I have mapped out a portion of logical space concerning the proper analysis of belief-about reports, the belief-about relation, and some valid inferences involving them that have not yet been sufficiently appreciated. The bottom line is that the puzzling arguments and their kin put those of us who take judgments concerning validity seriously in an awkward position. We must either deny the validity of these arguments, even though they seem valid and we have principled reasons for treating them as such, or else we must adopt something like the account I have provided, even though we might be dissatisfied with it in certain respects. For this reason, I ultimately conclude in the spirit of Kripke that 'the primary moral...is that the puzzle *is* a puzzle' (Kripke 1979, p. 156, emphasis in original). What's certain of belief-about

[33]See Lebens (2017) for a contemporary defense of the relational analysis of belief.

reports is what's certain of belief reports more generally, namely, that they'll continue to provide fertile ground for continued investigation.[34]

[34]Thanks to Josh Dever, Hans Kamp, Ray Buchanan, Mark Sainsbury, Jeff Speaks, Michelle Montague, David Beaver, Peter Hanks, Jon Litland, John Beavers, Michael Tye, Geoffrey Hall, Brendan Learnihan-Sylvester, and Ryan Simonelli for invaluable comments and discussion. Thanks also to participants of the 2018 Kamp Seminar in Language and Logic and the Graduate Student Colloquium Series at The University of Texas at Austin. Finally, many thanks to the editors of *Mind* and two anonymous referees for their insightful comments on earlier versions of this material.

Chapter 2: Belief is a Ternary Relation

Recall the following puzzling argument involving *belief-about reports* of the form ⌜S believes about o that it's F⌝:

Puzzling Argument

Lewis believes about London that it's pretty.

Peter believes about Paris that it's pretty.

So, Lewis believes about London something Peter believes about Paris.

In Chapter 1, I argued that in order to explain the validity of arguments such as this one, we should interpret the 'that'-clauses of belief-about reports as designating properties that are not standardly taken to be propositions, such as the property of being pretty. This suggestion was then implemented from the point of view of *the standard view*, on which *unadorned belief reports* of the form ⌜S believes that p⌝ are true in context c if and only if the referent of S in c stands in the belief relation to the proposition designated by ⌜that p⌝ in c. The result was a somewhat gerrymandered semantics for belief-about reports that left untouched the traditional, propositional semantics for unadorned reports. In either case, 'believes' was taken to semantically express a binary relation between subjects and propositions; the proposed semantic account for belief-about reports supplemented the standard view by accounting for the peculiar behavior of 'that'-clauses and the semantic contribution of 'about' in contexts such as those of the puzzling argument and its kin. As I'll argue in this chapter, however, the semantic complexity of the resulting view is objectionable and warrants an investigation into alternatives.

The datum of the puzzling argument naturally suggests one particular alternative, namely, that a belief-about report of the form ⌜S believes about o that it's F⌝ is true in c just in case the referent of S in c stands in the belief relation, which is crucially taken to be ternary, to the referent of o in c and the property designated by ⌜that it's F⌝ in c. If this is the proper treatment of the semantics of belief-about reports,

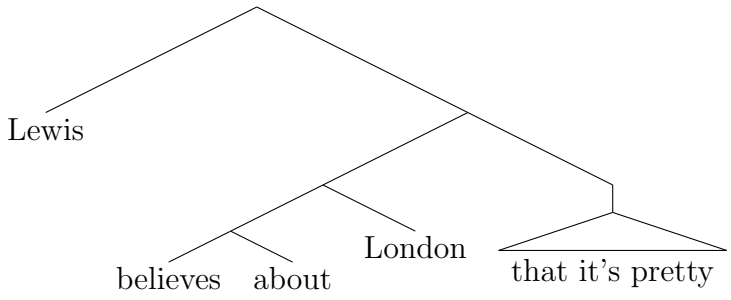
then considerations of linguistic economy favor extending it to unadorned belief reports, as well, so as to generalize to the worst case. The goals of this work are to explicate such a view, implement it in accordance with formal theories of syntax and semantics, compare it to adjacent views in the literature, and defend it against some powerful objections. In the end, I'll argue that the view is worth taking seriously because, in addition to receiving empirical support from contemporary linguistics, it also affords a number of theoretical benefits, including a simple explanation of the puzzling arguments, a unified treatment of attitudinal contents as properties, a characterization of propositions as a certain kind of property of possible worlds, a unified analysis of relative truth, and more.

This chapter proceeds as follows. In §2.1, I'll argue that the view developed in Chapter 1 is objectionably ad hoc. In §2.2, I'll introduce a new view called *the target and content view (TAC)* as a superior alternative. In §2.3, I'll provide a formal implementation of this theory in accordance with contemporary theories of syntax and semantics. In §2.4, I'll argue that the resulting view is neutral with respect to popular views in the philosophy of mind concerning the nature of belief. In §2.5, I'll develop accounts of propositions, truth, and related notions that follow naturally from TAC. In §2.6, I'll compare it to a variety of adjacent views in the literature and respond to some pressing objections in the process. In §2.7, I'll recapitulate a few key points and summarize the costs and benefits of TAC. In the end, I'll conclude that the view is worth taking seriously both as a semantics for belief reports and as a metaphysical account of the nature of propositions.

§2.1 The Standard View$^+$

Let's call the semantic account of belief-about reports developed in Chapter 1 *the standard view*$^+$. According to this view, the logical form of a belief-about report can be represented at the relevant degree of abstraction by a syntax tree such as the following:

(1)



where 'Lewis' refers to Lewis, 'London' refers to London, 'that it's pretty' designates prettiness, and 'believes' semantically expresses the belief relation, which is a binary relation between subjects and propositions. Our focus will be on the proposed semantic value for 'about,' which is given as follows:

$$[\![\textbf{about}]\!]^g = \lambda Q_{<t,<e,t>>} \lambda x_e \lambda P_{<e,t>} \lambda y_e \exists z (Q(z)(y) = \mathrm{R}(z)(P)(x) = 1)$$

where the R-relation maps a proposition, property, and thing to 1 just in case, intuitively, the proposition ascribes that property to that thing – however the notion of ascription winds up being analyzed according to a theorist's preference. The noticeable complexity of this semantic value justifiably raises suspicion.

It must first be noted that this view does not involve a type-shifting operation in the tradition of Partee and Rooth (1983), which is a semantic derivation rule the use of which is justified by a type mismatch between sister nodes.[1] For example, interpreting the conjunctive NP 'John and every boy' requires shifting the type of 'John' in order to match the type of 'every boy'; conjunction requires arguments of the same semantic type. By syntactically representing type-shifted expressions with asterisks, we can formulate the shift from type e to type $<<e,t>,t>$ in the following way:

$$[\![\textbf{John}^*_{ett}]\!] = \lambda P_{et}.P([\![\textbf{John}_e]\!])$$

The standard view$^+$ doesn't involve a traditional example of type-shifting because there's no initial mismatch of types between sister nodes according to how the semantic values

[1] Contra the following suggestive remark in Chapter 1:

> The validity of the cake arguments can be explained instead in terms of a semantic type-shifting operation that makes 'a birthday cake' designate a type of cake in this context. This suggests a way forward for the puzzling arguments.

are currently defined. Considering how 'about' is used in other sentences of English, the proposed semantic value of 'about' involves a polysemy, at best, or an ambiguity, at worst. This starts to make the view look objectionaly ad hoc unless some independent motivation for these hypotheses can be provided.

An advocate of the standard view$^+$ might respond by noting that a trivial modification to their view can introduce a mismatch of types. Suppose, for instance, that 'about' is instead taken to be a syncategorematic expression that doesn't meaningfully enter into the compositional derivation. Then 'believes,' which has type $<t,<e,t>>$, and 'London,' which has type e, would not have compatible semantic types. We could then invoke a type-shift operation to turn the semantic value of 'believes' into that which the standard view$^+$ ultimately assigns to 'believes about,' as in the following:

$$[\![\textbf{believes}^*]\!] = \lambda x_e \lambda P_{et} \lambda y_e \exists z_t([\![\textbf{believes}]\!](Q)(y) = R(z)(P)(x) = 1)$$

The derivation would proceed unchanged otherwise, but it would now involve a genuine instance of a type-shifting operation.

This approach, however, is also unlike a traditional example of type-shifting because it introduces into the compositional derivation the R-relation, which is not part of the λ-calculus. Instead, the R-relation is meant to capture the relationship between propositions and the things that they are intuitively about, and there are substantive disagreements about what this amounts to. The suggestion is to brute force a mismatch of types in order to invoke a type-shifting operation that introduces the extra-logical notion(s) required to derive the target truth-conditions, but allowing such a strategy would seemingly grant us the ability to compositionally derive any target truth-conditions for any sentence whatsoever. It would be preferable for our theories of syntax and semantics to constrain the availability of truth-conditions rather than to permit them arbitrarily.

A more plausible response to the worry is to concede that the standard view$^+$ requires a polysemy in 'about' but to further provide independent motivation for it. Consider, for example, the following sentences:

(2) Mike owes me about fifty dollars.

(3) Serena is about to fall asleep.

(4) The rugs were strewn about the hall.

(5) Joe read a book about arithmetic.

In (2), the meaning of 'about' involves numerical approximation or proximity. In (3), it involves temporal proximity in the direction of the future. In (4), it involves spatial proximity. In (5), it involves the traditional, philosophical notion of intentionality, which we might speculatively categorize as a kind of representational proximity. So, even in the absence of belief-about reports, there are strong reasons for taking 'about' to be polysemous. This hypothesis accords with the flexibility of prepositions as a syntacatic category, more generally, as a similar variety of related meanings can be observed for 'in,' 'on,' and so forth.

In light of this, the problem with the standard view^{+} isn't that it requires a polysemy; it's that the semantic value for 'about' drives the majority of the compositional derivation of a belief-about report through an exceedingly complex semantic type. In (1), for example, the semantic value of 'about' operates via successive functional application on the semantic values of 'believes,' 'London,' 'that it's pretty,' and 'Lewis,' giving it the semantic type $<tet,<e,<et,<e,t>>>>>$. Even without providing a rigorous compositional semantics for (2)–(5), it's clear that 'about' in these sentences modifies phrases in a manner more typical of prepositions. In (2)-(3), for example, 'about' plausibly has the semantic type $<et,et>$, and in (4)-(5), it plausibly has the semantic type $<e,<et,et>>$. Since the standard view^{+} requires an exceedingly complicated semantic type for 'about' that goes beyond what normal uses of it as a preposition require, one might reasonably worry that the view is objectionably ad hoc. While it might turn out that the cost of this semantic complexity is worth paying, alternative accounts of the validity of the puzzling argument and its kin ought to be considered before making such a determination.

§2.2 The Target and Content View (TAC)

One particular alternative that naturally suggests itself is to explain the validity of the puzzling argument through an assignment of logical forms such as the following:

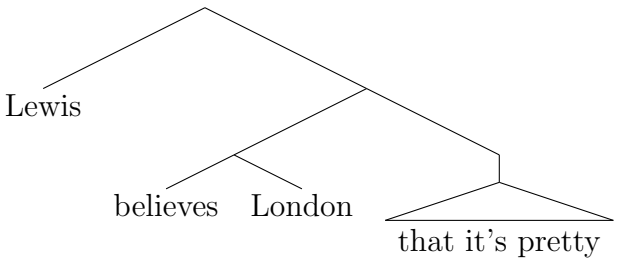
$Babc$

$Bdec$

$\therefore \exists x(Babx \ \& \ Bdex)$

On the intended interpretation, the constants are assigned (in order of appearance) to Lewis, London, the property of being pretty, Peter, and Paris, and the predicate 'B' is assigned to the belief relation, which is taken to be a ternary relation between subjects, things, and properties. The 'that'-clause is still taken to designate a property in the same manner as the standard view^{+}. As a first approximation, the logical form of the first premise of the puzzling argument can be represented at the relevant degree of abstraction by a syntax tree such as the following:

(6)



Here, 'about' does not appear at LF, since it is semantically vacuous and plays the role of a syncategorematic indicator of (or case marker for) the verb's first argument. 'believes' is a ditransitive verb of type $<e,<et,et>>$, for which the derivation of truth-conditions is routine. The result is that a belief-about report of the form $\ulcorner S$ believes about o that it's $F\urcorner$ is true in c just in case the referent of S in c stands in the belief relation to the referent of o in c and the property designated by $\ulcorner$that it's $F\urcorner$ in c. The view is not that there is a ternary belief relation in addition to a binary belief relation; the view is that there is only one belief relation, which is semantically expressed by 'believes' when it operates on (at least) a clausal complement, and which is ternary. I'll sometimes talk about "the ternary belief relation" and "the binary belief relation," but

this talk should be understood as talk about the belief relation, which is taken to be ternary on some views and binary on others.[2]

Some views, such as Cresswell and von Stechow (1982) and Maier (2009), take 'believes,' and other attitude verbs, to be ambiguous or polysemous in contexts that give rise to so-called "de dicto," "de re," and "de se" readings, but there doesn't appear to be any cross-linguistic evidence for such hypotheses, and an explanatorily equivalent semantics with fewer ambiguities is theoretically desirable. Absent reasons to the contrary, I'll operate under the assumption that attitude verbs taking clausal complements are univocal. But this means that if 'believes' is a ternary predicate at LF in the context of belief-about reports, then considerations of linguistic economy favor extending this treatment to unadorned belief reports, as well. The suggestion is to therefore generalize to the worst case by treating unadorned belief reports as belief-about reports at LF.

Let's conform to traditional usage by calling the theoretical role that a property, such as prettiness, plays in a belief-about report the *content* of the reported belief; such properties can be evaluated for truth-values relative to parameters that include individuals, as emphasized by Jubien (1993). But let's break from tradition by introducing a new theoretical role to be played by a thing, such as London, in a belief-about report. Let's call it the *target* of the reported belief, with the analogy in mind that the subject aims the content at the target. Then in the first premise of the puzzling argument, the target of Lewis's reported belief is London, and its content is the property of being pretty. Setting aside some details we'll address later, a reported belief is true just in case its target instantiates its content.

Now consider the following unadorned belief report:

(7) Lewis believes that London is pretty.

In order to generalize the semantics of 'believes' to this report, the proposal is to take

[2]There's a case to be made for calling the belief relation on the view I propose "the belief-about relation," but this engenders more confusion than clarity.

the logical form of (7) to be more clearly displayed by rewriting it as follows:

(8) Lewis believes (about α) that London is pretty.

where 'α' names some object as the target of the reported belief, and 'that London is pretty' designates some property as its content. In the case of an unadorned belief report at surface form, such as (7), let's call the content a *proposition*. Then the task at hand is to give a plausible account of the target named by 'α' and the proposition designated by 'that London is pretty.' There are undoubtedly a variety of proposals worth considering on this front, but one proposal, in particular, seems to stand out given the requirement that propositions are properties. The proposal I have in mind is grounded in a natural way of speaking suggested by Speaks (2014b) when he writes the following:

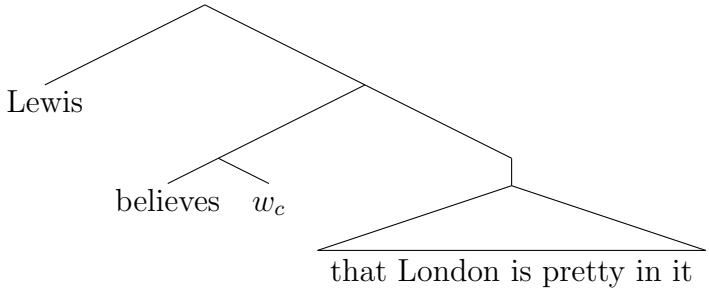
> Though the view that propositions are a sort of property may sound odd at first, it actually fits rather naturally much of our talk about propositions. We might say that *believing a proposition, for example, is taking the world to be a certain way*. But if, as it seems, "ways things are" are properties, this indicates that having a belief is taking a certain attitude toward a property. (75, emphasis mine)

One way to interpret this remark, albeit not representative of the view that Speaks ultimately provides, is that the target of a typical belief is the actual world, and the content of a typical belief is a property of possible worlds. Having said this is not yet to have identified any particular property of possible worlds as a "content" in the terminology of our theory, but I'll now propose such a view the justification of which will be provided upon considering its formal implementation.

According to an informal formulation of what I'll call *the target and content view (TAC)*, (i) the target of Lewis's reported belief in (7), and the value of 'α' in (8), is the world of the circumstance of evaluation, which can normally be thought of as the actual world, and (ii) the content of Lewis's reported belief in (7), and the proposition designated by 'that London is pretty,' is the property of being a possible world w

such that London is pretty in w. The informal formulation of this view takes the logical form of (7) in c to be represented at the relevant degree of abstraction by a syntax tree such as the following:

(9)



where 'w_c' refers to the world of the circumstance of evaluation and, in accordance with the standard view$^+$, 'that London is pretty in it' designates a property specifiable in terms of the λ-calculus, viz. λw(London is pretty in w). The terms of the λ-calculus are understood here to designate finely grained functions-in-intension, or what Church (1941) calls "rules of correspondence."[3] Finally, 'believes' is a ditransitive verb that semantically expresses the ternary belief relation, which obtains between a subject S, thing o, and property F.

The informal formulation of TAC can be summarized as the conjunction of the following semantic theses:

- $\ulcorner S$ believes about o that it's $F\urcorner$ is true in c iff the referent of S in c stands in the ternary belief relation to the referent of o in c and the property designated by $\ulcorner$that it's $F\urcorner$ in c.

- The logical form of $\ulcorner S$ believes that o is $F\urcorner$ in c is more clearly displayed by rewriting it as $\ulcorner S$ believes about w_c that o is F in it,$\urcorner$ where 'w_c' refers to the world of the relevant circumstance of evaluation.

[3]This isn't an essential feature of TAC or the standard view$^+$, but it reflects the popular view that properties and relations are more finely grained than functions on the extensional conception standard to mathematics. It will turn out, however, that the extensional characterization of λ-terms can't be combined (given TAC) with a reductive view of possible worlds as sets of propositions, unless one endorses a non-well-founded set theory. For more on the fine-grained interpretation of the λ-calculus, see §1.2 of Alama and Korbmacher (2018).

TAC has some important theoretical benefits the full exploration of which will occupy us for the remainder of this work. Here are a few of them that arise at first glance. It simply explains the validity of the puzzling arguments without any objectionably ad hoc lexical entries. It explains without further elaboration the validity of many simple argumentative forms taken to support the standard view$^+$; for example, $\ulcorner S$ believes that $p\urcorner$ and $\ulcorner S'$ believes that $p\urcorner$ are correctly predicted to entail $\ulcorner S$ believes something$\urcorner$ and $\ulcorner S$ believes what S' believes.$\urcorner$ It offers a theoretically unifying account of the designations of 'that'-clauses across contexts as properties. It provides an account of propositions, understood as the designations of the 'that'-clauses of unadorned reports, as a certain kind of property of possible worlds. Like any view, TAC faces objections and has costs, too. But before we delve more deeply its philosophical consequences, it remains to be shown that TAC can be formally implemented in accordance with contemporary theories of syntax and compositional semantics. Doing so will allow us to add some nuance to the view, as well.

§2.3 Formal Implementation

The formal implementation of TAC I'll propose is supported by work on variable-based theories of intensionality, the locus classicus of which is Percus (2000). The precise linguistic motivation for this family of semantic views falls outside the scope of this work, but the guiding idea is to adopt an intensional semantic framework in which covert possible world variables, $w_0, w_1, \ldots$, are generated as sisters to lexical predicates at LF.[4] The syntax therefore generates logical forms such as the following:

(10) [Serena [smile w_1]]

where the semantic value of 'smile' in context is the intension that maps a possible world w to the characteristic function of the set of smiling things in w. As von Fintel and Heim (2011) point out, such a view can be made to work by letting unbound world variables at LF be interpreted by default as the world of the context of utterance, and

[4]Variable-based theories of intensionality solve problems with scope-based theories of intensionality, such as the problem of the third reading of indefinites in Fodor (1970) and the scope paradox in Bäuerle (1983). For a comprehensive overview, see §4 of Grano (2021).

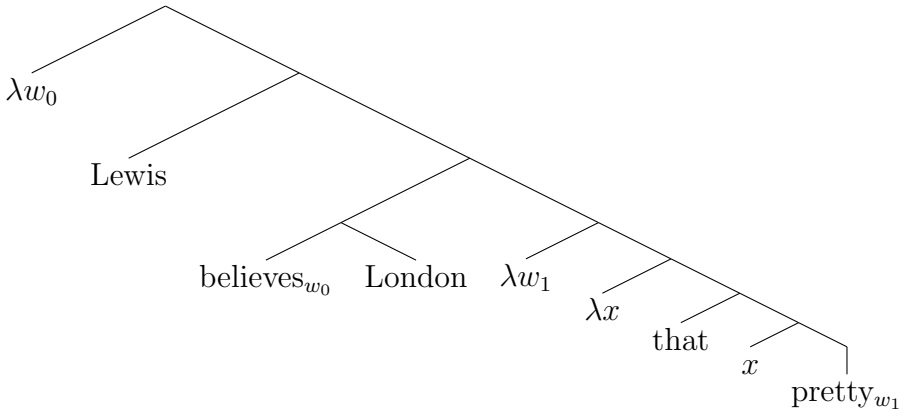
this is how the informal formulation of TAC works, but a more common alternative is to introduce a λ-binder at the top of the clause, as in the following:

(11) [λw_1 [Serena [smile w_1]]]

The semantic value of this logical form in context c is then the intension that maps a world w to 1 just in case Serena smiles in w. We'll say that a sentence S is true in c just in case the logical form of S in c maps the world of c to 1.

