A Puzzle about Belief-about

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I present a puzzle for the standard, propositional semantic account of belief reports by considering novel inferences which it incorrectly predicts to be invalid under assumptions that are plausible by its advocates' own lights. In response, I propose a conservative departure from the standard view on which certain 'that'-clauses designate novel devices of semantic type $< e, t >$ that I call *open propositions*. After outlining some desiderata for a theory of open propositions, I provide some reasons for advocates of the standard view to treat them as properties of a certain kind. Then I give a bridge principle between the core notions of belief and belief-about before showing how the resulting view can be implemented in accordance with formal theories of syntax and semantics. I bring 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. Introduction

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, that is, the *belief relation*, obtains between subjects and propositions.

Advocates of the standard view include Burge (1980), Fodor (1978), Salmon (1986), Stalnaker (1987), Braun (1998), Schiffer (1992, 2003),

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

> 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. (King, 2002, p. 342)

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King et al., (2014), Soames (2014), and Speaks (2014b, 2014a), 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]

The most well-known argument for the standard view is that it best explains the validity of certain arguments involving belief reports in ordinary language.[4] Its advocates ask us to consider valid arguments like the following:

Lewis believes that London is pretty.

Peter believes that London is pretty.

So 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

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

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 such as Speaks (2014a, pp. 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.

[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.

[4] See, for example, 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).

Here is the plan for the paper. In the next section, I present some valid arguments involving belief reports which generate a puzzle for the standard view when the aforementioned principle is upheld. In §3, I 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 $< e, t >$, which I call *open propositions*. In §4, I outline some desiderata that any theory of open propositions must satisfy, and in §5, I provide some reasons on this basis for advocates of the standard view to treat open propositions as properties of a certain kind. In §6, I give a bridge principle between the core notions of belief and belief-about, and show how the resulting view can be implemented in accordance with formal theories of syntax and semantics. In §7, I 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.

2. 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 is 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, what I will call the *puzzling arguments*:

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

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

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

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.

These arguments involve belief reports that are, or are otherwise syntactically derivable from, reports of the form ⌜*S* believes about *x* that *p*⌝. 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 under assumptions that are plausible by its advocates' own lights. Suppose that the premisses of the first argument are true.[6] By the standard view, the 'that'-clauses in the first and second premisses designate some propositions, *P* and *Q*, respectively. Since the premisses 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 which 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 premisses 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.

[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.

[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.

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 result, both (3) and the first premiss 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 premiss 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 premisses don't necessitate the conclusion under any such charitable interpretation. Supposing the premisses 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

[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)

about Paris; a fortiori, Lewis doesn't believe anything about London that Peter believes about Paris.

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 premisses as designating different propositions. But then the premisses don't necessitate there being a shared object of belief between the subjects, which the conclusions seem to require.

3. The 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:

What Lewis baked is a birthday cake.

What Peter baked is a birthday cake.

So what Lewis baked is what Peter baked.

Lewis baked a birthday cake.

Peter baked a birthday cake.

So Lewis baked something Peter baked.

To the extent that these arguments, which I will call the *cake arguments*, are deemed to be valid, they pose a challenge to the view that indefinite noun phrases univocally designate particulars, such as

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 §6 below.

[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 premisses as involving covert existential quantification over modes of presentation at logical form, and this additional layer of complexity provides no explanatory advantage.

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 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.

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.[9] 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. 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 to which Lewis and Peter must stand in the belief relation, respectively, in order for the premisses of the puzzling arguments to be true. There are many ways to understand what open propositions could be given these constraints, for example, 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

[9] 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.

designated by ⌜that he/she/it is F⌝ in the context of a belief-about report is a novel device of semantic type $< e, t >$, which either is or determines the function that maps an object o to the proposition (roughly) that o is F.

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.[10] At a high level of abstraction, the second puzzling argument can then be given a logical form like the following:

$$Fabc$$

$$Fdec$$

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

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:

$$a = c$$

$$b = c$$

$$\therefore a = b$$

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

[10] This is not to be confused with the relation that Speaks (2014c, p. 216) calls by the same name, namely, 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'.

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 ⌜*S* believes that *p*⌝. 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 (roughly) 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 (roughly) that London is pretty. I take up the formal implementation of this proposal in §§5 and 6, but before delving into these details, we should more clearly understand the theoretical roles that open propositions are supposed to play.

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

Lois believes about Lex that he killed Superman.

Superman is Clark Kent.

So Lois believes about Lex that he killed Clark Kent.

Fregeans might explain the apparent invalidity of this argument by appealing to fine-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 *salva 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 of the possible worlds view 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:

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

What Lewis believes about London is true of other cities.

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

So 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.