The formal implementation of TAC will make use of intensional entities of type $<s,<*,t>>$, where '$*$' stands for any primitive semantic type; entities of type $<s,<e,t>>$ are intensional monadic properties of things like tables, and entities of type $<s,<s,t>>$ are intensional monadic properties of possible worlds.[5] Surface form belief-about reports such as the first premise of the puzzling argument will then be assigned a logical form such as the following:

(12)



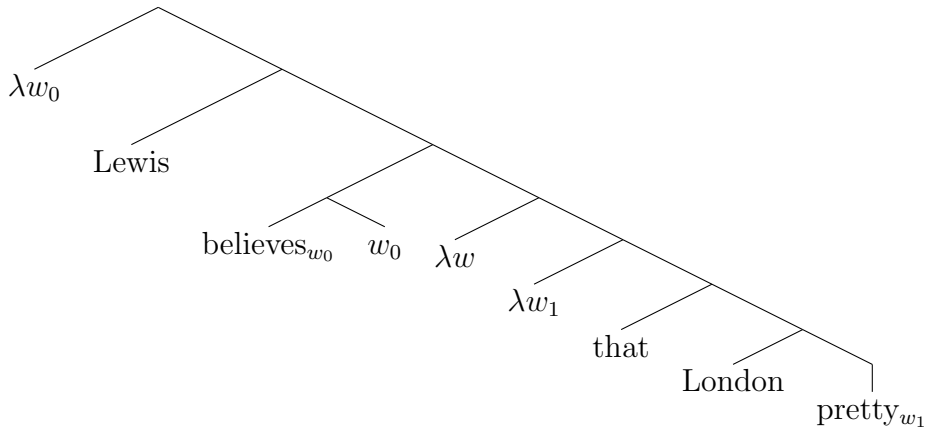
The rough sketch of how this logical form is syntactically derived runs as follows. First, 'London' moves from inside the 'that'-clause to the target position of the attitude verb (à la "res movement" in Heim (1994)), leaving behind a trace of type e and inserting

[5]If someone insists that what I'm calling "intensional monadic properties" are really binary relations between possible worlds and things, I would not object to this way of speaking. The most important thing is to be clear about how one is regimenting their theoretical vocabulary. An intensional monadic property can be understood as a relation between a thing and a world, and an intensional binary relation can be understood as a ternary relation between two things and a world. I would insist that "the (non-intensional) monadic property of being pretty simpliciter" is $\lambda x(Pretty(@)(x))$, where '@' refers to the actual world. And I would insist that some thing x instantiates an intensional monadic property P just in case $P(@)(x) = \text{TRUE}$.

a co-indexed λ-binder at the top of the clause. Then the predicate 'pretty' projects a world variable λ-binder co-indexed with the verb's subscripted world variable ('w_1') at the top of the clause.[6] In terms of the compositional derivation, the predicate abstracts are interpreted by the rule of Predicate Abstraction as in Chapter 1. We'll call the semantic value of 'pretty' (in c) '*Pretty*'. Then given the standard semantics for the λ-calculus, the 'that'-clause in (12) designates $\lambda w \lambda x(\mathit{Pretty}(w)(x))$.[7] By η-reduction, $\lambda w \lambda x(\mathit{Pretty}(w)(x)) = \mathit{Pretty}$. In this way, the entire 'that'-clause of (12) designates *Pretty*, conceived of as an intensional monadic property.

Now we have to generalize this treatment to unadorned belief reports. The proposal will be that the logical form of (7) across contexts can be represented as follows:

(13)



The syntactic story behind this logical form is roughly analogous to the one provided for (12). The idea is that 'w_0' starts out as the lexical sister to 'pretty' before moving (via 'res'-movement) to the target position of the attitude verb; it leaves behind a trace of type s ('w_1') and inserts a co-indexed λ-binder ('λw_1') at the top of the clause. Then the predicate 'pretty' tries to project a λ-binder to bind its lexical sister, but finding it already bound, projects a dummy 'λw' at the top of the clause instead. The 'that'-clause in (12) accordingly designates $\lambda w \lambda w_1(\mathit{Pretty}(w_1)(\mathit{London}))$, conceived of as an

[6]Note that there can be a separate logical form corresponding to [λw_0 Lewis believes$_{w_0}$ w_0 λ_{w_1} that x is pretty$_{w_1}$], in which the unbound occurrence of x receives its interpretation from the variable assignment function.

[7]We could also write this as '$\lambda w \lambda x(\mathit{Pretty}(w)(x) = 1)$' or '$\lambda w \lambda x(\mathit{Pretty}(w)(x) = \textsc{true})$'. Someone, such as myself, committed to speaking First-Orderese and avoiding arbitrariness in the metaphysics of properties will take there to exist entities corresponding to truth-values. Someone willing to speak Higher-Orderese will not require this commitment given my use of the λ-calculus.

intensional monadic property of possible worlds.[8]

We'll assume a standard semantic type hierarchy generated by the primitive types e for things, t for truth-values, and s for possible worlds. But 'believes' needs to operate on targets of types e and s in addition to contents of types $<s,<e,t>>$ and $<s,<s,t>>$. So, we'll introduce a "disjunctive" type $e \vee s$ that includes types e and s; in particular, $D_{e \vee s} = D_e \cup D_s$. Then 'believes' will have the following lexical entry (in c):

$$[\![\textbf{believe}]\!]^c = \lambda w_s \lambda x_{e \vee s} \lambda P_{<s,<e \vee s,t>>} \lambda y_e (y \text{ stands in the belief relation in } w \text{ to } x \text{ and } P)$$

This semantic value isn't significantly more complex than that of any other ditransitive verb in such an intensional system; the semantic type of 'believe' is complex, but this is the result of having first taken entities of type e and s to be disjoint.[9] Semantic composition proceeds in the usual way, resulting in the following truth-conditions in context:

$[\![(12)]\!]^c = 1$ if and only if Lewis stands in the belief relation (in w_c) to London and $\lambda w \lambda x(Pretty(w)(x))$, i.e. $Pretty$.

$[\![(13)]\!]^c = 1$ if and only if Lewis stands in the belief relation (in w_c) to w_c and $\lambda w \lambda w_1(Pretty(w_1)(\text{London}))$.

The basic idea behind this formal implementation is that there are two syntactic transformations that result in λ-binders at the top of the subordinate clause: res-movement and predicate projection. In the case of a surface form belief-about report, the target raises from a nominal position in the 'that'-clause, whereas in the case of surface form unadorned report, the target raises from the position of the lexical sister of the predicate in the 'that'-clause. In both cases, the predicate projects in the manner typical

[8]Someone might suggest an alternative implementation of TAC that is sympathetic to the view held by Speaks (2014b) that propositions are properties of everything or nothing, and that, for instance, the proposition that London is pretty is the property of being such that London is pretty. On this implementation, the 'that'-clause of (12) designates $\lambda w \lambda x(Pretty(w)(x))$, and the 'that'-clause of (13) designates $\lambda w \lambda x(Pretty(w)(London))$; in both cases, the '$\lambda w$' comes from the predicate's projection, and the 'λx' comes from the complementizer 'that.' One could then say that the proposition that London is pretty is the *intensional* monadic property of being such that London is pretty. This view is worth exploring more.

[9]I don't take semantic types to correspond to fundamental ontological categories, although they are useful for bookkeeping purposes. In my ideal semantics, every entity has (at least) type e.

to (variable-based) intensional semantic frameworks. All 'that'-clauses designate intensional monadic properties of things or possible worlds.

The addition of the λ-operator, which binds the possible world variable, at the top of the clause means that TAC straightforwardly handles embedded constructions – such as counterfactual conditionals, doubly-embedded reports, sentential negations, and so on – under the assumption that these constructions are treated as sentential operators at LF. The ability to easily accommodate embedded constructions is one of the purposes behind moving to such an intensional semantic framework, the other being a linguistic justification for taking the 'that'-clauses of unadorned reports to designate properties of possible worlds (in context). Most of the philosophical issues we'll go on to discuss do not require the formal implementation of TAC. So, for ease of exposition, it is sometimes preferable to drop the intensional semantic framework and to think of (e.g.) the property of being pretty simply as $\lambda x(x$ is pretty), the proposition that London is pretty simply as λw(London is pretty in w), instantiation as simply obtaining between things and properties, and so on. We'll move into the formal versions of these identifications only when necessary.

§2.4 Metaphysics of Belief

It's common to make a distinction between the semantics of attitude reports and the metaphysics of the reported attitudes. Getting clear on this requires aligning on terminology. By 'belief,' for instance, I mean nothing more than the relation semantically expressed (in context) by the predicate, 'believes,' when it selects for (at least) a clausal complement. From this it follows that TAC places certain requirements that one might plausibly call "metaphysical" on belief. It requires, for example, that belief is a ternary relation that obtains between subjects, things, and properties. This is conceptually distinct, however, from what many call "the metaphysics of belief," by which they mean a metaphysical analysis of belief in the form of instantiation conditions specified without reference to belief itself. It is then an open question whether TAC places interesting requirements on the metaphysics of belief, so understood.

To address this question, it will first be useful to recognize that TAC doesn't entail – for better or worse – anything about the logical relationship between the following reports:

(14) ⌜S' believes that o' is F'.⌝

(15) ⌜S' believes about o' that it's F'.⌝

According to TAC, these sentences are true in context c under the following conditions, respectively, where S', o', and F' are interpreted as S, o, and F:

(16) S stands in the belief relation (in w_c) to w_c and $\lambda w(o$ is F in $w)$.

(17) S stands in the belief relation (in w_c) to o and $\lambda x(x$ is $F)$.

There are many views that relate (16) and (17) by entailment, (partial) metaphysical explanation, or neither of these. The correct view will largely depend on what relationships (if any) must obtain between subjects and the targets of their beliefs, on the one hand, and subjects and the contents of their beliefs, on the other. Suppose, for instance, that whenever a subject S stands in the belief relation to a target o and content p, then (i) S is in a mental state that reliably indicates of o under normal circumstances that it instantiates p, and (ii) S bears a special relation of causal or epistemic acquaintance to o (but not necessarily to p). Then whether (17) entails (16) (and vice versa) depends on whether being acquainted with o in a world w requires being acquainted with w itself (and vice versa); condition (ii) seems less important here, because indicating of o that it's F in w seems to require indicating of w that o is F in it (and vice versa). Under these assumptions, the most plausible entailment (if any) seems to be from (16) to (17), since acquaintance with an object in a world can plausibly ground acquaintance with the world itself.[10]

Alternatively, suppose that there are no such requirements on the belief relation and that, as a result, (16) and (17) entail one another. Then perhaps the choice of which to assert in a given context is a matter of what one wishes to emphasize or

[10]We'll consider an objection to this line of thought later.

bring into focus. One might think that passivization is roughly analogous; 'Alex loves Serena' is true just if Alex instantiates the property of loving Serena, and 'Serena is loved by Alex' is true just if Serena instantiates the property of being loved by Alex. In both cases, a syntactic movement operation results in metaphysically equivalent truth-conditions specified in terms of distinct, but related, properties.

A similar point can be made about the variety of views that can relate (16) and (17) by (partial) metaphysical explanation. According to TAC, there's a class of beliefs the contents of which are propositions, and there's a disjoint class of beliefs the contents of which are properties that are not propositions. It's an open question whether one of these classes forms a partial ground for the other. Suppose, for example, that subjects primarily have beliefs the contents of which are propositions, and that these beliefs, when combined with special relations of acquaintance to individual objects, ground the subjects' beliefs the contents of which are properties that are not propositions. Then (16) would be a partial ground of (17). This is an interesting position to which we'll return later. For now, I won't take a stand on these questions, especially since I take the relations in question – entailment in particular – to be the proper object of empirical investigation.[11] The important point is that TAC doesn't require by itself any entailment or (partial) explanatory relations to obtain between (16) and (17). A fortiori, it doesn't predict by itself that there is any logical relationship between (14) and (15). This strikes me as a virtue of the view, since debates surrounding the validity of exportation largely turn on questions about the semantics of proper names, such as whether they are Fregean in nature and how to best understand empty names.[12]

Let's now consider the question of whether endorsing TAC requires one to forfeit the thesis of *propositionalism about belief*, according to which the belief relation

[11]For some relevant empirical work on the 'belief about' construction, see §1.4.iv of Hawthorne and Manley (2012).

[12]Someone might object that this is a vice of the view because a semantic theory should predict that (14) and (15) entail each other. An advocate of TAC can claim that, at best, (14) and (15) modally entail one another, but then an objector can just as well claim that the puzzling arguments are only modally valid. I take it, however, that cases of empty names provide a prima facie reason for thinking that exportation is not semantically guaranteed. Thanks to Jeff Speaks for this point.

is either identical with or otherwise metaphysically analyzed in terms of a relation to propositions.[13] To that end, suppose there's a fundamental doxastic relation, *belief**, that's binary, propositional, and referenced in a statement of the instantiation conditions of the (ternary) belief relation. One version of this view analyzes *that S stands in the (ternary) belief relation to o and F-ness* in terms of *that for some proposition p, S stands in the belief* relation to p, and p attributes F-ness to o*. The result would be the following analysans for (16) and (17), respectively:

(18) For some proposition p, S stands in the belief* relation (in w_c) to p, and p attributes $\lambda w(o \text{ is } F \text{ in } w)$ to w_c.

(19) For some proposition p, S stands in the belief* relation (in w_c) to p, and p attributes $\lambda x(x \text{ is } F)$ to o.

There is nothing logically inconsistent with endorsing a view along these lines, and so in that sense TAC is logically consistent with propositionalism about belief. By endorsing TAC, however, one forfeits the traditional semantic motivation for propositionalism, namely, that certain valid inferences involving belief reports require treating 'believes' as a binary predicate at LF. And without this source of justification, it's unclear why someone would maintain a propositional analysis of belief. Perhaps there are other, non-semantic reasons to prefer a propositional ground floor. Absent such reasons, however, TAC is most naturally paired with a non-propositional analysis of belief, that is, one on which the ternary belief relation is the fundamental doxastic notion.

It does not follow from this that TAC requires a radical revision to contemporary debates concerning the analysis of belief, even if these debates normally operate under the assumption of propositionalism; TAC is consistent with taking the (ternary) belief relation to be metaphysically analyzable in non-doxastic terms within competing frameworks. For example, according to standard forms of representationalism about belief, as in Fodor (1975), Millikan (1984), Dretske (1988), and Burge (2010), S stands in the

[13]For more on propositionalism, see Grzankowski (2012).

(binary) belief relation to the proposition p just in case S has some mental representation x such that (i) the content of x is p, and (ii) x is a belief state. Such a view is popularly combined with the functionalist thesis that a mental state falls under a particular kind, e.g. belief, due to the causal relations it bears – actually, potentially, or under normal circumstances – to other mental states, behaviors, and features of the environment. For example, if S has two belief states with the propositions designated by p and ⌜if p, then q⌝ as their content, respectively, and if S is not antecedently committed to the falsity of the proposition designated by q, then S's aforementioned belief states typically cause S to have a belief state the content of which is the proposition designated by q.

Advocates of TAC can endorse a suitably modified version of representationalism according to which S stands in the (ternary) belief relation to target o and content p just in case S has mental representations x and y such that (i) the content of x is o, (ii) the content of y is F, (iii) x is a target state with respect to y, and (iv) y is a belief state with respect to x. Then one can define the functional roles of target and belief states in a suitably modified way: if S has four states x_1, x_2, y_1, y_2 such that x_1 is a target state with respect to y_1, y_1 is a belief state with respect to x_1, the content of x_1 is o, the content of y_1 is the property designated by ⌜that it's F⌝, x_2 is a target state with respect to y_2, y_2 is a belief state with respect to x_2, the content of x_2 is o, the content of y_2 is the property designated by ⌜that if it's F, then it's G⌝, and if S is not antecedently committed to o not instantiating the property designated by ⌜that it's G⌝, then the aforementioned target and belief states of S typically cause S to have states x_3 and y_3 such that x_3 is a target state with respect to y_3, y_3 is a belief state with respect to x_3, the content of x_3 is o, and the content of y_3 is the property designated by ⌜that it's G⌝. While the functional roles of being a target state with respect to something and being a belief state with respect to something must be specified simultaneously, this doesn't pose a problem for the canonical Ramsey-Lewis method, as in Lewis (1972), of defining functional roles "all at once."

Analogous remarks apply to less popular theories in the philosophy of mind, including contemporary forms of so-called liberal dispositionalism, as in Audi (1972), Baker (1995), and Schwitzgebel (2013), and interpretationism, as in Dennett (1987) and Davidson (1984). According to liberal dispositionalism, S stands in the (binary) belief relation to the proposition that p just in case S is disposed to act as if p were true or is otherwise disposed to undergo certain private mental episodes requiring further specification. For advocates of TAC, loose dispositionalism amounts to the claim that S stands in the (ternary) belief relation to o and F just in case S is disposed to act as if o instantiates F or is otherwise disposed to undergo certain private mental episodes requiring further specification. According to interpretationism, attributions of belief take place from within the so-called "intentional stance," which is useful for predicting behavior. To the extent that such a view is consistent with any objectual semantics for attitude reports, it's consistent with TAC. The upshot is that TAC is situated squarely within the semantics of the attitude verbs, which has some consequences for belief ipso facto, but which does not introduce advantages or disadvantages for particular views within contemporary debates about the metaphysics of the attitudes.

§2.5 Propositions, Truth, and Assertion

Much ink has been spilled on the nature of propositions, understood as that which plays (some combination of) the following theoretical roles: (i) the designations of 'that'-clauses in context, (ii) the compositional semantic values of sentences in context, (iii) the primary bearers of truth and falsity, and (iv) the objects of speech acts such as assertion and mental states such as belief.[14] According to TAC, some surface form belief-about reports have 'that'-clauses that designate properties not typically considered to be propositions, such as the property of being pretty. TAC therefore requires making a distinction between contents that are propositions and contents that are not, but it also provides the unifying characterization of all attitudinal content in terms of prop-

[14]For a collection of views emphasizing the theoretical unity afforded by theories of propositions, see King et al. (2014).

erties of some kind or another.[15] And propositions, understood as the designations of 'that'-clauses in unadorned reports at surface form, can be further characterized as a certain kind of property of possible worlds. The proposition that London is pretty, for example, is the property of being a possible world w such that London is pretty in w.

Some properties instantiated by possible worlds, however, are not propositions, as the property of being self-identical demonstrates. Some properties instantiated exclusively by possible worlds, even, are not propositions, as the property of being a possible world demonstrates.[16] What's more, some propositions on this conception are not instantiated by any possible world, as the proposition that London is Paris ($= \lambda w(\mathit{Identity}(w)(\text{London})(\text{Paris}))$) demonstrates. So, while I've given some examples of properties that are propositions according to TAC, I haven't yet given a necessary and sufficient condition for *being a proposition*.

One way to provide such a condition involves constructing an infinite set of properties.[17] The guiding intuition is that every proposition either attributes a monadic property to one thing, or a binary relation to two things, or a ternary relation to three things, and so on. Roughly, then, p is a proposition if and only if either (i) for some thing x_1 and some monadic property F-ness, p is the property of being a possible world w such that x_1 is F in w, or (ii) for some things x_1, x_2 and some binary relation R-ness, p is the property of being a possible world w such that x_1 and x_2 are R in w, or ... (n) for some things $x_1, x_2 \ldots, x_n$ and some n-ary relation R-ness, p is the property of being a possible world w such that $x_1 \ldots x_n$ are R in w, and so on. Properly stating this requires moving into the formal implementation of TAC. Let Π be the infinite set of properties specified in the following way:

$$\lambda p_{<s,<s,t>>}(\exists x_1)(\exists Y)[p = \lambda w \lambda w_1(Y(w_1)(x_1))],$$
$$\lambda p_{<s,<s,t>>}(\exists x_1, x_2)(\exists Y)[p = \lambda w \lambda w_1(Y(w_1)(x_1)(x_2))],$$

[15] In this work, 'attitudinal content' refers to the content of attitudes semantically expressed (in context) by verbs operating on clausal complements. This leaves open whether there are other attitudes with non-propositional contents, as defended by Grzankowski (2012).

[16] Here the assumption that properties are more finely grained than sets is operative.

[17] Or, equivalently, constructing an infinite conjunction.

$$\ldots$$

$$\lambda p_{<s,<s,t>>}(\exists x_1, x_2, \ldots, x_n)(\exists Y)[p = \lambda w \lambda w_1(Y(w_1)(x_1)\ldots(x_n))],$$

$$\ldots$$

Then we have the following characterization of being a proposition:

PROP: $(\forall x)(x$ is a proposition if and only if $(\exists \varphi \in \Pi)(x$ instantiates $\varphi))$

I only intend this as an extensionally adequate characterization, and not as a metaphysical analysis. We can carve out the propositions from all of the other properties, but that doesn't mean that propositions have natures distinct from them. If that's right, then an extensionally adequate criterion is all we can hope for to set propositions apart as a kind of property of possible worlds.[18]

Just as much ink has been spilled on the question of to which parameters, if any, propositions bear truth-values (fundamentally): possible worlds, times, locations, bodies of knowledge, agents, standards of precision, taste, or normativity, and so on. Since TAC takes propositions to be properties of possible worlds, it's most naturally understood as requiring propositions to bear truth-values relative to possible worlds, at least. For this purpose, we'll use the English locution $\ulcorner F$ is true of $x\urcorner$ to express such a binary truth relation that obtains between propositions and possible worlds. The following principle seems very attractive under this assumption:

INST: For every proposition p and possible world w, p is true of w if and only if w instantiates p.

[18]This model of explanation can be adopted by advocates of other views of propositions. Speaks (2014b), for example, takes the proposition that Amelia talks to be the property of being such that Amelia talks, and he worries (p. 89) about properly demarcating the class of propositions from the other properties. PROP would suffice for such a view if we instead took Π to be the infinite set of properties specified in the following way:

$$\lambda p_{<e,t>}(\exists x_1)(\exists Y)[p = \lambda z(Y(x_1))],$$
$$\lambda p_{<e,t>}(\exists x_1, x_2)(\exists Y)[p = \lambda z(Y(x_1)(x_2))],$$
$$\ldots$$
$$\lambda p_{<e,t>}(\exists x_1, x_2, \ldots, x_n)(\exists Y)[p = \lambda z(Y(x_1)\ldots(x_n))],$$
$$\ldots$$

Given a set of potential alethic parameters Φ, let's call *relativism about* Φ the view that propositions only determine truth-values when supplemented with a member of Φ. We'll call *contextualism about* Φ the view that propositions determine truth-values without such supplementation. Then TAC is most naturally understood as a kind of relativism about the set of possible worlds, or *relativism about modality* for short. The motivation for adopting relativism about modality, in particular, is the explanatory power gained from adopting an intensional semantic framework as outlined in the formal implementation above.

More generally, I take the question of whether we ought to adopt relativism about any potential parameter to be largely determined by the explanatory power such a hypothesis grants with respect to as much linguistic data as possible. The proper methodology is exhibited by the dialectic on relativism about the set of moments of time, or *relativism about temporality* for short, exhibited by Lewis (1980) and King (2003). I defer to the results of such an empirical investigation. If King (2003) is correct that relativism about temporality is false, then no adjustments to TAC are needed. If Lewis (1980) is correct that it's true, however, then our intensional semantic framework and TAC itself need to be reformulated in such a way that the proposition that London is pretty, for instance, becomes the property of being an ordered pair $x{=}<w, t>$ for some world w and time t such that London is pretty in $Pos(1, x)$ at $Pos(2, x)$.[19] We then have an updated notion of relative truth as follows:

INST-2: For every proposition p, possible world w, and time t, p is true of $<w, t>$ if and only if $<w, t>$ instantiates p.

The unadorned report 'Lewis believes that London is pretty' will then be taken to be true in c if and only if Lewis stands in the ternary belief relation to $<w_c, t_c>$ and λx(London is pretty in $Pos(1, x)$ at $Pos(2, x)$). When fully generalized so as to remain neutral with respect to varieties of relativism outside of modality, TAC characterizes

[19] $Pos(n, x)$ is the n^{th} member of ordered n-tuple x.

propositions as *properties of ordered n-tuples of parameters of alethic evaluation, which include possible worlds.*[20]

Next, observe that the argumentation provided for TAC thus far generalizes to considerations involving a truth predicate in ordinary language. There is a version of the puzzling argument, for instance, that runs as follows:

Truth Argument

P1. It's true of London that it's pretty.

P2. It's true of Paris that it's pretty.

C. So, something true of London is also true of Paris.

If the proper treatment of the original puzzling argument involves taking 'believes' in the context of attitude reports to be a ternary, instead of binary, predicate at LF, then considerations of theoretical uniformity strongly suggest that the proper treatment of the argument above is to take 'true' in the context of truth ascriptions to be a binary, instead of monadic, predicate at LF. So, consider the following truth ascriptions:

(20) It's true of London that it's pretty.

(21) It's true that London is pretty.

A natural extension of TAC is to therefore take these sentences to be true in w_c under the following conditions, respectively:

(22) $\lambda x(x$ is pretty) is true of London.

(23) λw(London is pretty in w) is true of w_c.

Notice that our property-theoretic notion of *truth-of* unifies two kinds of relative truth: the truth of a proposition relative to a possible world, and the truth of a property relative to an object. In both cases, x is true of y just in case x is instantiated by y. This is a theoretical virtue of TAC, viz. that it unifies two relative notions of truth into one.

[20]Reasons for not going relational here are considered later. To avoid arbitrariness in the metaphysics of propositions, it would be preferable to replace ordered n-tuples of alethic parameters with a plurality of alethic parameters, and then replace the positional predicate 'Pos' with functions that map such pluralities to parameters of a certain kind, e.g. 'Mod' would map a plurality of alethic parameters to the modal parameter among them, '$Temp$' to the temporal parameter among them, and so on.

TAC is naturally paired with relativism about modality, but Cappelen and Hawthorne (2009) – henceforth *C&H* – have argued extensively that there is a fundamental alethic property, *being true*, which is monadic and instantiated by propositions simpliciter. Do their arguments undermine TAC? It's important to first note that *C&H* allow for relative notions of truth so long as they're not fundamental alethic notions, that is, so long as they can be metaphysically analyzed in terms of the fundamental, monadic property *being true*. The relevant question is therefore whether the binary truth relation TAC assigns to the English predicate 'true' in clausal truth ascriptions can be so-analyzed. Clearly, this will not be the case if the advocate of TAC endorses INST, since that principle analyzes relative truth in terms of instantiation. But in a way similar to its consistency with propositionalism in principle, TAC (without INST) is logically consistent with there being a fundamental alethic property, $true_1$, that's monadic, instantiated by propositions, and referenced in a statement of the instantiation conditions of the true-of relation. Suppose, for example, that possible worlds are maximal consistent propositions. Then one could stipulate that a proposition P, such as λw(London is pretty in w) is true of a possible world W, such as λw(London is pretty in w & o_1 is F_1 in w & ... & o_n is Z_n in w) if and only if: (i) W could be true$_1$, (ii) no stronger proposition than W could be true$_1$, and (iii) necessarily, if W is true$_1$, then P is true$_1$. It would then be natural to take being true$_1$ to be the property of being instantiated.[21]

[21]This stipulation itself, however, would need to be given in an artificial language under the assumption that English predicates semantically express intensions. One would need, for instance, to be able to utter 'Object o instantiates property P' without this being understood as expressing that o stands in the instantiation relation to P *in some world*. The picture that emerges is one in which English expressions semantically express intensions, which relate worlds and things in virtue of facts that can only be stated in a language more suitable for discussing fundamental metaphysics – *Fundamentalese*. Fundamentalese is an artificial language that anyone who endorses an intensional semantics for English must use if they wish to express anything non-parameterized. Some might say that this is all the worse for intensional semantic frameworks, but others will say that this is all the worse for English as a language in which to do metaphysics.

Here is a demonstration of how an advocate of TAC would appeal to Fundamentalese at some level of analysis:

(i) It's true that London is pretty
if and only if
(ii) $\lambda w \lambda w'(Pretty(w')(London))$ is true of @
if and only if
(iii) TRUE-OF$_3$(@, $\lambda w \lambda w'(Pretty(w')(London))$, @)

The cost of taking monadic truth to be fundamental in this way, however, is that one must forfeit the unified account of truth-of mentioned earlier; although propositions are "true of" worlds and properties are "true of" objects, these are two distinct senses of 'true of' – one entailment-theoretic, the other instantiation-theoretic. As a result, such a view will treat truth-ascriptions such as (20) and (21) above as involving polysemous truth predicates, and this drives a wedge between the parallel treatment of belief reports and truth ascriptions. Perhaps this is a justifiable wedge given the recognized need for a variety of truth predicates, including, for example, sentential truth at a context. But I think it would be preferable if we maintained the analogy between truth and belief as much as possible, especially if doing so enables us to avoid polysemy.

There is a way for the advocate of fundamental monadic truth to allow English truth predicates to univocally semantically express binary relations, but this involves a circuitous detour through monadic truth that arguably fails to satisfying the intent behind *C&H*'s view. Suppose someone proposed that any property (including a proposition) F is true of x if and only if some proposition P attributes F to x and P is true_1, and a proposition is true_1 just in case the actual world instantiates it simpliciter.[22] Then truth-of is reduced to truth simpliciter, which is reduced to instantiation simpliciter plus the actuality of some world. And the unified account of truth-of, which is univocally expressed by the English truth predicate, is preserved. The proposed reduction, however, seems to miss the point of *C&H*'s view, which at bottom wants to avoid a ground floor of explanation in terms of relations to parameters, such as worlds and times, plus a privileged status afforded to some of these parameters, such as the actual world and the present moment. Moreover, the detour through being true_1 doesn't have any independent motivation. If the ground floor winds up being facts about what instantiates what, then we might as well take any property (including a proposition) F to

(i) and (ii) are in English, and (iii) is in Fundamentalese. In general, any property (including a proposition) F is true of x if and only if $\text{TRUE-OF}_3(@)(F)(x)$.

[22]This is another place where the proposal can only be expressed in Fundamentalese. It will need fundamental predicates 'INSTANTIATES_2', 'IS TRUE_1', and 'IS ACTUAL_1' the interpretations of which are not relativized to possible worlds.

be true of x just in case x instantiates F – and this is just INST.

The crux of the issue is that $C\&H$ take a fundamental, monadic truth property to be part of a simple package of views that ought to be our default for theorizing, deviations from which require substantial argumentation. It's for this reason that $C\&H$ argue against existing motivations for relativism about (sets of) various things, rather than develop any arguments in favor of their package of views beyond its theoretical simplicity. But this means that the present work constitutes a novel argument for relativism about modality that $C\&H$ don't consider, viz. (i) that explaining the validity of the Truth Argument requires a binary truth predicate at LF, (ii) that it would be theoretically ideal if this predicate occurred univocally in (20) and (21), (iii) that this plausibly requires a unified account of the truth of propositions relative to worlds and the truth of properties relative to objects, and (iv) that a metaphysics in which the binary truth relation is the fundamental alethic notion provides the best account of the aforementioned. What's more, another part of the simple package of views defended by $C\&H$ is that 'that'-clauses designate propositions in the context of belief reports, but even the standard view$^+$ rejects this in order to explain the validity of the puzzling arguments. So, I agree with $C\&H$ that the burden falls on those who would deviate from simple, orthodox views. I simply take this burden to be satisfactorily met by the motivations, which $C\&H$ don't address, for TAC itself.

Any plausible semantic theory must provide accounts of disquotational truth principles and sentential truth relative to a context. First, the semantic account of truth-ascriptions provided above is consistent with the truth of every instance of the following schema, instances of which result from replacing 'p' with a truth-evaluable sentence of English:

(24) The proposition that p is true if and only if p.

Replacing 'p' with 'London is pretty,' for example, we have the following instance:

(25) The proposition that London is pretty is true if and only if London is pretty.

This is treated, roughly, as having the following logical form in c:

(26) [the $p : p = \lambda w$(London is pretty in w)](p is true of $w_c \leftrightarrow$ London is pretty in w_c)

The point is that disquotation is preserved since the truth predicate and the disquoted sentence contain the same covert, lexicalized possible world variable at LF.[23]

Next, accounting for sentential truth in a context turns out to involve some surprising consequences given the formal implementation of TAC. The upshot of this implementation is that the 'that'-clause 'that London is pretty' designates in context $\lambda w \lambda w_1(pretty(w_1)(London))$.[24] But notice that the intensional semantic framework in question also assigns the declarative (unembedded) sentence 'London is pretty.' the following semantic value (in context): $\lambda w(Pretty(w)(London))$. The designation of the 'that'-clause, being an intensional monadic property of possible worlds, has semantic type $<s,<s,t>>$, but the semantic value of the declarative sentence has semantic type $<s,t>$. It is therefore a consequence of this formal implementation of TAC that the proposition – understood as a content in TAC's sense – that London is pretty is not the context-invariant compositional semantic value of 'London is pretty.' As a result, we can't simply take sentential truth in a context to be a matter of a sentence's semantic value in that context being true of the world of the relevant circumstance of evalua-

[23]With some assumptions concerning the semantic interpretation of the logical connective 'if and only if,' the formal formulation of TAC will provide the following logical form for (25):

$$\lambda w_2[\text{the } p : p = \lambda w \lambda w_1(Pretty(w_1)(\text{London}))](\lambda w'(p \text{ is true}_{w'} \text{ of } w')(w_2) = 1 \leftrightarrow \lambda w'(Pretty(w')(\text{London}))(w_2) = 1)$$

Given an account of intensional truth-of in terms of intensional instantiation, this formulation designates an intension that maps any world to TRUE. Notice that the compositional semantic values of (sub)sentences, except for the one in the 'that'-clause, have type $<s,t>$, whereas the compositional semantic value of the 'that'-clause has type $<s,<s,t>>$. The reasons for this are clarified in the rest of this section.

[24]The contextual relativization of this claim is especially important. The 'that'-clause requires a preceding operator to provide a landing site for the res movement of the verb's sister world variable. This poses a challenge for the syntactic derivation of sentences such as 'That London is pretty is true.' Either these sentences must be taken to be grammatically not well formed, or else res movement can lower (rather than raise) terms in such constructions, or else the full semantic interpretation of these sentences must somehow involve being first transformed into something like 'It's true that London is pretty.' There is also some uncertainty as to whether 'the proposition that London is pretty' designates the compositional semantic value of the declarative sentence 'London is pretty' or what I have been calling a proposition. These are all syntactic costs of the view.

tion.

That being said, it's not clear to me exactly how worrisome this needs to be. First, there is an established body of literature, including Dummett (1973), Lewis (1980), Stanley (1997a), and Ninan (2012), suggesting that attitudinal objects are not sentential semantic values. More importantly, the semantic value of 'London is pretty' and the proposition that London is pretty are, after all, very closely related; in particular, the proposition that London is pretty is just $\lambda w[\![\textbf{London is pretty.}]\!]^c$, for any context c. So, we could say that a sentence S is true in context c if and only if $\lambda w[\![S]\!]^c$ is true of w_c. Since we are working in the formal implementation of TAC, the intensional account of truth-of yields the following for any circumstance of evaluation w': $\lambda w[\![S]\!]^c$ is $\text{true}_{w'}$ of w_c if and only if $\lambda w[\![S]\!]^c(w')(w_c) = 1$ if and only if $[\![S]\!]^c(w_c) = 1$. So, an account of sentential truth in a context can still be given in terms of more fundamental alethic properties of the proposition corresponding to, albeit not the semantic value of, a declarative sentence in context.

It is somewhat unfortunate that we lose the identification of propositions as the semantic values of declarative sentences. Indeed, it starts to look like propositions are not playing a unifying theoretical role anymore; they are simply the designations of 'that'-clauses in surface form unadorned attitude reports, and they are the corresponding contents of attitudes reported in precisely that way. Other properties, such as prettiness, are designated by other 'that'-clauses. And now propositions aren't the semantic values of declarative sentences. One might reasonably wonder whether propositions can still play another one of their usual roles, namely, that of being the objects of illocutionary acts, such as assertion. To get started, consider the following argument:

Assertion Argument

P1. What Lewis asserted/said of London is that it's pretty.

P2. What Peter asserted/said of Paris is that it's pretty.

C. So, what Lewis asserted/said of London is what Peter asserted/said of Paris.

By a line of reasoning analogous to those pertaining to belief reports and truth ascrip-

tions, TAC is committed to illocutionary speech act verbs being ternary predicates at LF. Assertion must therefore be taken to be a ternary relation with targets and contents, some of the latter of which are properties that are not propositions. At first glance, this is worrisome because it's unclear in virtue of what Lewis asserts of London that it's pretty. It does not seem at all plausible, for example, that Lewis achieves this directly by uttering the following:

(27) Consider London. It's pretty!

The problem is that it's unclear what the instantiation conditions of the ternary assertion relation could be such that the contents of some assertions are properties that aren't propositions. Call this *the assertion problem* for TAC.

The assertion problem is one of the strongest objections to TAC, but I think it can be answered satisfactorily by furthering the analogy between belief reports and indirect speech reports. Consider a context c in which London is contextually salient and in which Lewis sincerely utters the following sentence:

(28) It's pretty.

Both of the following indirect speech reports are acceptable in this context:

(29) Lewis asserted that London is pretty.
(30) Lewis asserted of London that it's pretty.

Everyone, and not just an advocate of TAC, needs an account of the relationship between these reports that explains why they're both acceptable in this context. TAC treats the indirect speech reports above as true in c under the following conditions, respectively:

(31) Lewis stands in the ternary assertion relation to w_c and λw(London is pretty in w).
(32) Lewis stands in the ternary assertion relation to London and the property of being pretty.

It's an open question whether these conditions stand in relations of entailment or partial metaphysical ground to one another; this is analogous to the discussion of (16) and (17). There we considered a view about the partial metaphysical ground of certain beliefs that is attractive in the present context. Suppose, in particular, that subjects primarily perform assertions the contents of which are propositions. These assertions, when combined with linguistic devices such as names that directly refer to individual objects, ground the subjects' assertions the contents of which are properties that are not propositions. So, (31) is a partial metaphysical ground of (32). The correct response to the assertion problem is therefore to concede that subjects do not directly bear the ternary assertion relation to targets and contents that are not propositions, but to maintain that they do so indirectly partly in virtue of standing in the ternary assertion relation to targets and contents that are propositions.

§2.6 Situating and Defending TAC

The last few sections have shown that TAC provides or can otherwise be supplemented in a natural way with a characterization of propositions as a definable kind of property of possible worlds, an account of relative truth in terms of instantiation, a semantics for truth ascriptions that validates disquotation, and a coherent account of assertion. These are the table stakes for any view concerning the semantics of attitude reports and the nature of propositions. Now that they've been paid, TAC can reasonably enter into a discussion with more established views. In order to further clarify TAC's commitments, it's helpful to compare it with adjacent views in the literature, such as the multiple relation theory of judgment, the de se property view of content, propositional guise theories, and the view of propositions as properties of everything or nothing. Along the way, I'll raise and respond to some powerful objections. In the end, I hope to have defended the view satisfactorily and paid homage to the views on which it is partially based.

§2.6.1 The Multiple Relation Theory of Judgment

A view similar in spirit to TAC was advanced by Bertrand Russell (as in Russell

(1906), Russell (1910) and Russell (1912)) in the form of the *multiple relation theory of judgment (MRTJ)*.[25] To illustrate the view, consider the following belief reports:

(33) Bertrand believes that Serena smiles.

(34) Bertrand believes that Alex loves Serena.

According to MRTJ, (33) is true in c if and only if Bertrand stands in the ternary belief relation – let's call it BEL_3 – to the property of smiling and Serena. Also according to MRTJ, (34) is true in c if and only if Bertrand stands in the quarternary belief relation – let's call it BEL_4 – to the relation of love, Alex, and Serena. For any finite $n > 2$, MRTJ takes there to be an n-place belief relation, BEL_n, semantically expressed by 'believes' when it takes a clausal complement attributing a relation to $(n-1)$-many things. As is well-known, Russell's (then) motivation for the view stemmed largely from his dissatisfaction with propositions; on a fact-based conception of them, in particular, false propositions are problematic.[26]

Given the historical context, Russell wasn't concerned with the linguistic consequences of requiring a systematic polysemy in attitude verbs. Nor did he have the technical tool developed more recently of the so-called "multigrade" (or "variably polyadic") relation.[27] A relation is multigrade just if both it obtains between n things and it obtains between m things, where $n \neq m$. Classic examples are the relations of composition, by which many things compose one thing, and instantiation, by which many things instantiate relations. If there are linguistic predicates that semantically express multigrade relations, however, they pose a unique challenge for a compositional semantics driven primarily by functional application between the values of expressions with certain semantic types. So, there are some seemingly problematic linguistic consequences stemming from MRTJ of which advocates of TAC should be wary.

[25]Recent attempts to rehabilitate Russell's theory include Jubien (1993), Newman (2002), Moltmann (2003), and Lebens (2017). Someone might argue that TAC is a radical rehabilitation of MRTJ; I wouldn't object, as long as it were recognized that TAC departs from MRTJ by countenancing propositions.

[26]For a concise overview of MRTJ, see §1 of Griffin (1985).

[27]For a comprehensive discussion, see Oliver and Smiley (2004).

The core similarity between MRTJ and TAC is that they both posit targets, in the form of individual things, and contents, in the form of properties and relations, among the relata of doxastic relations. In the case of a belief report the complement clause of which is a monadic predication, such as ⌜S believes that o is F⌝, MRTJ assigns truth-conditions equivalent to those TAC assigns to the corresponding surface form belief-about report, viz. ⌜S believes about o that it's F.⌝ As a result, MRTJ does not recognize a class of contents identifiable as propositions, whereas TAC does. Another unique feature of TAC is that it takes attitude verbs with clausal complements to be univocal. According to TAC, there is only one belief relation, and it's ternary. This means that for any belief report, TAC requires that there is exactly one target and one content. It's worth considering a few pieces of linguistic data in light of this. Consider the following reports:

(35) Lewis believes of Alex and Serena that they are in love.

(36) Someone believes of Alex and Serena that the first loves the second.

(37) ?Someone believes of Alex and Serena that he loves her.

Reports of this form pose a challenge for TAC because they seem to require there to be more than one target in a single report. Call this the *multiple target problem* for TAC.

In response, 'Alex and Serena' in (35) should be understood as referring plurally to Alex and Serena, and the 'that'-clause should accordingly be understood as designating a monadic property of pluralities; Rausch (2021) sketches the syntactic and semantic manoeuvres required to accommodate this. So, this is a case of plural reference, and not a case of multiple targets. Second, (36) should be understood along the following lines:

(38) Someone believes of Alex and Serena that the first mentioned of them loves the second mentioned of them.

This reduces (36) to another case of plural reference, where 'them' refers to the plurality in question. Finally, there are a few different things an advocate of TAC can say re-

garding (37). The first is that it's not entirely unreasonable to suggest that (37) is simply ungrammatical. Of the reports considered in this paragraph, (37) sounds the most awkward, and that fact requires some kind of explanation. But even if it is grammatical, that means we should think that 'believes' semantically expresses a multigrade relation after all, plausibly alongside of 'composes' and 'instantiates.' In that case, there's significant work to be done accounting for multigrade relations from within the framework of generative grammar and compositional semantics. For what it's worth, what is arguably the most comprehensive study of multigrade relations to date, viz. Oliver and Smiley (2004), argues that there aren't any, and that all alleged cases involve plural reference and pluralities. So, my official stance is that (37) probably isn't grammatical, but if it is, then semantic theorists need to develop a framework for multigrade relations, generally.

§2.6.2 The Property Self-Ascription View

Chisholm (1981) and Lewis (1979) famously argue that exotic cases of mistaken self-identification force us to countenance mental states that are essentially indexical in nature, and that the contents of such mental states are self-ascribed properties.[28] To take a familiar example, suppose I were to unknowingly see my own reflection while I was on fire. Then consider the following reports:

(39) Alex Rausch believes that he himself is on fire.

(40) Alex Rausch believes that Alex Rausch is on fire.

We're meant to have the intuition that (39) can be false in such a context while (40) is true. According to what I'll call the *property self-ascription view (PSA)*, the explanation of this intuition is that (39) reports that Alex self-ascribes the property of being on fire, while (40) does not, and that only self-ascribing the property of being on fire can explain the panicked, self-preserving behavior I take when I identify myself to myself in the essentially indexical way. PSA then generalizes to the worst case by taking

[28]For further development and defense of the property view of content, see Feit (2008) and Turner (2010).

all belief reports to involve the self-ascription of properties; (40) is taken to be true, for example, just in case I self-ascribe the property of being such that Alex Rausch is on fire.

There is an interesting methodological parity between PSA and TAC. In the case of PSA, the motivating example(s) appear to involve subjects who share all of the same propositional beliefs, e.g. me before realizing I'm on fire and me afterwards, while some difference, e.g. my behavior, remains in need of explanation. The solution to this problem – the self-ascription of properties – is then taken to generalize to all belief reports for theoretical uniformity. In the case of TAC, the motivating example(s) appear to involve subjects who share none of the same (relevant) propositional beliefs, e.g. Peter and Lewis, while some similarity, e.g. what it is they both "believe about" things, remains in need of explanation. The solution to this problem – targets, contents, and ternary belief – is then taken to generalize to all belief reports for theoretical uniformity. Despite the methodological similarity between them, neither PSA nor TAC provides the resources required to explain the other view's motivating example(s).[29,30]

Like TAC, PSA requires taking the 'that'-clauses of some belief reports to designate properties, such as the property of being on fire, that are not typically taken to be propositions. And although it is not usually done so, advocates of PSA can plausibly demarcate in a similar fashion the properties that might reasonably be called "propositions" from others. But PSA, unlike TAC, takes 'believes' to be a binary predicate, belief to be a binary relation, and the belief relation to be the primitive relation of self-ascription. From the point of view of TAC, belief is a kind of mental ascription not limited to the self. To have a belief is to believe about something that it is a certain

[29]Speaks (2014b, 86) suggests an alternative explanation for the essential indexical that can be adopted by advocates of TAC. The suggestion is to first countenance the notion of primitive self-ascription of properties in addition to propositional beliefs, and to then argue that utterances of (39), but not (40), pragmatically convey that Alex self-ascribes the property of being on fire. Since cases of essential indexicality can also involve other attitudes like hoping, entertaining, and desiring, this strategy requires also countenancing primitive notions of self-hope, self-entertaining, self-desiring, and so on.

[30]I follow Cappelen and Dever (2013) in interpreting PSA's motivating examples as being instances of Frege's puzzle when indexicality is involved and, accordingly, as not posing a problem distinct from those arising from apparent opacity in attitude constructions, more generally.

way. One can believe about oneself that he is a certain way, but doing so does not require a form of mental ascription different in kind from that required to believe of anything that it is a certain way.

§2.6.3 Guise Theories

A variety of other views take 'believes' to be a ternary predicate at LF or belief to be (reducible to) a ternary relation, albeit for different reasons than those motivating TAC. Kaplan (1989), Perry (1979), and Richard (1983), for example, suggest that 'believes' operates on Kaplanian characters in addition to singular contents in order to solve one or both of Frege's Puzzle and the problem of essential indexicality. Salmon (1989a) takes the semantics for 'believes' to existentially quantify over propositional guises, so that while 'believes' is a binary predicate at LF, it is analyzed in terms of a ditransitive doxastic relation, *belief**. TAC is consistent with the spirit of these proposals. One could add another argument to the attitude verb in order to account for various kinds of opacity by taking the quarternary belief relation so-expressed to obtain between a subject, property, guise or character, and object. And one could further existentially quantify over the guise position in order to analyze the resulting ternary belief relation in terms of a quaternary doxasatic relation, *belief**. I would not object to these modifications for any reason other than I don't think they are the correct answer to worries about opacity. TAC does not purport to provide such an answer.

§2.6.4 Properties of Everything or Nothing

Jeff Speaks (2014b) proposes the view that *propositions are properties of everything or nothing (PEN)*, and that, for example, the proposition that Amelia talks is the property of being such that Amelia talks. Consider the following belief report:

(41) Jeff believes that Amelia talks.

According to PEN, this report is true in c if and only if Jeff stands in the binary belief relation in w_c to λx(Amelia talks), which is itself true if and only if it is instantiated by something. PEN and TAC therefore agree that propositions are properties but disagree about which properties they are. They also disagree about whether 'believes' is a

binary predicate at LF and whether belief is a binary relation.

In presenting his view, Speaks (2014b) raises a number of points directly relevant to TAC. The first occurs in a footnote:

> A different view in the neighborhood of the view that I defend (and which I used to hold) is the view that propositions are properties of worlds, like the property corresponding to the open sentence
>
> Were w actual, it would the case that Amelia talks.
>
> On this sort of view, truth of course can't be identified with instantiation, on pain of making possible truth entail truth. On this sort of view, a proposition is necessarily true iff it is instantiated by every world. I don't have the space here to discuss my reasons for favoring the present version of the property view over the "properties of worlds" versions. (footnote 11, 77; parentheses in original)

The view that Speaks considers here can be roughly understood as a version of TAC that abstracts away from an intensional semantics driven by the covert lexicalization of possible world variables in the sister positions of verbs. The remark concerning truth must be understood as a remark concerning the monadic property of being true, since a relative notion of truth, such as INST, can easily be given for such a view. So, one might think that PEN is superior to TAC because it can easily accommodate monadic truth through the following principle:

MONADIC For any proposition p, p instantiates the property of being true (simpliciter) if and only if p is instantiated.

As far as I can tell, this is completely correct, but I also think that TAC is superior to PEN because it can easily accommodate relative truth through INST. Allow me to explain.

The argument I'm about to give assumes that there is some theoretical use for a relative notion of (non-sentential) truth, the analysis of which is given by the following, for some sentence Φ with unbound occurrences of 'x' and 'y':

$$\ulcorner(\forall x)(\forall y)(x \text{ is true relative of } y \text{ if and only if } \Phi.\urcorner$$

It also assumes that in the completed formulation of the above, 'x' and 'y' can be universally instantiated respectively by (i) a proposition p and possible world w, and by (ii) a property F, such as prettiness, and an object o, such as London. Under these assumptions, it is difficult to see how PEN can plausibly provide a witness for Φ. On the one hand, there are candidates for Φ that would satisfy condition (i) – depending on one's view on the nature of possible worlds – such as the following:

(42) were y actual, x would be true

(43) x is a member of y

(44) y entails x

The first of these is agnostic as to what possible worlds are, the second takes them to be maximal, consistent sets of propositions, and the third takes them to be maximal conjunctive propositions. But in each case, the analysis clearly fails to satisfy condition (ii). Against the first, London isn't the kind of thing that can be true. Against the second, London isn't a member of prettiness. And against the third, prettiness does not entail London. On the other hand, there are candidates for Φ that would satisfy condition (ii), such as the following:

(45) y instantiates x

(46) for some proposition p', (a) p' attributes x to y and (b) p' is true simpliciter

When these analyses are applied to condition (i), however, they result in actual truth entailing necessary truth. Suppose it's actually true that Amelia talks. Then against the first, it would be necessarily true that Amelia talks because every possible world w instantiates λx(Amelia talks). Against the second, it would be necessarily true that

Amelia talks because for any possible world w, the proposition ($= p'$) that w instantiates λx(Amelia talks) (a) attributes λx(Amelia talks) to w and (b) is true simpliciter. So, it's difficult for PEN to specify a sentence for Φ that satisfies the assumed desiderata, whereas TAC does so simply through (45), i.e. INST.

In response, Speaks could argue that there is no theoretically useful notion of relative (non-sentential) truth, or – more plausibly – that there is no such single notion that can satisfy both conditions (i) and (ii).[31] In the latter case, Speaks would drive a wedge between the truth of a proposition relative to a possible world and the truth of a property relative to an object; it could even be argued that there isn't a notion of relative truth between properties that aren't propositions and objects, in the first place. The point isn't that these suggestions are unworkable; it's that even though Speaks has a simple view of monadic truth, he has to say something more complicated about the varieties of relative truth, viz. that between propositions and possible worlds and that between properties and objects. In a parallel way, TAC provides a simple, unified view of relative truth as instantiation – a proposition/property p is true relative to a possible world/object x if and only if x instantiates p – but the advocate of TAC has to respond to the felt need for monadic truth, as I do in §2.5.

So, what recommends TAC over PEN? First, TAC simply explains the puzzling arguments, while PEN needs to develop an account of belief-about reports along the lines of Chapter 1. Second, TAC receives some empirical motivation from contemporary linguistic work on intensional semantic frameworks. Theories of linguistic intensionality that appeal to possible world variables bound by λ-operators at LF have become increasingly popular since Percus (2000), and these frameworks form the basis of the formal implementation of TAC. There doesn't appear to be any independent linguistic motivation, however, for taking clauses to be systematically bound by a vacuous λ-operator at LF, as PEN seems to require.[32] Finally, and for this reason, TAC avoids an objection to PEN raised by Dixon and Gilmore (2016), according to which PEN

[31] Speaks (2012) develops an account of propositional truth relative to possible worlds.

[32] Although see footnote 8.

arbitrarily takes propositions to be monadic properties, such as *being an* x_1 *such that Amelia talks*, rather than n-ary relations, for some $n \geq 2$, such as *being an* $x_1, \ldots, x_n$ *such that Amelia talks*.

That being said, Speaks (2014b) raises some explicit worries for theories in the abstract form of TAC. He writes,

> ...this might lead us to expect that ordinary belief ascriptions of the form
>
> A believes that S
>
> should not express binary relations between subjects and propositions, but rather ternary relations, and hence to be of the form
>
> A believes of o that it is F.
>
> where "F" stands for the property expressed by S in context. However, there is no plausible candidate for the value of "o," for two reasons. First, (as noted above) there is nothing to stop two different subjects from each believing that Amelia talks, but to do so by believing the property of being such that Amelia talks to hold of distinct things. Second, we would get into trouble with the modal profiles of attitude ascriptions if we supplied as value for "o" anything whose nonexistence was consistent with the truth of the ascription. (83, parentheses in original)

TAC is uniquely situated to respond to both of these worries. First, the actual world is a plausible candidate for the value of 'o,' since (i) it's not just a random object in the vicinity of believers, and (ii) it fits nicely, as Speaks (2014b) himself suggests, with "the intuitive idea that in, for example, the case of belief, one 'takes the world to be a certain way'" (82). The second worry is, roughly, that for any potential value of 'o' on the proposed view, if $\ulcorner S$ believes that $p\urcorner$ is true in c, then the following counterfactual would be incorrectly predicted to be false in c:

(47) ⌜If o were to not exist, then S would believe that p.⌝

But it is standard to take possible worlds to be abstract objects that therefore exist necessarily. In this case, (47) is a counterpossible conditional that is, at least, not obviously false.

A different worry one might have about TAC, and not PEN, is that it requires mental states, such as belief, to be too cognitively demanding.[33] On the one hand, PEN has the following simple account of the instantiation conditions of the belief relation:

S stands in the binary belief relation to p just in case S takes p to be instantiated.

On pain of regress, the taking relation must be ternary, and not binary, so that this reduces to the following:

S stands in the binary belief relation to p just in case S stands in the taking relation to p and $\lambda x \exists y(y$ instantiates $x)$

On the other hand, if the advocate of TAC wants to endorse an analogous principle in lieu of a more complicated view such as representationalism, the account would run roughly as follows:

S stands in the ternary belief relation to o and F just in case S stands in the taking relation to o and F

In the case of the unadorned report 'Jeff believes that Amelia talks' in c, PEN and TAC will provide the following analyses, respectively:

(48) Jeff stands in the taking relation to λx(Amelia talks) and $\lambda x \exists y(y$ instantiates $x)$

(49) Jeff stands in the taking relation to w_c and λw(Amelia talks in w).

[33]The worry comes from Speaks, p.c. The explicit analysis of belief in terms of a ternary taking relation is my own.

The worry is that taking one's own world to instantiate properties, as in (49), requires an objectionable amount of cognitive sophistication, or at least more cognitive sophistication than taking a property to be instantiated, as in (48). Call this *the cognitive sophistication problem.*

The worry boils down to the sophistication required for actual subjects to stand in cognitive relations to the actual world. Clearly, actual subjects stand in cognitive relations to concrete objects in the actual world. Arguably, they're able to do so, at least in the vast majority of cases, in virtue of having at one point stood in a causal relation to the surfaces of those objects and having undergone – unconsciously and through the grace of evolution by natural selection – a process of abstraction that resulted in their bearing a cognitive relation to the object as a whole. The advocate of TAC must tell an analogous story, but on a much grander scale, according to which subjects make the leap from representations of concrete objects to a representation of the actual world.[34] This all assumes, of course, that mental states that play the functional role of *target with respect to something* represent in a manner finely-grained enough to warrant such worries in the first place.

In a similar vein, someone might argue that PEN, compared to TAC, has the distinct advantage of placing no requirements on what possible worlds could be. It is entirely open to Speaks, for instance, to reduce possible worlds to maximal, consistent sets of propositions, and to then maintain that the actual world is the possible world every member of which is instantiated. This is a simple and elegant view. TAC, on the other hand, invites the worry that possible worlds can't plausibly be constructed out of propositions, since it takes possible worlds to be properties of propositions. Call this the *restrictive modality problem.*

First, it's clear that TAC is well-suited to be combined with accounts of possi-

[34]Some views on the metaphysical nature of possible worlds, such as the view that they are sets of propositions, render this response implausible. Others, such as the view that possible worlds are maximal, consistent properties, might have an easier time. On this view, the actual world qua mereological fusion of everything instantiates the actual world qua maximal, consistent property. Thus, subjects could abstract from concrete object, to mereological fusion of everything, to the maximal, consistent property instantiated by this fusion. Thanks to Jeff Speaks for this point.

ble worlds according to which they are not constructed out of propositions. So, it's consistent with taking possible worlds to be (i) possible and total states of affairs, as in Plantinga (1974), (ii) maximal connected objects, as in Lewis (1986), (iii) recombinations of simple atomic facts, as in Armstrong (1989), or (iv) Everettian worlds in a quantum multiverse, as in Wilson (2020). The worry is whether TAC can plausibly be combined with views that reduce possible worlds to propositions, such as those according to which possible worlds are (i) maximal, consistent sets of propositions, as in Adams (1974), or (ii) maximal, consistent conjunctions of propositions, as in Prior and Fine (1977). So, suppose that possible worlds are maximal, consistent sets of propositions, and that such a possible world w_1 is specified partially as follows:

$$w_1 = \{\lambda w(\text{London is pretty in } w), \lambda w(\text{Amelia talks in } w), \ldots\}$$

If the functions designated by terms of the λ-calculus are understood extensionally, then this picture requires a non-well-founded set theory; this becomes clear if we rewrite λ-terms designating propositions as sets of ordered n-tuples:

$$w_1 = \{\{< w_1, \textsc{true} >, < w_2, \textsc{false} >, ...\}, \{< w_1, \textsc{true} >, < w_2, \textsc{true} > ...\}, \ldots\}$$

So, such a reduction of possible worlds to sets of propositions will arguably require, as I do, taking the terms of the λ-calculus to designate finely grained functions-in-intension. Then there is no difficulty in taking w_1 to both set-theoretically contain and instantiate a proposition.

Similar remarks can be made concerning a reduction of possible worlds to maximal, consistent propositions, which in the case of TAC amounts to maximal, consistent properties of worlds. The trouble with such reductions, including the set-theoretic one above, is that an account of relative truth other than INST will always seem more natural. On the set-theoretic view, it's more natural to take a proposition to be true relative to a world if the world contains the proposition; on the maximal property view, it's more natural to take a proposition to be true relative to a world if the possible world

entails (in some property-theoretic sense) the proposition. Perhaps these views are correct, and there is simply a different alethic notion governing the truth of propositions relative to worlds than that governing the truth of properties relative to objects. I'm hopeful, however, that we can gain some ideological parsimony by unifying these two notions.

Here is one way to think about the commitments TAC incurs in the metaphysics of modality. Possible worlds are the kinds of things that instantiate propositions, like $\lambda w(Pretty(w)(\text{London}))$. So, they are the kinds of things that, along with other things, such as London, intensions map to truth-values. Alternatively, they are among the relata of intensional properties and relations. If someone takes these properties and relations to be finely grained, as I do, then there is little reason to think that possible worlds need any particular nature in order to plausibly be among the relevant relata.

However, TAC is also naturally combined with a view that takes the fundamental alethic facts to involve relations to possible worlds. So, fundamental alethic facts concerning what is true of what will not differentiate the possible world that is actual from any other possible world. The actual world in this sense must therefore have a metaphysically privileged status that is not explained in terms of what is true of what. The reductive view that possible worlds are maximal consistent sets of propositions usually identifies the actual world with the possible world every member of which is true – so that won't work. The reductive view that possible worlds are maximal consistent properties usually identifies the actual world with the possible world that is instantiated, but that also won't work because TAC takes every such possible world, in virtue of itself being a proposition, to be true of itself, hence instantiated.

It would therefore seem that regardless of whether TAC is combined with a reductive or non-reductive account of possible worlds, one must take it to be a fundamental fact which one of the possible worlds is the actual world. This view mirrors the claim made by "A-theorist," such as Prior (1968), Chisholm (1989), and Zimmerman (2008), that *being present* is a fundamental tensed property of times. It is prima fa-

cie desirable to treat modality and temporality in analogous ways, but I don't intend to defend any particular view about the metaphysics of possible worlds in this work. The upshot is that PEN does have an advantage over TAC because it places no requirements on the metaphysics of possible worlds, whereas TAC plausibly requires that *being actual* is a fundamental modal property. That being said, PEN purchases this advantage at the cost of forfeiting a unified analysis of relative truth.

§2.7 Conclusion

Here's a summary of where we've been. The standard view$^+$ provides an initially compelling explanation of the puzzling arguments, but it requires a complicated semantic type for 'about' that's objectionably ad hoc. TAC is an alternative that naturally suggests itself, according to which belief is a ternary relation between subjects, objects, and properties. 'Lewis believes of London that it's pretty' is true just in case Lewis stands in the belief relation to London and the property of being pretty, and 'Lewis believes that London is pretty' is true just in case Lewis stands in the belief relation to the actual world and the property of being a possible world such that London is pretty in it. Beliefs accordingly have targets and contents. TAC can be implemented formally in accordance with contemporary theories of syntax and semantics by appealing to a popular intensional semantic framework. The view is basically neutral with respect to popular views in the metaphysics of the attitudes. It's most plausibly combined with a view of truth as fundamentally relative to parameters, and with actuality as a primitive feature of modal reality. This is consistent with a systematic treatment of sentential truth, disquotational truth principles, and a theory of assertion.

TAC has notable similarities and differences with a number of views in the literature, including the multiple relation theory of judgment, the de se property view, propositional guise views, and the view of propositions as properties of everything or nothing. It faces the *multiple target problem*, which requires an appeal to plural reference and properties of pluralities, (ii) the *assertion problem*, which requires an appeal to partial metaphysical explanation, (iii) the *cognitive sophistication problem*, which

requires an appeal to abstraction from objects to the actual world, and (iv) the *restrictive modality problem*, which rules out a certain combination of modal principles that some have found attractive. While these are some of its costs, TAC also has quite a bit of purchasing power. It provides a simple explanation of the puzzling arguments, a unification of the contents of belief as properties, a characterization of propositions as a certain kind of definable property of possible worlds, and a unified analysis of relative truth. What's more, it receives empirical support from contemporary linguistics in the form of popular variable-based theories of intensionality. Every theorist will need to decide for themselves whether the cost is worth the benefit in this case, but I hope to have shown that TAC is a view worth taking seriously.

Chapter 3: Variable-based Intensionality for Structured Propositions

It's widely recognized that traditional scope-based theories of intensionality, such as Russell (1905), Montague (1973), Ladusaw (1977), Stowell (1993), and Ogihara (1996), struggle to account for the behavior of determiner phrases (DPs) in the context of psychological attitude reports.[1] A variety of counterexamples suggest that scopal relations alone fail to generate accessible readings of certain reports in context. One of the most pressing counterexamples to these theories, and the focus of the present work, is the so-called "third reading of indefinites" first identified by Janet Fodor (1970). In response to this problem among others, variable-based theories of intensionality, such as Percus (2000), Schwager (2011), Schueler (2011), and Schwarz (2012), posit covert possible world variables at the level of logical form (LF), primarily under the assumption of a possible worlds semantics for propositional attitude verbs à la Hintikka (1969). But a lacuna remains in the literature on variable-based intensionality for theorists who endorse more finely-grained semantics, such as those according to which propositions are structured entities individuated by the identity and arrangement of constituents.[2]

Recently, Lederman (2022) has started to bridge this lacuna by providing a variable-based account of the third reading given broadly Fregean assumptions about the nature of structured propositions. Lederman's account, however, requires a problematic simplifying assumption the consequences of which have not yet been sufficiently addressed. The goal of this work is to challenge this assumption and construct a variable-based theory of intensionality for advocates of structured propositions in its absence. For this purpose, working primarily within a Russellian semantics that lacks the adornment of Fregean senses will suffice; the theory that emerges can be straightforwardly

[1] Traditional scope-based theories of intensionality contrast with non-traditional scope-based theories, such as Keshet (2011), in addition to variable-based theories. I'll simply use 'scope-based theories' in this work to refer to traditional scope-based theories, unless explicitly indicated otherwise.

[2] I'll assume that propositions are the objects of psychological attitudes such as belief and desire, the designations of 'that'-clauses in context, and the compositional semantic values of declarative sentences in context. I'll sometimes omit references to context for ease of exposition.

modified in order to accommodate more complex, including Fregean, semantic assumptions.[3] The theory, if successful, contributes to a growing literature aimed at legitimizing structured views of propositions by formally implementing them in accordance with contemporary theories of syntax and semantics.

Complicating this semantic project nevertheless is a collection of linguistic data suggesting that third readings are more generalizable and complex than has been previously recognized. Accounting for this data requires both advocates of structured propositions (henceforth, *structured propositionalists*) and advocates of propositions as unstructured sets of possible worlds (henceforth, *Hintikkans*) to complicate their views. I'll therefore argue that if third readings are to be explained semantically, then structured propositionalists in particular ought to adopt a theory roughly analogous to the one I'll propose. Implicit in this conditional claim is the question of whether third readings result from pragmatic processes instead of forming a unified class of semantic phenomena. While I hope to shed some light on this question by the end of this work, my main focus will be to motivate the most plausible semantic explanation of third readings possible for structured propositionalists.

Here's the plan. In §3.1, I'll explain how variable-based theories of intensionality couched within possible world semantics emerge in response to the problem of third readings for scope-based theories. In §3.2, I'll introduce the theory of structured propositions and isolate the foundational difficulties it encounters when combined with a simple variable-based approach; these difficulties are not simply due to the structured propositionalists' rejection of possible world semantics. In §3.3, I'll argue against a semantic theory based on Lederman (2022) that can overcome these foundational difficulties and account for the third reading, but only at the cost of requiring a problematic simplifying assumption. In §3.4, I'll propose a new variable-based theory of intensionality for structured propositionalists in response. In §3.5, I'll explain how this theory can

[3]I don't intend my use of 'Russellian' or 'Fregean' to carry strong commitments to the historical views of Russell or Frege. For our purposes, a Russellian semantics takes semantic values in context to only involve objects, properties, and relations, whereas a Fregean semantics takes semantic values in context to also involve modes of presentation of such things.

accommodate some complications discussed in Schwager (2011). In §3.6, I'll conclude the work by considering positive and negative reactions to the theory, their philosophical significance, and avenues for future research.

§3.1 Variable-based Intensionality

The purpose of this section is to introduce the predominant approach to variable-based theories of intensionality, understood as a response to the third reading of indefinites, which poses a problem for scope-based theories. To begin, consider the following belief report:

(1) Betty believes that every senator spies.

As is well-known, this report admits of readings that are true in different contexts, such as the following:

> Suspicious Suits
>
> All and only the senators attend a conference, wearing suits. Betty the Reporter thinks that anyone wearing a suit spies. Unaware that this a conference for senators, she pens a story with the headline, 'EVERYONE ATTENDING CONFERENCE SPIES!'
>
> Suspicious Senators
>
> Betty the Reporter is suspicious of the government and thinks that maintaining a senatorial seat requires spying. Despite not knowing any senators, she pens a story with the headline, 'EVERY SENATOR SPIES!'

On the reading of (1) true in Suspicious Suits, the NP-complement 'senator' can be substituted with a co-extensional expression salve veritate, but this isn't the case on the reading of (1) true in Suspicious Senators. When a sentential operator O operates on a sentence S whose surface form contains a DP with NP-complement φ, we'll say that the DP is *transparent*, and otherwise *opaque*, with respect to O in context c just in case, for every expression φ^* co-extensional with φ in c, $\ulcorner OS \urcorner$ is true in c if and only if $\ulcorner OS[\varphi^*/\varphi] \urcorner$ is true in c.[4] Then the reading of (1) true in Suspicious Suits contains an

[4] $\ulcorner S[\varphi^*/\varphi] \urcorner$ is the sentence that results from substituting every occurrence of φ in S with φ^*.

occurrence of 'every senator' that's transparent with respect to the attitudinal operator 'Betty believes,' and the reading true in Suspicious Senators contains an occurrence that's opaque.[5]

According to scope-based theories of intensionality, such as Russell (1905), Montague (1973), Ladusaw (1977), Stowell (1993), and Ogihara (1996), whether a DP is transparent or opaque – i.e., its *intensional status* – with respect to a sentential operator depends exclusively on the syntactic position of the DP relative to that of the operator at LF. Such a view predicts the different readings of (1) by assigning it two possible logical forms, which can be represented at the relevant degree of abstraction as follows:[6]

(1a) $\forall x(\textit{senator}(x) \rightarrow \textit{Betty-believe: spy}(x))$ ← wide scope

(1b) $\textit{Betty-believe: } \forall x(\textit{senator}(x) \rightarrow \textit{spy}(x))$ ← narrow scope

The prediction is that a DP δ is transparent with respect to a sentential operator O just in case δ c-commands O at LF, as in the wide scope reading (1a). Otherwise, the DP is predicted to be opaque, as in the narrow scope reading (1b). Since May (1977), the predominate approach to syntactically deriving logical forms such as these is through Quantifier Raising (QR), a form of movement by which a DP adjoins a higher sentential node, leaving behind a trace.[7] While this view enjoys significant empirical coverage, a number of troubling counterexamples to it were identified in the latter half of the twentieth century.[8]

Characterizing the readings of (1) in terms of opacity and transparency is an intentional departure from their traditional characterization in terms of "de dicto" and "de re" readings as in Quine (1956). The present work brackets questions surrounding the proper derivation of ascriptions of singular (or "de re") attitudes, which might be more faithfully represented by reports such as the following (cf. §2.5 of Hawthorne and Manley (2012)):

(i) Betty believes of every senator that he spies.

For a similar point, see footnote 2 of Lederman (2022). For an account of the syntax and semantics of reports in the form of (i), see Rausch (2021).

[5]Hereafter I'll omit the explicit relativization of transparency and opacity with respect to sentential operators that are clear from context.

[6]Hereafter I'll talk simply in terms of logical forms, but this talk should be understood as being implicitly about representations of logical forms at the relevant degrees of abstraction.

[7]For a canonical introduction to QR, see §7 of Heim and Kratzer (1998).

[8]For overviews of this literature, see Keshet and Schwarz (2019) and §4 of Grano (2021).

Our focus will be on the problem of the so-called "third reading of indefinites," although I'll later argue that the problem generalizes to other determiners. For now, consider the following context and belief report:

GAME SHOW

You're watching a live game show with Betty, who thinks you have no friends. In fact, two of the contestants, Xavier and Yvette, are your only friends. They also happen to be the only contestants with green eyes. Betty holds a superstitious belief that green eyes cause good luck. She asserts, "I think a green-eyed contestant will win."

(2) Betty believes that a friend of yours will win.

It's widely agreed that there's a reading of (2) that's true in Game Show, as demonstrated by the acceptability of the following line of ordinary reasoning in this context: *Betty believes that a green-eyed contestant will win, and every green-eyed contestant is a friend of yours. So, Betty believes that a friend of yours will win.* On this reading, the DP 'a friend of yours' is transparent; if Xavier and Yvette were the only contestants born in March, then the corresponding reading of 'Betty believes that a contestant born in March will win' would also be true in this context.

As Janet Fodor (1970, 226-232) first observed, however, this reading of (2) results from neither the wide nor narrow scope interpretation of the DP.[9] These interpretations result from logical forms such as the following:

(2a) $\exists x(friend(x)$ & *Betty-believe:* $win(x))$ ← wide scope

(2b) *Betty-believe:* $\exists x(friend(x)$ & $win(x))$ ← narrow scope

On the intended interpretation, '$friend$' is assigned to the property of being a friend of yours, and 'win' to the property of winning the game at some later time.[10] The wide scope reading is false in this context because no individual friend of yours is such that

[9]For additional examples, see Ioup (1977) and Bonomi (1995).

[10]I'll abstract away from tense and aspect, which don't concern us here.

Betty stands in the belief relation to the singular proposition that (s)he will win; Betty doesn't believe that Xavier will win, and Betty doesn't believe that Yvette will win, so there's no witness to the existential quantifier in (2a). The narrow scope reading is false in this context, as well, because it's not the case that Betty believes you have any friends. Let's call the reading on which (2) is true in Game Show *the third reading*. Then since there don't appear to be any additional scopal interactions available at LF, scope-based theories of intensionality prima facie predict incorrectly that the third reading is unavailable in this context.

The third reading seems to require a way of evaluating the NP-complement ('friend of yours') relative to the evaluation world of the matrix clause while simultaneously keeping the force of existential quantification within the subordinate clause. This poses a difficulty for scope-based theories because the entire DP moves outside of the subordinate clause at LF through QR.[11] According to variable-based theories of intensionality, such as Percus (2000), Schwager (2011), Schueler (2011), and Schwarz (2012), the solution involves covert possible world variables at LF.[12] What von Fintel and Heim (2011) call *the standard solution*, for example, generates the third reading of (2) by assigning it a logical form such as the following:

(3) λw_1 *Betty-believe*$_{w_1}$: λw_2 $\exists x(friend_{w_1}(x)$ & $win_{w_2}(x))$

where variables $w_1, w_2, \ldots$ of semantic type s range over possible worlds.[13]

According to this view, verbs select for possible world variables and project λ-operators co-indexed with them to the heads of their immediate clauses. As a result, '*win*' is evaluated with respect to the evaluation world of the subordinate clause ('w_2'). Nouns also select for possible world variables, but their variables are bound by the

[11]Sophisticated forms of movement that bypass this difficulty are considered in §8.3.2 of von Fintel and Heim (2011) and Appendix B of Lederman (2022). I won't consider movement-based solutions in this work, however, because – in addition to incurring the cost of a novel form of syntactic movement – they fail to account for the generality and complexity of third readings established later.

[12]The original implementation in Percus (2000) appeals to situation variables, but I'll conflate situations and possible worlds.

[13]I'll display possible world variables as subscripts to verbs and nouns at LF, but these variables should be understood as semantically contributing arguments for intensions.

λ-operators projected by verbs.[14] In this case, the noun '*friend*' is evaluated with respect to the evaluation world of the matrix clause ('w_1'). Given the standard λ-calculus and intended meanings for predicates and logical vocabulary, the subordinate clause is therefore semantically interpreted (in context) as the intension that maps a world w to 1 just in case there exists an x such that x is your friend in the evaluation world of the matrix clause and x wins in w.

The attitudinal operator acts on this intension in accordance with a possible worlds semantics à la Hintikka (1969), assuming a semantic value in context c along the following lines:[15]

$$[\![\textbf{Betty-believe}]\!]^c = \lambda w_s \lambda T_{<s,t>}(\text{every } w^* \text{ compatible with Betty's beliefs in } w \text{ is such that } T(w^*) = 1)$$

As a result, the semantic interpretation of the matrix clause in c is the intension defined as follows, for any world w:

$[\![(3)]\!]^c(w) = 1$ if and only if the following condition is met:
for every world w^* compatible with Betty's beliefs in w,
there is an x such that x is your friend in w, and
x wins the game in w^*

When '$friend$' in (3) is substituted by a noun co-extensional with it in the evaluation world of the matrix clause, the same coarse-grained intension as above is defined. So, the DP is correctly predicted to be transparent. In general, for any DP δ, NP-complement φ, and sentential operator O, the standard view predicts δ to be transparent with respect to O just in case φ operates on a world variable w_i and the λ-operator $\ulcorner\lambda w_i\urcorner$ c-commands O at LF. On this view, a sentence is true in a context just in case

[14] Percus (2000) and Keshet (2008) convincingly show that the standard solution requires a variable binding theory that restricts the availability of certain co-indexations, but these complications fall outside the scope of this work.

[15] I'll treat 'Betty believes' as a single lexical item for now because the details of the compositional derivation that this simplification obfuscates are not at issue. Semantic values in this work are relativized to both a context c and the variable assignment function determined by c, g_c, but I'll only make variable assignment functions explicit when treating the semantics of quantification.

the semantic interpretation of its logical form in the context maps the world of the context to 1. In this way, (2) is correctly predicted to be true in Game Show, as desired.

Possible worlds semantics for propositional attitude verbs play an important role in the standard solution. Since the subordinate clause is semantically interpreted as a course-grained intension, the embedded NP-complement can be evaluated with respect to the evaluation world of the matrix clause without placing any implausible requirements on the attributee's conceptual repertoire. A Hintikkan semantics is presupposed by most variable-based theories of intensionality, including Percus (2000), Schwager (2011), Schueler (2011), and Schwarz (2012), but comparatively little attention has been paid to whether – and, if so, how – more finely-grained semantics can account for the third reading by adopting a variable-based theory of intensionality.[16]

§3.2 Structured Propositions

The purpose of this section is to introduce the theory of structured propositions, identify the foundational obstacles it faces when confronted with variable-based theories of intensionality, and identify some of the minimal properties that a successful theory must have as a result. Structured propositions are generally introduced by considering a common objection to possible worlds semantics, namely, that they incorrectly predict necessarily equivalent sentences to be substitutable salve veritate in the context of attitude reports.[17] Since the worlds in which Biden is president are exactly those in which Biden is president if and only if arithmetic is undecidable, the following belief reports are prima facie predicted incorrectly to be true in the same contexts:

(4) Betty believes that Biden is president.

(5) Betty believes that Biden is president if and only if arithmetic is undecidable.

Moved by this consideration among others, some theorists have adopted the view that

[16]Lederman (2022) is a recent exception. The non-traditional scope-based theory of "split intensionality" developed by Keshet (2011) also requires a Hintikkan semantics, but the viability of a non-traditional scope-based theory of intensionality for structured propositions falls outside the scope of this work.

[17]For a more general argument against propositions as sets of truth-supporting circumstances, including possible and impossible worlds, see Soames (1987).

psychological attitude verbs semantically express (in context) relations between subjects and propositions structured by the identity and arrangement of constituents.

According to a structured view of propositions, the proposition that Biden is president, which is reported as the object of Betty's belief in (4), is not identical with the proposition that Biden is president if and only if arithmetic is undecidable, which is reported as the object of Betty's belief in (5). This is because only the latter proposition has the semantic values of 'arithmetic' and 'undecidable' (in context) as constituents so-arranged. Structured propositionalists therefore maintain that some distinct propositions have the same truth-value in every possible world, and that 'that'-clauses are hyperintensional nodes in the context of attitude reports.[18] The theory of structured propositions boasts an impressive roster of adherents, with historical precedents in the works of Frege (1892), Russell (1903), and Carnap (1947) and contemporary support from Lewis (1972), Cresswell and von Stechow (1982), Zalta (1983, 1988), Cresswell (1985), Soames (1985, 1987, 1989), Salmon (1986a, 1986b, 1989a,1989b), Menzel (1993), King (1995, 1996, 2007, 2009), Richard (2013), and Bacon (forthcoming).

Despite the differences between their views, structured propositionalists generally take there to be a correspondence between propositional constituents and subsentential semantic values (in context). For our purposes, the following principle serves as a representative example of this commitment:

> **Terminal Node Constituency:** For any thing x and proposition P, x is a constituent of P if and only if for some (canonical) sentence S and context c, S designates P in c and x is the semantic value of a terminal node in the logical form of S in c.

Suppose, for example, that the sentence 'Serena smiles' designates in c the proposition that Serena smiles, that 'Serena' and 'smiles' are terminal nodes in the logical form of

[18] We'll say that a node in a sentence is *hyperintensional* (in context) if and only if it's not the case that substituting it with any co-intensional expression preserves the truth-value of the sentence (in context).

'Serena smiles' in c, and that the semantic values of 'Serena' and 'smiles' in c are, respectively, Serena and the property of smiling. Then Terminal Node Constituency entails that Serena and the property of smiling are constituents of the proposition that Serena smiles.

A couple of caveats are worth mentioning, although defending them falls outside the scope of this work. First, it might be desirable to restrict this principle to sentence-context pairs that are "canonical" – in some sense incumbent upon the structured propositionalist to explain – in order to bracket degenerate cases arising from stipulated conventions.[19] Second, it might be desirable to restrict the attribution of propositional constituency to the semantic values (in context) of certain occurrences of lexical items.[20] Complications aside, a commitment of this nature is motivated by the thought that propositional constituency must be determined in a principled manner, since allowing for other sources of constituency threatens to trivialize semantic theorizing, generally.[21] For our purposes, Terminal Node Constituency is intended as an extensionally adequate characterization of propositional constituency, and not as a metaphysical analysis of what it is to be a propositional constituent.

It's not immediately obvious whether – and, if so, how – a structured view of propositions with such commitments can account for the third reading by incorporating possible world variables into logical forms. The standard solution is unavailable as it stands because structured propositionalists can't take propositions to be unstructured sets of possible worlds, but there are more foundational difficulties preventing adherents of Terminal Node Constituency from easily adopting a syntax inspired by the standard solution. For simplicity at this stage, let's grant the structured proposi-

[19]Suppose, for example, that a community of speakers stipulates that the sentence 'Serena smiles' designates in context the proposition that the present day is good, even though 'Serena' might still occur as a terminal node and have Serena herself as its semantic value (in context). Then Terminal Node Constituency will entail that Serena is a constituent of the proposition that the present day is good. However problematic the supposition might be, the restriction to canonical sentence-context pairs avoids the difficulty altogether.

[20]Collins (2007) argues, for example, that if propositional structure mirrors syntactic structure, then syntactic copying at LF results in too many propositional constituents.

[21]For considerations against so-called "unarticulated constituents," see Stanley (2000).

tionalist a method of compositionally deriving structured propositions as the semantic values (in context) of the logical forms of 'that'-clauses; we'll surround a clause with angle brackets at LF to indicate the application of such a method. Let's also grant that possible world variables are not syntactically required but may nevertheless occur covertly as needed at LF. Now suppose a structured propositionalist tried to implement a variable-based theory of intensionality by assigning the third reading of (2) in context c a logical form along the following lines:

(6) $\mathit{Believe}[\mathit{Betty}, \langle \exists x(\mathit{friend\text{-}in}(w_c, x)\ \&\ \mathit{win}(x))\rangle]$

On the intended interpretation, '*Believe*' is assigned to the belief relation, '*Betty*' to Betty, '*friend-in*' to the relation of being a possible world w and individual x such that x is a friend of yours in w, and 'w_c' to the world of c.[22] As indicated by the angle brackets, the subordinate clause is interpreted as designating a structured proposition, which by Terminal Node Constituency has constituents corresponding to the machinery of existential quantification, '*friend-in*,' 'w_c,' '*wins*,' and the conjunction operator.[23] Our structured propositionalist will then propose on the basis of this logical form the following truth-conditions for the third reading of (2) in context c:

(2) is true in c if and only if Betty stands in the belief relation in w_c to the structured proposition that for some x, x is a friend of yours in w_c and x wins.

Their idea is to maintain that the instantiation conditions of the belief relation are loose enough for these truth-conditions to be satisfied by Game Show, even if Betty insists that she holds no belief the truth of which depends on who your friends are in any possible world. The advantage of including the world of the context in the specification of the object of Betty's reported belief is that its own truth-conditions will depend on

[22] More generally, for any context named by expression α, $\ulcorner w_\alpha \urcorner$ names the world of that context.

[23] In a fully worked out version of the view, (6) as a whole would also designate a structured proposition. For ease of exposition, I'll speak in terms of the truth-conditions of (6) in context instead; the considerations of this section run orthogonal to the compositional derivation of structured propositions as the designations of clauses in context, and the details of such derivations are taken up fully in later sections.

who your friends are only in that world. So, this structured proposition has the desired modal profile when evaluated for truth at different possible worlds. If such an account could be made to work – let's call it *the simple theory* – then structured propositionalists would have a syntactically and semantically straightforward variable-based theory of intensionality at the cost of a less traditional account of the belief relation.

There are two problems with the simple theory, however, that suggest a more sophisticated approach. The first problem is a slingshot argument in the style of Church (1943) that runs as follows. Let ϕ be any variable-free, declarative sentence in English, and consider the third reading of the following report:

(7) ⌜Betty believes that a friend of yours such that ϕ will win.⌝

According to the simple theory, the truth-conditions of this reading in context c can be expressed by the following:[24]

> ⌜(7) is true in c if and only if Betty stands in the belief relation in w_c to the structured proposition that for some x, x is a friend of yours in w_c such that ϕ and x wins.⌝

But a principled theory of the belief relation will plausibly require the following entailment relations to obtain in c under the assumption that Betty is minimally rational:

> ⌜Betty stands in the belief relation in w_c to the proposition that for some x, x is a friend of yours in w_c such that ϕ and x wins.⌝ $\Longrightarrow$
>
> ⌜Betty stands in the belief relation in w_c to the proposition that for some x, x is a friend of yours in w_c such that ϕ.⌝ $\Longrightarrow$
>
> ⌜Betty stands in the belief relation in w_c to the proposition that for some x, x is such that ϕ.⌝ $\Longrightarrow$
>
> ⌜Betty stands in the belief relation in w_c to the proposition that ϕ.⌝

If these entailments obtain, then the truth of the third reading of (7) in c requires Betty to stand in the belief relation in the world of c to every proposition designated (in con-

[24]The formulation below places 'in w_c' next to the NP-complement 'friend of yours' rather than ϕ in order to more faithfully represent the syntax of the standard solution, which takes possible world pronouns to be sisters of NPs and VPs.

text) by a variable-free, declarative sentence in English – an absurdity. In order to avoid this result, an advocate of the simple theory will need a principled reason to reject one of the entailments, despite their seeming simplicity and plausibility, while simultaneously maintaining that the instantiation conditions of the belief relation are looser than has been traditionally supposed. In light of this, objecting to one of these entailments and not the others seems objectionably ad hoc, and any independent motivation for doing so has not yet been produced.[25]

The second problem with the simple theory involves third readings embedded within the consequents of counterfactual conditionals. Consider the following sentence:

(8) Even if you were friendless, Betty would (still) believe that a friend of yours would win.

There's a reading of this sentence that's true in Game Show in which the indefinite DP 'a friend of yours' is evaluated with respect to the evaluation world of the main clause.[26] Let w_c be the evaluation world of the main clause, and let $w_\diamond$ be the nearest possible world to w_c in which you have no friends. Then according to the simple theory, supplemented with a standard semantics for counterfactuals in the style of Stalnaker (1968) and Lewis (1973), the intended reading of (8) is true in c if and only if Betty stands in the belief relation in $w_\diamond$ to the structured proposition that a friend of yours in w_c will win. According to Terminal Node Constituency, these truth-conditions require Betty to stand in the belief relation in a counterfactual scenario to a proposition that contains the evaluation world of the main clause, i.e. the actual world, as a

[25]Some readers might worry that the slingshot argument applies to anyone who endorses the truth of third readings by reasoning as follows: ⌜*S believes that a friend of mine such that ϕ will win*⌝ *is true in context, and belief is closed under the entailments in the main text; so,* ⌜*S believes that ϕ*⌝ *is true, for an arbitrary sentence ϕ.* The problem with this line of reasoning is that the entailment relations in the main text don't obtain between belief reports, but on claims making explicit reference to the belief relation and its propositional relatum. The final entailment, in particular, becomes problematic when transformed into an inference on belief reports; the transparent reading of ⌜Betty believes that something such that ϕ exists⌝ does not entail ⌜Betty believes that ϕ.⌝

[26]There's also a reading not at issue that's trivially false in Game Show, assuming that the counterfactual construction syntactically introduces a possible world variable binder allowing the NP-complement to be evaluated relative to the relevant counterfactual scenario(s). I'll discuss modal embedding more fully later.

constituent. But this is problematic because it's possible for Betty to have the belief reported by the intended reading without believing anything at all about the actual world.[27] Moreover, if a special relation of causal or epistemic acquaintance must obtain between believers and the constituents of their beliefs – as many structured propositionalists maintain – then it would be especially implausible for Betty to bear such a relation in a merely possible world to the actual world.[28] With or without such an acquaintance constraint, there are strong reasons for thinking that the simple theory incorrectly predicts that there isn't a true reading of (8) in Game Show.

The moral of the simple theory's failure is that the truth of the third reading can't be explained in terms of the attributee standing in the belief relation to a proposition with a constituent corresponding to either the embedded NP-complement or a covert possible world variable.[29] This suggests that structured propositionalists interested in a variable-based theory of intensionality must somehow take embedded NP-complements and world variables to make semantic contributions without contributing propositional constituents, and this amounts to a rejection of Terminal Node Constituency. A theory of this form proposed by Lederman (2022) has recently appeared in the literature, but it requires a problematic simplifying assumption the consequences of which have not yet been sufficiently addressed.

§3.3 A Simplifying Assumption

In this section, I'll argue against a simplified version of the proposal found in Le-

[27]Soames (1998) deploys an analogous argument against rigidifying forms of descriptivism about proper names, although see Pickel (2012) for a reply.

[28]A variety of authors who endorse a special relation of causal or epistemic acquaintance on singular belief are included in Jeshion (2010), although see Hawthorne and Manley (2012) for a dissenting view.

[29]The simple theory is a more complicated version of what I'll call *the flatfooted theory*, which isn't a variable-based theory of intensionality at all, according to which the true reading of (2) in Game Show is simply its narrow scope reading (2b), appearances to the contrary notwithstanding. While the simple theory requires covert possible world variables at LF, the flatfooted theory does not. I focus on the simple theory in the main text for the following reasons: (i) it's a variable-based theory of intensionality, (ii) it captures the correct modal profile of the structured proposition to which Betty reportedly stands in the belief relation, and (iii) it only requires loose instantiation conditions for the belief relation between subjects and a special class of propositions, namely, those with relations to possible worlds as constituents. Both views are susceptible to the slingshot argument, mutatis mutandis, although the flatfooted theory doesn't face the problem of third readings embedded in counterfactual conditionals.

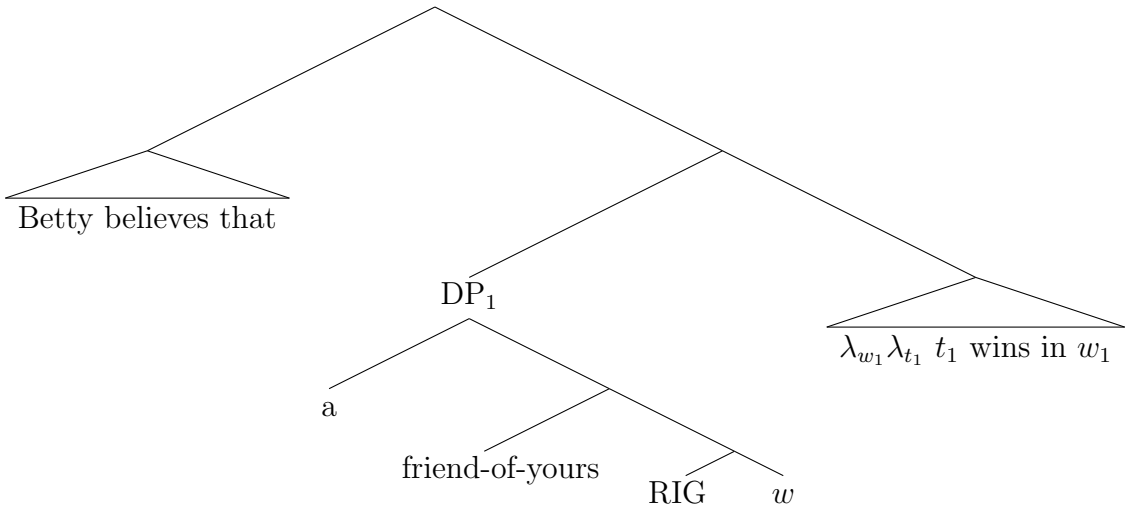
derman (2022) by abstracting away from Fregean senses and other compositional details that will be provided later. To begin, the guiding idea behind the theory I have in mind is that the truth of the third reading of (2) in Game Show can be partly explained in terms of Betty standing in the belief relation to a plausible proposition, namely, the proposition that a person identical with either Xavier or Yvette will win. The overarching strategy will be to somehow interpret the NP-complement 'friend of yours' in that particular context as if it were instead 'person identical with either Xavier or Yvette,' on the basis of the fact that {Xavier, Yvette} is the extension of 'friend of yours' in the world of the context.

For this exercise, we'll grant the structured propositionalist a number of useful tools, including a conception of structured intensions of semantic type *set* for NPs and *st* for clauses, a semantics for generalized quantifiers on which determiners have semantic type $<set, <set, st>>$, and an intensional implementation for QR. We'll also assume that unbound world variables are interpreted by default as the world of the context of utterance, i.e. the actual world.[30] With these assumptions in place, consider the following abstract proposal for the logical form of the third reading of (2) in Game Show – hereafter, *GS* – after movement by intensional QR:[31]

[30]This assumption is considered in §8.2.4 of von Fintel and Heim (2011). It's a divergence from the treatment in §3.2 of Lederman (2022), which binds the possible world variable by a λ-operator at the top of the clause in order to accommodate various embedded constructions. These details need not detain us here, however, since the relevant shortcomings of the theory under discussion run orthogonal to issues surrounding embedded constructions. I'll return to this topic later.

[31]The syntax here is analogous to the first syntax tree in §3.2 of Lederman (2022), although note a slight typographic error there that displays [[**RIG** $\boldsymbol{t_{4_w}}$ **winners**] **lost**] as a sentential constituent, instead of the intended [**two** [**RIG** $\boldsymbol{t_{4_w}}$ **winners**]].

(9)



Call 'RIG' a *rigidifier*; it's purpose is to rigidify the interpretation of the NP-complement with respect to the world of the context of utterance. Our focus is to secure an interpretation of the indefinite's sister node as follows:

$$[\![\textbf{friend-of-yours RIG } \boldsymbol{w}]\!]^{\text{GS}} = \lambda w_s \lambda x_e (x = \text{Xavier} \vee x = \text{Yvette})$$

This result can be driven by the following lexical entry, which is constant across contexts, for the rigidifier:

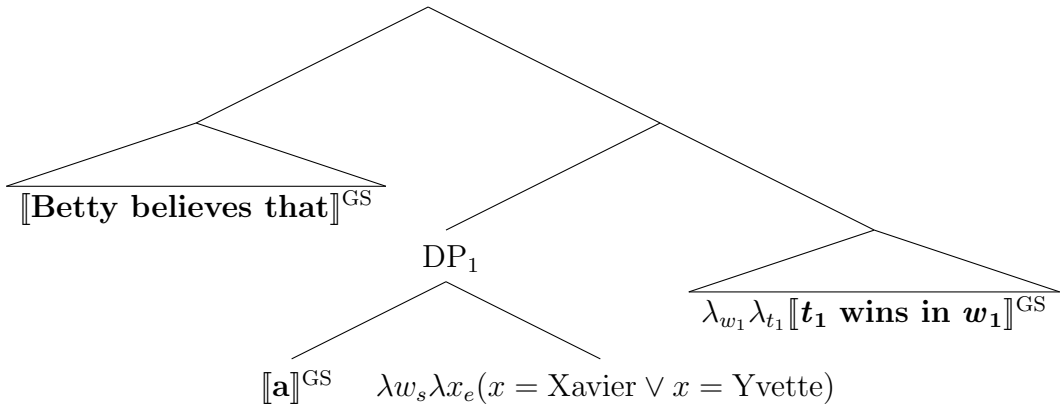
$$[\![\textbf{RIG}]\!]^{\text{GS}} = \lambda w_s \lambda P_{set} \lambda w'_s \lambda x_e (x = a_1 \vee x = a_2 \vee \ldots \vee x = a_n),$$
$$\textit{where } \{a_i | 1 \leq i \leq n\} = \{x_e | P(w)(x) = 1\}$$

Through successive functional application, the rigidifier's semantic value maps the world of the context and the semantic value of the noun to a constant intension, namely, the characteristic function of the set of individuals satisfying the noun in the world of the context.[32]

In the present case, the rigidifier's value maps the world of Game Show and the semantic value of 'friend of yours' to, roughly, the property of being either Xavier or Yvette, since Xavier and Yvette are your only friends in the context. The compositional derivation therefore includes an intermediate stage displayed as follows:

[32]This constant function is analogous to what Lederman (2022) calls a *mere list*.

(10)



At this point, it's evident that Terminal Node Constituency has been rejected; since the semantic values of 'friend-of-yours,' 'RIG,' and 'w' (in context) have disappeared from the compositional derivation, there's no plausible way for them to reappear as constituents of the proposition so-derived. If the theory up to this point is correct, then the third reading of (2) is true in Game Show if and only if the opaque reading of the following is also true in Game Show:[33]

(11) Betty believes that a person identical with Xavier or Yvette will win.

And the opaque reading of (11) is true in Game Show. So, this theory, which we'll call *the haecceity theory*, correctly predicts the third reading of (2) to be true in context, as desired.

The haecceity theory semantically interprets the NP-complement of a transparent DP as if it were an NP of the form ⌜person identical with x_1, or x_2, ... or x_n, ⌝ for proper names x_1, x_2, ... and x_n. When some individuals a_1, a_2, ... and a_n uniquely satisfy such a predicate, we'll call the propositional constituent corresponding to the predicate *the haecceity of* a_1, a_2, ... *and* a_n.[34] Then the haecceity theory takes the third reading of (2) to be true in Game Show only if Betty stands in the belief relation to a structured proposition containing as a constituent the haecceity of Xavier and Yvette, since they uniquely satisfy the NP 'friend of yours' in that context. Call a property P

[33]I'll use 'person' instead of 'thing' in what follows for ease of exposition. Nothing important hinges on this choice of sortal, but it's important that the 'that'-clause has the form ⌜that a(n) X identical with Xavier or Yvette will win,⌝ rather than simply 'that Xavier or Yvette will win.'

[34]Haecceities correspond to one kind of "sense of rigid properties" in Lederman (2022).

rigid relative to a set S just in case necessarily, the set of things that instantiate P is S. Then a haecceity is rigid relative to the set of individuals that possibly instantiate it. The haecceity theory is therefore a member of a family of views that require the following simplifying assumption:

> **Rigidification**: If δ is a transparent DP with NP-complement φ occurring in an attitude report true in context c, then the attributee of the report stands in the belief relation to a structured proposition that contains as a constituent a property rigid relative to the set of individuals satisfying φ in c.

The system of Lederman (2022) adheres to this assumption in its own terms.[35]

As for the haecceity theory, it isn't immediately obvious that the attributee of any third reading whatsoever stands in the belief relation to a proposition containing the required haecceity as a constituent. Lederman anticipates this kind of worry for his own view and responds as follows:

> one might wonder whether in every case where such reports are available, the ascribee can be reasonably said to stand in the belief-relation to a relevant thought *[proposition]*. In response to this concern, I note that a parallel assumption is also built into all competing treatments I am aware of. (1262, parenthetical mine)

This response makes it clear that there's a gap in the literature concerning the motivations for, and potential problems with, Rigidification. In order to start filling in this gap, I'll present a simple argument against the haecceity theory and suggest that the problem lies in Rigidification. Consider the following context:

[35]Lederman (2022) characterizes it as follows:

> the proposal requires that, when a person's beliefs can truly be reported using a transparent attitude ascription, the person must stand in the belief-relation to a thought composed in part of a sense of a rigid property. For instance, I assumed that John stood in the belief-relation to a thought composed in part of the sense of the list "Ann, Bill, Carol and Dan". (1262)

Blindfolds

You're watching a live game show with Betty, who thinks you have no friends. The three contestants are as follows: (i) your friend Xavier, with visible, green eyes, (ii) your friend Yvette, with blindfolded, green eyes, and (iii) a stranger Zoe, with blindfolded, brown eyes. (You have no other friends.) Betty holds the superstitious belief that green eyes cause good luck. She asserts, "I think a green-eyed contestant will win."

In this context, Betty knows that there's at least one green-eyed contestant, namely, Xavier, but she doesn't know who all the green-eyed contestants are due to the blindfolds. Still, she thinks that whoever the green-eyed contestants happen to be, one of them will win. As in the original case of Game Show, there's a reading of (2) that's true in Blindfolds, as demonstrated by the acceptability of the following line of ordinary reasoning in this context: *Betty believes that a green-eyed contestant will win, and every green-eyed contestant is a friend of yours. So, Betty believes that a friend of yours will win.* And this must be the third reading of (2) for the same reasons as before; no individual friend of yours is such that Betty stands in the belief relation to the singular proposition that (s)he will win, contra the wide scope interpretation, and Betty believes you have no friends, contra the narrow scope interpretation.

According to the haecceity theory, however, the third reading of (2) is true in Blindfolds only if the opaque reading of (11) is true, since Xavier and Yvette uniquely satisfy 'friend of yours' in the world of the context. The problem is that the opaque reading of (11) is clearly false in Blindfolds. It's not plausible that Betty stands in the belief relation to the proposition that a person identical with either Xavier or Yvette will win, because Yvette and Zoe are interchangeable as contestants from Betty's point of view due to their blindfolds. What's more, a powerful variant of this argument can be posed to advocates of the haecceity theory who require, as many structured propositionalists do, a special relation of causal or epistemic acquaintance to obtain between believers and the constituents of their beliefs. Imagine a context exactly the same as

Blindfolds except that Yvette is placed behind a curtain. Then the opaque reading of (11) is false in this context, contra the haecceity theory, because Betty doesn't bear an acquaintance relation to Yvette. Since Betty might not even know who Yvette is, Betty doesn't stand in the belief relation to any proposition containing as a constituent any haecceity of some individuals that include Yvette.

The basic challenge can be formulated as a valid argument against the haecceity theory as follows:

Argument against Haecceity Theory

P1. The third reading of (2) is true in Blindfolds.

P2. The opaque reading of (11) is false in Blindfolds.

P3. If the haecceity theory is correct, then the third reading of (2) is true in Blindfolds only if the opaque reading of (11) is true in Blindfolds.

C. So, it's not the case that the haecceity theory is correct.

Assuming that the linguistic data presented by P1 and P2 are robust, the problem with the haecceity theory is located at P3 with its analysis of the third reading in terms of haecceities. Perhaps, then, haecceities aren't the right kind of rigid property for a variable-based theory of intensionality. Someone might suggest, for example, that the property of being an actual green-eyed contestant could serve as a substitute in this case, but this suggestion runs into the same problem as the simple theory with respect to third readings embedded in the consequents of counterfactual conditionals. I'll leave it as an open question for advocates of Rigidification whether a different rigid property can be pressed into service for their view. Before moving on to what seems to me to be a more promising line of thought, let's briefly consider the costs of rejecting the premises above under the assumption that we still aim to provide a semantic explanation of third readings, generally.

The first two premises are pieces of linguistic data corroborated by the reports of numerous respondents, but it's a theoretical option to insist on divergent linguistic intuitions. On the one hand, someone prepared to deny the truth of the third reading of

(2) in Blindfolds, contra P1, must explain away appearances to the contrary in a way that doesn't jeopardize the third reading in the original context of Game Show. On the other hand, someone prepared to assert the truth of the opaque reading of (11) in Blindfolds, contra P2, must explain away appearances to the contrary in a way that doesn't reintroduce the slingshot argument. P3 is a straightforward consequence of the haecceity theory, but (again) perhaps an alternative implementation involving other kinds of rigid properties can be made to work. Even if one of these responses is ultimately how a structured propositionalist ought to respond, cases like Blindfolds still provide us with strong reasons for questioning Rigidification. So, we ought to consider the costs associated with lifting it, even if doing so turns out to be costly in its own way.

§3.4 The Swapping Theory

In my view, the moral of the haecceity theory's failure is that the third reading of (2) in Blindfolds can be explained in terms of Betty standing in the belief relation to the proposition that a green-eyed contestant will win, plus the fact that the property of being a green-eyed contestant is instantiated by exactly the members of the extension of 'friend of yours' in the world of the context. If this were the case, it suggests that the truth of any third reading in context, generally, could be explained in terms of the attributee standing in the belief relation to some proposition or another that contains, as a constituent, a property instantiated by exactly the members of the extension of the NP-complement in the world of the context. But there is no requirement that this property be rigid with respect to any set. The truth of (2) in Blindfolds is a case in point, since the property of being a green-eyed contestant isn't rigid with respect to the set of individuals satisfying it in the world of the context. The purpose of this section is to therefore develop a variable-based theory of intensionality for structured propositions under the following assumption:

> **@-Instantiation**: If δ is a transparent DP with NP-complement φ occurring in an attitude report true in context c, then the attributee of the report stands in

the belief relation to a structured proposition that contains a property instantiated in w_c by exactly the individuals satisfying φ in c.

This will require some preliminary assumptions, an initial fragment for opaque DPs, a new theory for transparent DPs, and the consideration of some basic embedded constructions for good measure.

§3.4.1 Preliminaries

To begin, structured propositionalists disagree amongst themselves about many aspects of their view, including the ontological category of propositions, their representational properties, and the means by which constituents are bound together into unified propositions. Abstracting away from these metaphysical distinctions, we can represent structured propositions in a Russellian semantic framework as ordered n-tuples consisting first of a property or relation R followed by $(n-1)$-many things, as in the following:

$$\langle R, x_1, x_2, \ldots, x_{n-1} \rangle$$

The proposition that John loves Jane, for example, is represented by ⟨Love, John, Jane⟩. It contains the love relation, John, and Jane as constituents, arranged in such a way that the proposition is true when John and Jane instantiate (in that order) the loving relation. There's nothing deep about this system of representation; it's arbitrary, for instance, that the relevant property or relation appears as the first member of the n-tuple. The truth-conditions for any structured proposition are determined by its constituents and their arrangement. So, a world-relative theory of propositional truth can be given as follows:

> **Propositional Truth:** For any possible world w, relation R, and things $x_1, x_2, \ldots x_n$, $\langle R, x_1, x_2, \ldots, x_n \rangle$ is true relative to w – abbreviated as $w \vDash \langle R, x_1, x_2, \ldots, x_n \rangle$ – if and only if $x_1, x_2, \ldots, x_n$ instantiate (in that order) R in w.

This is a principle situated squarely within the metaphysics of propositions, which are commonly taken to be non-mental and non-linguistic entities. Nothing has yet been

said about semantic values (in context), composition, or linguistic meaning, generally. On this view, the distinct role of a semantic theory is to map sentence-context pairs to structured propositions, which have truth-conditions in accordance with the metaphysical principle above.[36] We'll say that a sentence S is true in context c relative to a possible world w just in case the correct semantic theory maps S and c to a structured proposition that's true relative to w.[37] Such a mapping between sentence-context pairs and structured propositions must be determined compositionally in order to explain linguistic competence and productivity, but the nature of semantic composition and the specific assignment of semantic values in context can vary by theory.

Consider, for example, a Russellian semantics similar to those presented in Salmon (1986a), Soames (1987), and King (2007), according to which the structured proposition corresponding to a sentence-context pair is determined primarily by the order in which semantic values compose up the tree of syntax, rather than by any features of the semantic values themselves, such as whether one is in the functional domain of another. On these views, two sister nodes with semantic values x and y join at a mother node with $(x \oplus y)$ as its semantic value, where '$\oplus$' symbolizes a primitive operation mapping any two constituents to their unique fusion. Since this conception of semantic composition entails Terminal Node Constituency, it's incompatible with our new theory.

A more flexible framework is the extensional system of Pickel (2019), which, building on Elbourne (2011), takes semantic composition to proceed via functional application. On this view, the semantic value of a predicate, such as 'loves,' is a function that maps the semantic values of proper names, such as 'Jane' and 'John,' to a structured proposition, such as ⟨Love, John, Jane⟩. Since the semantic value of 'loves' is a function that is not a constituent of the proposition that John loves Jane, this view is inconsistent with Terminal Node Constituency. The variable-based theory of intensionality I'll

[36] I'll assume an answer to the question of what it is in virtue of which a given proposition has the truth-conditions it has. For discussion, see King et al. (2014).

[37] For simplicity, I won't consider any other possible parameters for propositional truth, such as times, locations, standards of precision, agents, etc.

propose, which we'll call *the swapping theory*, exploits this kind of semantic machinery in order to prevent NP-complements and possible world variables from corresponding to propositional constituents in third readings. As a first step toward that end, I'll define an initial fragment that generates opaque DPs.

§3.4.2 Opacity

The swapping theory treats NPs, VPs, determiners, and the complementizer as purely extensional semantically; reference to possible worlds only appears for now in the derivations of truth-conditions in accordance with Propositional Truth. For this reason, we only require a standard type hierarchy with primitive types of e for individuals, which include properties and relations, and t for structured propositions. Here's a sampling of semantic values for each of these lexical category:

NPs

$[\![\textbf{Betty}]\!]^c$ = Betty

$[\![\textbf{friend-of-yours}]\!]^c = \lambda x \langle \textsc{friend}, x \rangle$

VPs

$[\![\textbf{wins}]\!]^c = \lambda x \langle \textsc{win}, x \rangle$

$[\![\textbf{believes}]\!]^c = \lambda p_t \lambda x_e \langle \textsc{bel}, x, p \rangle$

Determiners

$[\![\textbf{a}]\!]^c = \lambda P_{et} \lambda Q_{et} \langle \textsc{some}, \lambda x_i \langle \textsc{conj}, P(x_i), Q(x_i) \rangle \rangle$

Complementizer

$[\![\textbf{that}]\!]^c = \lambda p_t . p$

The properties and relations appealed to in these lexical entries require further specification in order to figure meaningfully in our statement of various truth-conditions. For any subject x, possible world w, propositional function f, and propositions p and q:

- x instantiates FRIEND (WIN) in w if and only if x is your friend (x wins the game

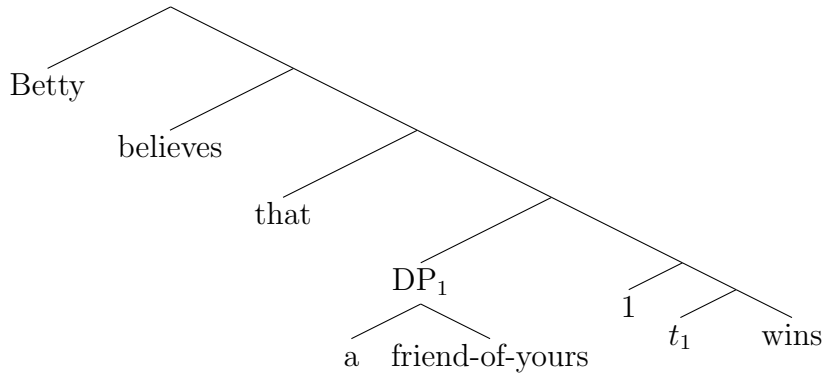
at some later time) in w.

- x and p instantiate BEL in w if and only if x stands in the belief relation in w to p.
- f instantiates SOME in w if and only if for some y, $w \vDash f(y)$.
- p and q instantiate CONJ in w if and only if $w \vDash p$ and $w \vDash q$.

So far, this system is analogous to Pickel (2019), except that the instantiation relation has been relativized to possible worlds.

Now consider the opaque reading of (2) in context, which we'll suppose to have the following logical form after QR:

(12)



Over the course of syntactic movement, the numeral index is inserted in the customary way following Heim and Kratzer (1998). Composition is then assumed to proceed by functional application whenever possible:

FUNCTIONAL APPLICATION

If α is a branching node and $\{\beta, \gamma\}$ is the set of its daughters, then for any context c, α is in the domain of $[\![\cdot]\!]^c$ if both β and γ are, and $[\![\beta]\!]^c$ is a function whose domain contains $[\![\gamma]\!]^c$. In this case, $[\![\alpha]\!]^c = [\![\beta]\!]^c([\![\gamma]\!]^c)$.

I depart from Pickel (2019), however, by adopting a generalized version of the canonical account of quantification, which will be useful later:[38]

[38]If this departure raises concerns about the compositionality of these semantics, see the recent iteration on the canonical account of quantification given by Glanzberg and King (2020), who refine and

Variable Predicate Abstraction

Let α be a branching node with daughters β and γ, where β dominates only a numeral j co-indexed with a variable v of type ϕ. Then, for any context c, $[\![\alpha]\!]^c = \lambda v_\phi [\![\gamma]\!]^{c, g_c[v_j \mapsto v]}$.

The compositional derivation relative to a context c is then demonstrated in stages, starting with an application of Variable Predicate Abstraction:

$$[\![\text{ [} \mathbf{1} \text{ [} t_1 \textbf{ win } \text{]] }]\!]^c = \lambda x [\![\ t_1 \textbf{ win } \ ]\!]^{c, g_c[t_1 \mapsto x]} = \lambda x \langle \textsc{win}, x \rangle$$

Through successive functional application, the semantic value of the determiner maps the value of the NP-complement and the propositional function above to the following structured proposition:

(13) $\langle \textsc{some}, \lambda x_i \langle \textsc{conj}, \lambda y \langle \textsc{friend}, y \rangle (x_i), \lambda y \langle \textsc{wins}, y \rangle (x_i) \rangle \rangle$

By β-reduction, this reduces to the following:

(14) $\langle \textsc{some}, \lambda x_i \langle \textsc{conj}, \langle \textsc{friend}, x_i \rangle, \langle \textsc{wins}, x_i \rangle \rangle \rangle$

By Propositional Truth, (14) is true relative to possible world w just in case for some x, $\langle \textsc{friend}, x \rangle$ and $\langle \textsc{win}, x \rangle$ are true in w, that is, just in case for some x, x instantiates FRIEND and WIN in w. The complementizer is semantically vacuous, mapping this proposition to itself to yield the semantic value of the entire 'that'-clause. Finally, through successive functional application, the semantic value of the attitude verb maps this proposition and the attributee to the following structured proposition, which is the semantic value of (12) in c:

(15) $\langle \textsc{bel}, \text{Betty}, \langle \textsc{some}, \lambda x_i \langle \textsc{conj}, \langle \textsc{friend}, x_i \rangle, \langle \textsc{wins}, x_i \rangle \rangle \rangle \rangle$

By Propositional Truth, this proposition is true relative to possible world w just in case Betty stands in the belief relation in w to (14).

---

defend the appeal to semantic rules outside of functional application. The rule of Variable Predicate Abstraction can be seen as a version of their rule, Variable IFA, that's modified to interpret numeral indices in the syntax.

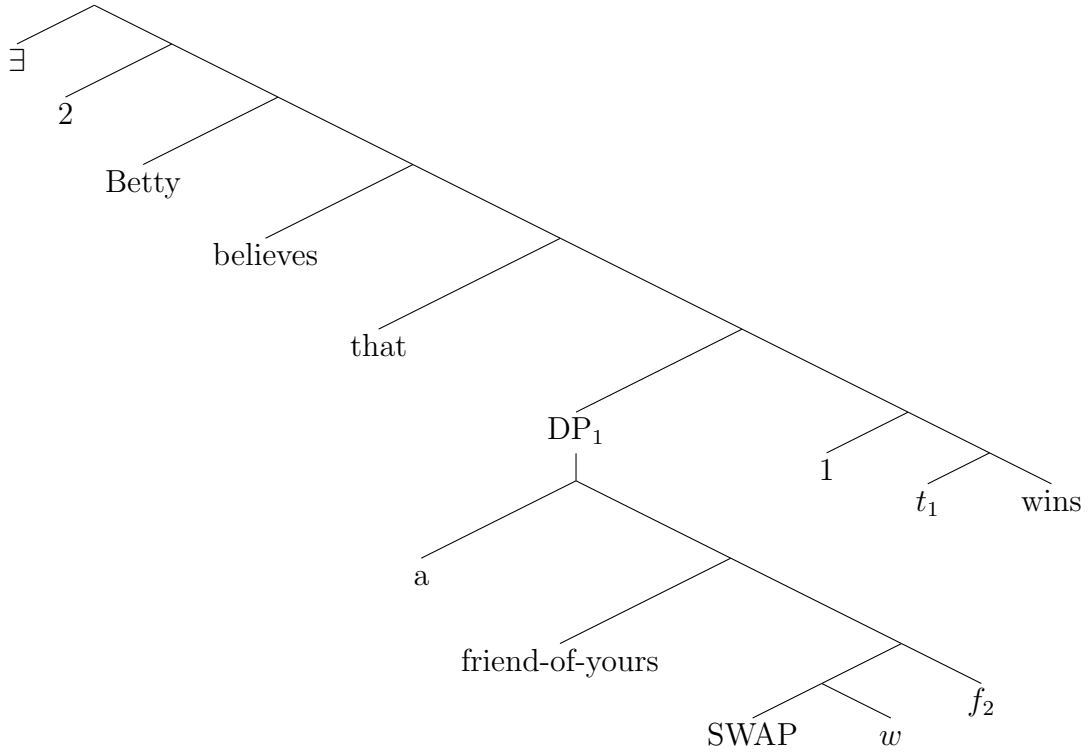
Substituting 'friend of yours' in (12) with a co-extensional expression in context can change the truth-value of the overall report by changing the object of Betty's reported belief to a proposition with distinct constituents. So, the DP is opaque with respect to the attitude verb, as desired. Now we can extend this initial fragment into a variable-based theory of intensionality that generates transparent DPs for third readings.

§3.4.3 Transparency

According to the swapping theory, the intensional status of a DP is determined by the occurrence of a covert "swapping" operator ('SWAP') that selects for, in addition to a possible world variable, a choice function variable existentially bound at the top of the clause. The idea that lexical items could introduce variables over choice functions is not a new one, as it's pursued by Reinhart (1997), Winter (1997), Kratzer (1998), Matthewson (1999) and others in their attempts to account for the exceptional scope-taking of indefinites. The swapping theory, however, uses choice functions defined on sets of NP-meanings rather than on NP-meanings themselves. So, it produces transparent DPs without analyzing them referentially, and it can also apply to more determiners than the indefinite for that reason. A function f is a *choice function* on a non-empty collection of sets X if and only if f maps every member of X to an element of that member, i.e. for all $x \in X$, $f(x) \in x$. Since our choice functions operate on sets of NP-meanings, they require a new semantic type CH, where variables of that type $f_1, f_2, \ldots$ are mapped by variable assignment functions into $\{f \in D_{et}^{\mathcal{P}(D_{et})} \mid \forall x \in \mathcal{P}(D_{et}), f(x) \in x\}$, or D_{CH}. Variables over possible worlds are treated as before, requiring semantic type s, where variables of that type $w_1, w_2, \ldots$ are mapped by variable assignment functions into the set of all possible worlds, D_s. We'll continue to assume that unbound possible world variables are interpreted by default as the world of the context, and that each context c comes equipped with a world w_c and a single variable assignment function g_c, where g_c is accordingly defined on variables of type CH, s, and e.

According to the swapping theory, the third reading of (2) has a logical form such as the following:

(16)



The swapping operator 'SWAP' selects for a possible world variable, choice function variable, and NP. The resulting DP has undergone movement by QR but remains clause-bound, respecting established island constraints on movement outside of finite clauses.[39] Following Reinhart (1997) and Winter (1997), the choice function variable is bound at the top of the matrix clause by an existential quantifier, which in our case is a complex ⌜[∃ [$\boldsymbol{i}$ …]]⌝, for co-indexed numeral i. Let's proceed with the compositional derivation.

For any $P \in D_{et}$, let $\downarrow_w P = \{x \in D_e | w \vDash P(x)\}$. Then the required lexical entries can be given as follows:

Choice Function Quantifier

$[\![\exists]\!]^c = \lambda P_{<CH,t>} \langle \text{SOME}, P \rangle$

[39]See May (1977) and, more recently, Grano and Lasnik (2018).

Operator

$[\![\textbf{SWAP}]\!]^c = \lambda w_s \lambda f_{CH} \lambda P_{et} (f\{R \in D_{et} | \downarrow_w R = \downarrow_w P\})$

The derivation begins with an application of Variable Predicate Abstraction on the numeral index '2' and its sister node, yielding a propositional function over choice functions as the semantic value of the penultimate root node. The semantic value of the choice function quantifier (in context) maps this propositional function to the structured proposition true in a world w just in case some proposition in its range is true in w, yielding the following as the semantic value of (16) in c:

(17) $\langle \textsc{some}, \lambda f_{CH} [\![\textbf{[Betty [believes [[a [foy SWAP } \boldsymbol{w\ f_2} \textbf{]] [1 } \boldsymbol{t_1} \textbf{ wins]]]]}]\!]^{c, g_c[f_2 \mapsto f]} \rangle$

We've ignored the complemetizer again since it's semantically vacuous, and 'foy' abbreviates 'friend-of-yours.' Through successive functional application, the semantic value of 'believes' applies to the value of the subordinate clause and the attributee, resulting in the following:

(18) $\langle \textsc{some}, \lambda f_{CH} \langle \textsc{bel}, \text{Betty}, [\![\textbf{[[a [foy SWAP } \boldsymbol{w\ f_2} \textbf{]] [1 } \boldsymbol{t_1} \textbf{ wins]]}]\!]^{c, g_c[f_2 \mapsto f]} \rangle \rangle$

At this point, the semantic value of the determiner successively applies to that of its complement and that of the predicate abstract, which is treated in the same way as in the derivation of the opaque DP. The value of the determiner's complement is determined by functional application on the lexical entry for the swapping operator; through β-reduction on the semantic value of 'SWAP' provided above, 'w' is replaced by '$[\![\boldsymbol{w}]\!]^c$', 'f_{CH}' by '$[\![\boldsymbol{f_2}]\!]^{c, g_c[f_2 \mapsto f]}$', and '$P$' by '$[\![\textbf{foy}]\!]^c$'. The result is as follows:

(19) $\langle \textsc{some}, \lambda f_{CH} \langle \textsc{bel}, \text{Betty},$
$([\![\textbf{a}]\!]^c([\![\boldsymbol{f_2}]\!]^{c, g_c[f_2 \mapsto f]}\{R \in D_{et} | \downarrow_{[\![\boldsymbol{w}]\!]^c} R = \downarrow_{[\![\boldsymbol{w}]\!]^c} [\![\textbf{foy}]\!]^c\}))(\lambda x \langle \textsc{wins}, x \rangle) \rangle \rangle$

We'll interpret the choice function variable, possible world variables, and noun in the usual way, allowing the determiner's value to operate successively on its two *et* arguments, yielding the following:

(20) $\langle$SOME, $\lambda f_{CH}\langle$BEL, Betty,

$\langle$SOME, $\lambda x_i\langle$CONJ, $f\{R{\in}D_{et}|{\downarrow_{w_c}}R{=}{\downarrow_{w_c}}\lambda x\langle$FRIEND, $x\rangle\}(x_i)$, $\langle\lambda x\langle$WINS, $x\rangle(x_i)\rangle\rangle\rangle\rangle$

To further simplify, for any monadic property Π and possible world w, let ${\downarrow_w}\Pi = \{x \in D_e | x$ instantiates Π in $w\}$; note that ${\downarrow_w}\lambda x\langle\Pi, x\rangle{=}{\downarrow_w}\Pi$.[40] This gives us the following equality:

$${\downarrow_{w_c}}\ \lambda x\langle\text{FRIEND}, x\rangle = {\downarrow_{w_c}}\ \text{FRIEND}$$

Applying this result and β-reducing the last λ-abstract yields the final formulation of the semantic value of (16) in c:

(21) $\langle$SOME, $\lambda f_{CH}\langle$BEL, Betty,

$\langle$SOME, $\lambda x_i\langle$CONJ, $f\{R{\in}D_{et}|{\downarrow_{w_c}}R{=}{\downarrow_{w_c}}$FRIEND$\}(x_i)$, $\langle$WIN, $x_i\rangle\rangle\rangle\rangle$

By Propositional Truth, this proposition is true relative to a possible world w' just in case for some $R \in D_{et}$ such that ${\downarrow_{w_c}}R{\subseteq}{\downarrow_{w_c}}$FRIEND, Betty stands in the belief relation in w' to $\langle$SOME, $\lambda x_i\langle$CONJ, $R(x_i)$, $\langle$WIN, $x_i\rangle\rangle\rangle$. The context and world of Game Show satisfy this condition, since R is witnessed by $\lambda x\langle$GREEN-EYED CONTESTANT, $x\rangle$, where GREEN-EYED CONTESTANT is the property of being a contestant with green eyes. In this way, the swapping theory correctly predicts that (2) is true in Game Show.

§3.4.4 Basic Embedding

What I've proposed is only the beginning of a fully detailed account of the swapping theory. While there will always be further complications arising out of additional examples, it's important to show that extending the theory to some basic embedded constructions, such as sentential negations and doubly-embedded attitude reports, is feasible. Without the assurance that these simple extensions can be plausibly handled, there is little reason to invest more time taking the theory seriously.

First, consider the negation of the third reading of (2), i.e. the reading of the following sentence that's true (in context) if and only if the third reading of (2) is false (in context):

[40] *Proof.* For any $w{\in}D_s$, $y{\in}D_e$ and property Π, $y{\in}{\downarrow_w}\lambda x\langle\Pi, x\rangle \iff$ $w \vDash \lambda x\langle\Pi, x\rangle(y) \iff w \vDash \langle\Pi, y\rangle \iff y$ instantiates Π in $w \iff y \in {\downarrow_w}\Pi$

(22) It's not the case that Betty believes that a friend of yours will win.

The intended reading is accessible in a context in which (22) is uttered in disagreement over whether the third reading of (2) is true. It corresponds to a logical form in which the existential quantifier over choice functions lands below the negation operator 'NOT' at LF, as in the following:

(23) [NOT [∃ 2 [Betty believes that a foy SWAP w f_2 wins]]]

On the other hand, there is no accessible reading of (22) corresponding to the logical form in which the quantifier lands above the negation operation at LF, as in the following:

(24) [∃ 2 [NOT [Betty believes that a foy SWAP w f_2 wins]]]

Such a reading would be trivially true in most contexts, since the majority of choice functions would witness the existential quantification. These observations suggest the provisional hypothesis that, in the logical form of a third reading, the existential choice function quantifier must land at the top of the first available matrix clause dominating the choice function variable. We can test this hypothesis by considering cases of doubly-embedded attitudes.

Consider the following report:

(25) Serena believes Betty believes a friend of yours will win.

There's an accessible reading of this report that attributes to Serena a belief expressed by the third reading of (2) in Game Show, i.e. a belief the object of which is the structured proposition (21). This reading results from a logical form in which the existential quantifier lands above the first available matrix clause dominating the choice function variable, as in the following:

(26) [Serena believes [∃ 2 [Betty believes [a foy SWAP w f_2 will win]]]]

At this point, one might object to the plausibility of a subject's belief involving quantification over choice functions, especially when the subject doesn't know what choice function are. In response, we can note that the core semantics of the swapping theory require subjects to stand in the belief relation to structured propositions with constituents that include propositional functions, properties of propositional functions, and logical relations between propositions. So, if the intelligibility of constituents is objectionable, it's a problem well before the introduction of choice functions. Moreover, most if not all semantic theories involve pre-theoretically unrecognizable formal machinery, but it's often possible to colloquially paraphrase the function of this machinery. A linguistically competent subject might not be familiar with the mathematical representation of choice functions, but he plausibly understands various ways of replacing one meaning for another in sentences or thoughts. In fact, it's arguable that his ability to do so is partly constitutive of his linguistic competence.

Our provisional hypothesis about the landing sites for existential quantification also predicts that there isn't an accessible reading of (25) corresponding to a logical form such as the following:

(27) [$\exists$ 2 [Serena believes [Betty believes [a foy SWAP w f_2 will win]]]]

Such a reading would be true in a context in which (i) Serena stands in the belief relation to the proposition that Betty believes that a green-eyed contestant will win, and (ii) although Serena doesn't believe it, every green-eyed contestant is a friend of yours. But Serena's reported attitude is only consistent with the object of Betty's belief containing a constituent corresponding to GREEN-EYED CONTESTANT, and this seems to preclude, at least to my ears, a true reading of (25). If someone wishes to permit such a reading, however, this will require allowing the existential quantifier to land at the top of any clause the main verb of which is a propositional attitude verb.

Extending the swapping theory to accommodate embedded constructions requires the working hypothesis that the existential quantifier over choice functions lands at the top of the first available matrix clause dominating the choice function variable. For

now, this hypothesis remains a stipulation in need of a further syntactic explanation, and it can accordingly be considered a cost of the theory. Still, there's ample reason to think that continued work in this direction will be fruitful.

§3.5 Complications

The purpose of this section is to highlight additional degrees of complexity required by semantic explanations of third readings. This involves considering at length two families of complications arising out of concerns found in Schwager (2011) and broaching the important question of whether third readings constitute a distinctively semantic phenomenon in the first place.

§3.5.1 Empty Extensions

The first family of complications arises out of considerations of empty extensions. Consider, for example, the following context:

> WITCHES
>
> You're watching a live game show with Betty, who believes in witches. You have no friends, and she asserts, "I think a witch will win."

The current formulation of the swapping theory incorrectly predicts that the third reading of (2) is true in this context. Betty stands in the belief relation to the proposition that a witch will win, which contains as a constituent a property, namely, being a witch, instantiated by exactly the individuals satisfying 'friend of yours' in the context, that is, no one. A simple solution is to update the semantic value of 'SWAP' in order to require the object of Betty's reported belief to contain a property that's instantiated by something in the world of the context, as in the following:

$$[\![\textbf{SWAP}]\!]^c = \lambda w_s \lambda f_{CH} \lambda P_{et} (f\{R \in D_{et} | (\exists x)(x \in \downarrow_w R) \;\&\; \downarrow_w R = \downarrow_w P\})$$

As it turns out, this modification is also helpful in extending the swapping theory to counterfactual conditions.

Consider (8), for example, repeated below as (28):

(28) If you had no friends, then Betty would believe that a friend of yours would win.

The data to explain is that there are at least two readings of this sentence. On the first, (28) is true in Game Show, since the NP-complement is evaluated relative to the world of the context of utterance. On the other, (28) is trivially false in every context, since the NP-complement is evaluated relative to the relevant counterfactual worlds in which you have no friends. The swapping theory can generate both readings under the assumption that modal expressions are syntactically analyzed in terms of quantifiers over possible world variables at LF. Extending the swapping theory with a comprehensive syntax and compositional semantics for counterfactuals falls outside the scope of this work. At a high level of abstraction, though, the true reading of (8) can be assigned a logical form, or an intermediary stage during semantic composition, along the following lines in context c:

(29) $[\forall w_1 : w_1 R_c w_c](w_1 \vDash [\![\textbf{you have no friends}]\!]^c \rightarrow$
$w_1 \vDash [\![\exists$ **2 Betty believes that a [foy [[SWAP** $\boldsymbol{w}$] $\boldsymbol{f_2}$]] **wins**$]\!]^c)$

where 'R_c' designates a contextually determined accessibility relation between worlds. Given how we've been treating unbound possible world variables, 'SWAP' will operate on the world of the context of utterance, w_c. This ensures that Betty reportedly stands in the belief relation – in the relevant worlds in which you have no friends – to a proposition that contains a property instantiated in w_c – where you do have friends – by exactly the members of the extension of 'friend of yours' in w_c. By contrast, the trivially false reading of (28) results from replacing the unbound occurrence of 'w' with 'w_1,' thereby binding it to universal quantifier introduced by the modal operator at LF. This requires, impossibly, that Betty stands in the belief relation – in the relevant worlds in which you have no friends – to a proposition that contains a property both (i) instantiated by something in those worlds and (ii) instantiated in those worlds by exactly the members of the extension of 'friend of yours' in those worlds, of which there are none.[41]

[41]This explanation requires that modal expressions introduce quantifiers over possible world variables at LF. This perspective on modal language is natural for advocates of variable-based theories of intensionality, since they already posit covert possible world variables at LF in order to generate third readings. Still, the swapping theory can be freed of this requirement by being supplemented with a

The updated value for the swapping operator assumes that there are no transparent interpretations of DPs with empty extensions. Challenging this assumption, Schwager (2011) considers a case similar to the following context and belief report:

> Burj Dubai
>
> The Burj Dubai is the tallest building in the world with 192 floors. It's not the case that Betty knows this. She asserts, "I think a building with one more floor than the Burj Dubai is desirable."

(30) Betty believes that a building with 193 floors is desirable.

The worry is that there's a reading of (30) that's true in this context, but it must be a third reading because – contra the wide scope interpretation – there are no buildings with 193 floors, and – contra the narrow scope interpretation – it's not the case that Betty stands in the belief relation to the proposition that a building with 193 floors is desirable, contra the narrow scope interpretation.

A response similar to the line of thought pursued by Schwager (2011) is to accept that there's a true third reading of (30) in context and to update the semantic value of 'SWAP' accordingly. In particular, we would require the object of Betty's reported belief to contain a property, namely, *being a building with one more floor than the Burj Dubai*, the instantiation conditions of which are satisfied at the relevant nearby possible worlds by exactly the member(s) of the extension of 'building with 193 floors' in those worlds. There are delicate issues here surrounding how instantiation conditions can be satisfied "at," as opposed to 'in," non-actual worlds, since it's not possible for the Burj Dubai to instantiate *being a building with one more floor than the Burj Dubai.* But I don't doubt that with enough philosophical ingenuity, an updated version of the swapping theory can be developed along these lines.

semantics for possible world λ-binders placed at the top of each clause. The compositional details of how that could go given our simple theory of structured propositions would take us too far afield for present purposes. One suggestion is to adopt a framework in which structured propositions are themselves taken to be properties of possible worlds. I hope to pursue this line of thought in future work.

At some point, however, we need to draw a line between what counts as a third reading, and so falls under the explanatory ambitions of our semantic theory, and what does not. Consider, for example, the following context and belief report inspired by Blumberg and Lederman (2021):

> TENNIS
>
> Mary is six years old. Betty doesn't know Mary. Betty sincerely asserts, "Every six year old can play tennis."

(31) Betty believes that Mary can play tennis.

It's clear that an utterance of (31) in Tennis reaches some level of acceptability, but this shouldn't commit us to there being a third reading of it explainable by the swapping theory. Even a report such as the following could be deemed acceptable in the same context:

(32) Betty believes that six year old children are capable.

But it doesn't seem very plausible to think that the acceptability of this report has anything to do with it having a third reading. The point is that speakers can take certain liberties while attributing attitudinal states, and audiences are often willing to accommodate the results. Perhaps these are instances of the more general phenomenon of loose speech, or perhaps a more systematic theory pertaining to attitude reports, such as the one proposed by Blumberg and Lederman (2021), can be given. In both cases, there's a risk that there isn't a unified class of third readings deserving of its own semantic explanation. In order to come to that determination, however, we need to understand the theoretical costs associated with semantic explanations, since it would be ideal to explain robust and systematic linguistic data in this way, if possible.

§3.5.2 Upward and Downward Entailment

The second family of complications arises out of considerations of upward and downward entailment environments. Consider, for example, the following context:

Blindfolds 2

You're watching a live game show with Betty, who thinks you have no friends. The four contestants are as follows: (i) your friend Xavier, with visible, green eyes, (ii) your friend Yvette, with blindfolded, green eyes, (iii) your friend Zoe, with blindfolded, brown eyes, and (iv) a stranger Wyatt, with blindfolded, brown eyes. (You have no other friends.) Betty holds the superstitious belief that green eyes cause good luck. She asserts, "I think a green-eyed contestant will win."

This context is exactly the same as Blindfolds except that Zoe is your friend and Wyatt has been added. But the same line of ordinary reasoning that establishes a true reading of (2) apparently remains acceptable in this context: *Betty believes that a green-eyed contestant will win, and all of the green-eyed contestants are friends of yours – even if a brown-eyed contestant is also your friend. So, Betty believes that a friend of yours will win.* For the same reasons as before, this must be the third reading of (2)); the haecceity theory also incorrectly predicts it to be false.[42,43]

In this case, the property of being a green-eyed contestant is instantiated by the members of a *subset* of the extension of 'friend of yours' in the world of the context. So, the truth of the third reading of (2) in Blindfolds 2 seems to not require what our current semantic value for 'SWAP' requires, namely, that the attributee stands in the belief relation to a structured proposition that contains a property instantiated in the

[42]According to the haecceity theory, since Xavier, Yvette, and Zoe uniquely satisfy 'friend of yours' in the world of the context, the third reading of (2) is true in Blindfolds 2 only if the opaque reading of the following sentence is true:

(i) Betty believes that a person identical with Xavier, Yvette, or Zoe will win.

But the opaque reading of this sentence is clearly false in this context, because Yvette and Zoe are both interchangeable with Wyatt as contestants from Betty's point of view due to the blindfolds. Note that without Wyatt, the opaque reading of (i) would be true in Blindfolds 2 simply because Xavier, Yvette, and Zoe would be all the contestants.

[43]Someone might worry that the truth of (2) in Blindfolds 2 leads to an unsavory result in the case where Zoe wins by reasoning as follows: *Betty believed that a friend of yours would win, and a friend of yours, namely, Zoe, did win; so, Betty's reported belief turned out to be true.* The problem with this line of reasoning is that the belief reported by the third reading, that is, the object of Betty's belief partly in virtue of which the report comes out true, is not the proposition that a friend of yours will win. A similar worry could be raised for garden variety de re belief reports. In those cases, it's easier to dismiss the worry because we have a positive conception of what Betty's reported belief might be, viz. a singular proposition, but in the case of the third reading, a positive conception of Betty's reported belief is precisely what's at issue in the present work.

world of the context by exactly the individuals satisfying the NP-complement in the context. Based on a similar observation, Schwager (2011) proposes a method of generating the third reading of indefinites with the following replacement principle:

> For the sake of reporting an attitude, a property that is involved in the content of the attitude that is to be reported (the reported property) can be replaced by a different property (the reporting property) as long as the reported property *is a subset of* the reporting property at all relevant worlds. (409, original parentheses, my emphasis)

In our example, the reported property is the property of being a green-eyed contestant, and the reporting property is the property of being a friend of yours.

In response, it's tempting to simply update the semantic value of 'SWAP' to be given in terms of the subset relation instead of the identity relation, as in the following:

$$[\![\textbf{SWAP}]\!]^c = \lambda w_s \lambda f_{CH} \lambda P_{et} (f\{R \in D_{et} | \downarrow_w R \subseteq \downarrow_w P\})$$

This strategy, however, won't successfully generalize to third readings involving other determiners, such as 'every,' or other propositional attitude verbs, such as 'deny.' This is because the set-theoretic relation that must obtain between reported and reporting properties varies depending on the strength of the determiner and what I'll call the *polarity* of the attitude verb in question.

Let's start with considerations of generality by considering the following context and belief report:

> WINNERS
>
> You're watching a live game show with Betty, who thinks you have no friends. In this game, multiple people can win. The contestants are as follows: (i) your friend Xavier, with visible, green eyes, (ii) your friend Yvette, with blindfolded, green eyes, and (iii) a stranger, Zoe, with green eyes. (You have no other friends.) Betty holds a superstitious belief that green eyes cause good luck. She asserts, "I think every green-eyed contestant will win."

(33) Betty believes that every friend of yours will win.

There's a true reading of (33) in Winners, as demonstrated by the acceptability of the following line of ordinary reasoning in this context: *Betty believes that every green-eyed contestant will win, and all of your friends are green-eyed contestants – even if a stranger also has green eyes. So, Betty believes that every friend of yours will win – in addition to others.* But this reading isn't the result of the wide or narrow scope interpretation of the DP, the logical forms of which can be represented as follows:

(33a) $\forall x(friend(x) \rightarrow$ *Betty-believe:* $win(x))$ ← wide scope

(33b) *Betty-believe:* $\forall x(friend(x) \rightarrow win(x))$ ← narrow scope

The wide scope reading is false because Betty doesn't stand in the belief relation to the singular proposition that Yvette will win; Betty can't see your friend Yvette's green eyes due to the blindfold. So, Yvette is a counterexample to the universal quantifier in (33a). The narrow scope reading is false in this context, as well, because Betty doesn't stand in the belief relation to the proposition that every friend of yours will win.[44] So, there are strong reasons to recognize another problem for traditional scope-based theories of intensionality, namely, the third reading of universals. In this case, the property of being a green-eyed contestant is instantiated by the members of a *superset* of the extension of 'friend of yours' in the world of the context.

So far, we've focused exclusively on the propositional attitude of belief, which has what I'll call *positive polarity*; a subject that instantiates a positive polarity attitude is committed to the world being in accordance, to some degree, with the content of the attitude. Other propositional attitudes, such as denial and doubt, have what I'll call *negative polarity*; a subject that instantiates a negative polarity attitude is committed to the world being in discordance, to some degree, with its content. As it turns out, the containment relation that must obtain between reported and reporting properties in

[44]Grant me that Betty isn't a structured propositionalist who takes propositions to be vacuously true if they're designated by universally quantified conditionals with empty antecedents.

true third readings depends not only on the strength of the determiner, but also on the polarity of the attitude, in question.

Consider the following context and attitude report:

DENIAL

You're watching a live game show with Betty. There can be one winner, and all eyes are visible. The contestants are as follows: (i)-(ii) your friends Xavier and Yvette, both with green eyes, (iii) your friend Wyatt, with brown eyes, and (iv) a stranger Zoe, with brown eyes. (You have no other friends.) For some reason, Betty thinks that Zoe is your only friend and will lose. Betty also holds a superstitious belief that green eyes cause good luck. She asserts, "I think your only friend Zoe will lose, but I deny that every green-eyed contestant will lose."

(34) Betty denies that every friend of yours will lose.

There's a true reading of (34) in Denial, as demonstrated by the acceptability of the following line of ordinary reasoning in this context: *Betty denies that every green-eyed contestant will lose, and all of the green-eyed contestants are friends of yours – even if a brown-eyed contestant is also your friend. So, Betty denies that every friend of yours will lose.* But this reading isn't the result of the wide or narrow scope interpretation of the DP, the logical forms of which can be represented as follows:

(34a) $\forall x(friend(x) \rightarrow$ *Betty-deny:* $lose(x))$ ← wide scope

(34b) *Betty-deny:* $\forall x(friend(x) \rightarrow lose(x))$ ← narrow scope

The wide scope reading is false in this context because both Xavier and Yvette are counterexamples to the universal quantifier in (34a); Betty denies that both Xavier and Yvette will lose, but she doesn't deny of either person that (s)he will lose. On the contrary, Betty believes that one of them must lose, since there can only be one winner. The narrow scope reading is false in this context, as well, because Betty doesn't stand in the denial relation to the proposition that every friend of yours will lose. On the contrary, Betty stands in the belief relation to the proposition that every friend of

yours will lose, since she thinks that Zoe is your only friend, and that Zoe will lose. So, the reading of (34) that's true in Denial is a third reading of the universal determiner. In this case, the property of being a green-eyed contestant is instantiated by a *subset* of the extension of 'friend of yours' in the world of the context.

An analogous line of reasoning shows that negative polarity attitudes reverse the containment relation for third readings with the indefinite determiner. Consider the following context and attitude report:

WINNERS-DENIAL

You're watching a live game show with Betty. In this game, multiple people can win. The contestants are as follows: (i) your friend Xavier, with blindfolded, green eyes, (ii) a stranger Zoe, with visible, green eyes, and (iv) a stranger Wyatt, with visible, brown eyes. (You have no other friends.) For some reason, Betty thinks that Wyatt is your friend, and that he'll lose. She holds a superstitious belief that green eyes cause good luck. She asserts, "I think your friend Wyatt will lose, but I deny that a green-eyed contestant will lose."

(35) Betty denies that a friend of yours will lose.

There's a true reading of (35) in Winners-Denial, as demonstrated by the acceptability of the following line of ordinary reasoning in this context: *Betty denies that a green-eyed contestant will lose, and all of your friends are green-eyed contestants – even if a stranger also has green eyes. So, Betty denies that a friend of yours will lose.* But this reading isn't the result of the wide or narrow scope interpretation of the DP, the logical forms of which can be represented as follows:

(35a) $\exists x(friend(x)$ & *Betty-deny:* $lose(x))$ ← wide scope

(35b) *Betty-deny:* $\exists x(friend(x)$ & $lose(x))$ ← narrow scope

The wide scope reading is false in this context because no individual friend of yours is such that Betty denies that he will lose; since Xavier is blindfolded, Betty doesn't

stand in the denial relation to the singular proposition that Xavier will lose. The narrow scope reading is false in this context, as well, because Betty doesn't stand in the denial relation to the proposition that a friend of yours will lose. On the contrary, Betty stands in the belief relation to the proposition that a friend of yours will lose, since she thinks that Wyatt is your friend and will lose. In this case, the property of being a green-eyed contestant is instantiated by the members of a *superset* of the extension of 'friend of yours' in the world of the context.

The following table summarizes the relationships between attitude polarities, determiner strengths, and set-theoretic relations observed in true third readings:

Attitude Polarity	**Determiner Strength**	**Reported to Reporting**	**Third Reading**
positive	weak	subset	(2) in Blindfolds 2
positive	strong	superset	(33) in Winners
negative	strong	subset	(34) in Denial
negative	weak	superset	(35) in Winners-Denial

For structured propositionalists and Hintikkans alike, accounting for this collection of data requires additional complexity in the full story of third readings. Consider first the structured propositionalist. Their commitment to treating attitude verbs as binary relations between subjects and propositions prevents a purely semantic explanation of the different effects of positive and negative polarity attitude verbs on the required set-theoretic relations. There is, however, some independent motivation in the study of negative polarity items (NPIs) and positive polarity items (PPIs) for thinking that syntactic structures represent negative and positive polarities as they occur at clausal nodes at LF; much work on this topic posits a strong relationship between NPIs and downward entailing environments, on the one hand, and PPIs and upward entailing environments, on the other. So, there's some plausibility to the idea that the swapping operator somehow imposes the appropriate containment relation in accordance with the polarity of the broader sentential context. Alternatively, we could posit two such operators with semantic values as follows:

$[\![\textbf{SWAP}^{-}]\!]^{c}=\lambda w_s \lambda f_{CH} \lambda P_{et}(f\{R{\in}D_{et}|{\downarrow_w}R{\subseteq}\downarrow_w P\})$

$[\![\textbf{SWAP}^{+}]\!]^{c}=\lambda w_s \lambda f_{CH} \lambda P_{et}(f\{R{\in}D_{et}|{\downarrow_w}R{\supseteq}\downarrow_w P\})$

The first of these would be licensed in negative polarity contexts, and the second in positive polarity contexts. In either case, it seems that the structured propositionalist requires some syntactic component of their theory to account for the full range of data.

The situation is the same, if not worse, for Hintikkans who endorse a variable-based theory of intensionality such as the standard solution. Recall that in the context of Blindfolds, Betty stands in the belief relation to the proposition that a green-eyed contestant will win, and the stranger Zoe has brown eyes covered by a blindfold. It's therefore consistent with what Betty believes that Zoe has green eyes and wins. But then the logical form the standard view assigns to (2) in context, repeated below as (36), is false, since not every possible world consistent with what Betty believes contains an actual friend of yours that wins:

(36) λw_1 *Betty-believe*$_{w_1}$: λw_2 $\exists x(friend_{w_1}(x)$ & $win_{w_2}(x))$

Unlike the structured propositionalist, who can appeal to a syntacticized theory motivated by the study of NPIs and PPIs, the Hintikkan might find it most natural to appeal to highly general pragmatic principles involved in the interpretation of belief reports. Following the line of thought developed in Stalnaker (1987) that "the identity of content is defined relative to a domain of relevant alternative possibilities" (65), the Hintikkan could argue that there are only three equivalence classes of possibilities at issue corresponding to the three possible winners, and that these possibilities hold fixed the actual eye colors of the contestants. Since Betty stands in the belief relation to the proposition that a green-eyed contestant will win, and Zoe actually has brown eyes, it would then be inconsistent with what Betty believes for Zoe to win. It remains to be seen, however, whether this vague idea can be plausibly implemented in a formal semantic or pragmatic setting.[45]

[45]One suggestion is to adjust the semantic value for the belief operator by first intersecting Betty's

§3.6 Concluding Remarks

Both positive and negative reactions to the swapping theory and its attendant complexities can be reasonable, and reflecting on the philosophical significance of each way of reacting can be useful. According to what I'll call *the optimistic reaction*, the swapping theory is a mark of progress for the linguistic implementation of structured propositions. In the best case, it represents to the best degree currently possible the syntactic and semantic phenomenona responsible for generating our linguistic intuitions surrounding third readings. In the worst case, it's a stopgap that can serve as a springboard for future theorizing. But in either case, the swapping theory therefore contributes to a growing literature aimed at legitimizing structured views of propositions by formally implementing them in accordance with contemporary theories of syntax and semantics.

Within the family of structured propositionalists, advocates of Russellian semantics are brought up to speed – and then some – with the recent Fregean advance made by Lederman (2022). Importantly, the strategy of the swapping theory is neutral with respect to these competing semantic frameworks. With lexical entries suitably modified, Propositional Truth can be reformulated under Fregean assumptions as follows:

> **Propositional Truth - Fregean:** For any possible world w, sense of a relation (or property) M, and senses of individuals $s_1, s_2, \ldots, s_n$, $\langle M, s_1, s_2, \ldots, s_n \rangle$ is true relative to w if and only if the individuals determined by $s_1, s_2, \ldots, s_n$ in w instantiate (in that order) in w the relation (or property) determined by M in w.

So, structured propositionalists who advocate Fregean or other non-Russellian semantics can appeal to the swapping theory, mutatis mutandis, in order to pursue a variable-based theory of intensionality. Although possible world semantics has traditionally received more attention in the linguistics literature, there's no convincing argument that this is because the theory of structured propositions can't receive a promising linguistic

belief-worlds with the context set. That will deliver the right result for the case at hand, but it will also have undesirable consequences, such as the truth of 'Betty believes that Zoe has brown eyes' in Blindfolds, despite Zoe being blindfolded.

implementation of the intensional phenomena at issue.

If only it were so simple. According to what I'll call *the pessimistic reaction*, the complexity introduced by the swapping operator, choice functions, existential quantification – plus however the Schwager (2011) complications get resolved – will ultimately become objectionably ad hoc. In the worst case, the swapping theory amounts to a mere description of the data and accordingly lacks any explanatory power. In the best case, assuming that it represents the degree of complexity required for any semantic explanation of third readings under structured propositionalism, it demonstrates that there must be a non-semantic explanation for such readings. Perhaps there's an explanation in the spirit of Grice (1975), for example, according to which there are no true readings of (2) in Game Show, although a speaker can nevertheless utter (2) in that context in order to pragmatically convey something true. Or perhaps one could argue in the spirit of Bach (1997) and Blumberg and Lederman (2021) that, roughly, an attitude report of the form $\ulcorner S$ believes that $p\urcorner$ is acceptable in context c just in case the referent of S in c stands in the belief relation to some proposition Q that entails, in conjunction with propositions from the common ground, the proposition designated by p in c.[46] Then (2) would be acceptable in Game Show because (i) Betty stands in the belief relation to the proposition that a green-eyed contestant will win, (ii) the common ground contains the proposition that every green-eyed contestant is a friend of yours, and (iii) the two propositions just mentioned entail the proposition that a friend of yours will win.

These initial suggestions seem promising, at least with respect to the third reading of (2) in Game Show, but it isn't obvious that they will easily generalize to more complicated cases. To take an example involving negative polarity attitudes, suppose that the referent of S in c stands in the denial relation to the proposition designated

[46]There are ways to understand this suggestion as offering a genuine, compositional semantic explanation of the third reading, but such an explanation wouldn't require enough syntactic or semantic complexity to meaningfully distinguish it from the non-semantic explanations considered here. The proposal of revisionist reporting in Blumberg and Lederman (2021) isn't this strong, however, because it involves a contextually supplied question filtering what's relevant to the interpretation of the report.

by p in c. It's not generally the case that the report $\ulcorner S$ denies that p or $q\urcorner$ will be acceptable in c, even though the proposition designated by p in c entails the proposition designated by $\ulcorner$that p or $q\urcorner$ in c. So, negative polarity attitude verbs will need to be handled differently, and various embedded constructions will further complicate any pragmatic explanation given. What's more, variable-based theories of intensionality have also been taken to explain true, transparent readings of sentences such as the following without recourse to exotic forms of movement:

37. Betty believes that every winner lost.

And it is arguably impossible to explain the truth of this reading partially in terms of what the proposition that every winner lost entails. If the swapping theory shows that structured propositionalists can't provide a semantic explanation for third readings, then the need to develop a systematic pragmatic account becomes paramount.[47]

This leaves us in the following situation. Theorists of every stripe face the difficult question of to what extent there is a unified class of third readings that demand a semantic explanation. Whether third readings ought to be explained semantically depends in part on how costly it would be to do so. Structured propositionalists don't face a unique disadvantage in this respect, at least compared to Hintikkans. For the price of the swapping theory plus some auxiliary assumptions concerning the syntactic representations of polarity and modality, structured propositionalists can explain a wide collection of apparently robust and systematic linguistic data falling under the title of "third readings." More work is required in order to determine whether the pragmatics of loose talk or related systems can explain the same data for a comparable or cheaper price. In any case, the theory of structured propositions has traditionally received less attention than its unstructured rival on both the semantic and pragmatic

[47]This assumes, of course, that systematic pragmatic explanations of robust regions of discourse are possible, contra Buchanan and Schiller (2021). Otherwise, third readings are unsystematic instances of loose talk. But one must be careful deploying such a line of thought in this instance. Since the data appears systematic, we would require a principled way to determine when to take such appearances at face value.

fronts. My hope is that this work goes some way towards rectifying the semantic aspect of that, in addition to providing fodder for continued investigation.

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