Premisses like these can plausibly be true together, and the conclusion carries a commitment to entities that are believed of things, said of things, true of things, and possibly true of things.[11] 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, namely, an object.[12]

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:

> What I believe about Lewis and Stephanie is that they are married.
>
> What I believe about Peter and Nancy is that they are married.
>
> So 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 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:

> What I believe about Lewis and Stephanie is that he loves her.
>
> What I believe about Peter and Nancy is that he loves her.
>
> So what I believe about Lewis and Stephanie is what I believe about Peter and Nancy.

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

[11] I treat sentences of the form ⌜What *S* believes about *x* is true/false⌝ as elliptic for ⌜What *S* believes about *x* is true/false of *x*⌝.

[12] 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.

So 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 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*:

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

Any virtue of Socrates is a virtue of Plato.

So one of Plato's virtues is that he's wise.

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

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

So 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 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.

5. Open propositions as properties

While there aren't going to be any considerations that entirely answer 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 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, for instance, Speaks (2014b), Soames (2014), Hanks (2011), Bealer (1982), Menzel (1993), Zalta (1988), and Richard (2013).[13] 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 fine-grained one takes propositions to be, there is a corresponding case to be made that properties have the same fineness of grain.[14] 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. Fourth,

[13] 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. For Richard, they are properties of maximal states of affairs.

[14] 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 fine-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 favour of identifying open propositions with properties.

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, for example, 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 remark:

> 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?[15] 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, that is, 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', that is, wisdom. The plausibility of this proposal increases when we consider that in the context of the virtue arguments, substituting 'wisdom' for 'that he's wise' 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 defence of the standard view from analogous substitution failures, as raised by

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

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

(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. 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⌝.[16]

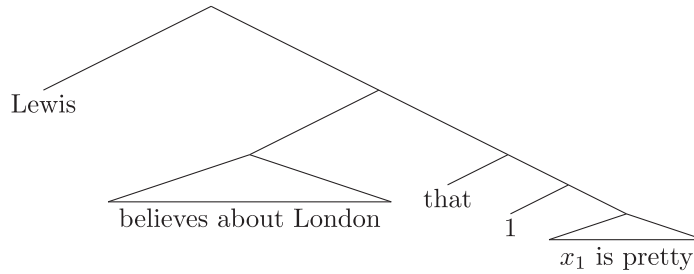
By design, treating open propositions as properties corresponding to open sentences makes for a straightforward formal implementation. In §3, I gave logical forms for belief-about reports in the language of first-order logic, the expressive limitations of which forced a high degree of abstraction. These 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.[17] We can initially represent the logical form of belief-

[16] 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'.

[17] 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.

about reports at the relevant level of abstraction with a syntax tree like the following:

(12)



The numerical index 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, the appearance of a numerical index 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 numerical index at logical form, but I don't pursue this line of thought here.

The node immediately dominating the numerical index is interpreted by the following rule:

Predicate Abstraction[18]

Let α be a branching node with daughters β and γ, where β dominates only a numerical index *i*. Then, for any variable assignment *g*, $[\![\alpha]\!]^g = \lambda x\ [\![\gamma]\!]^{g[x_i \mapsto x]}$

[18] Predicate Abstraction is an ad hoc rule of composition, so the resulting semantics are not compositional by functional application alone. However, Rabern (2013) has shown how to assign semantic values to numerical indices so as to allow them to compose with their sister nodes by functional application. Delving into the details of Rabern's account would be more complicating than illuminating, so I use Heim and Kratzer's for ease of exposition.

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

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

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 fine-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 fine-grained properties by fiat, as in Fine (2012, pp. 67–8). 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 a numerical index 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:

(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.

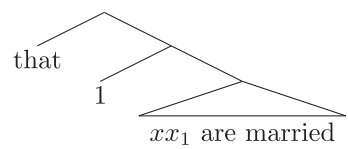
What is needed for this account to succeed, therefore, is a syntactic mechanism by which, at some level of representation or derivation, an

embedded subject term moves outside 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*.[19] One will find the formal implementation provided here plausible to the extent that one is willing to entertain syntactic movement operations of a similar flavour.

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.[20] Supposing that 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:

(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*:

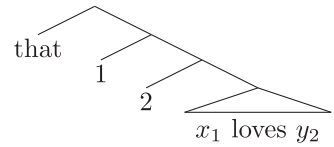
(19) $\lambda xx[\![xx_1 \textit{ are married}]\!]^{g[xx_1 \mapsto xx]}$

[19] 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.

[20] This restriction is essential to preserving the standard propositional semantics for reports of the form ⌜*S* believes that *p*⌝ when *p* contains a pronoun.

When sequences of objects are introduced, the syntax might require additional numerical indices, 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) $\lambda x \lambda y \, [\![x_1 \textit{ loves } y_2]\!]^{g[y_2 \mapsto y][x_1 \mapsto x]}$

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

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.

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

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 premisses 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. On 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.

6. 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' (2012, 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 popularity of the standard view, that the belief-about relation is to be analysed 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.[21]

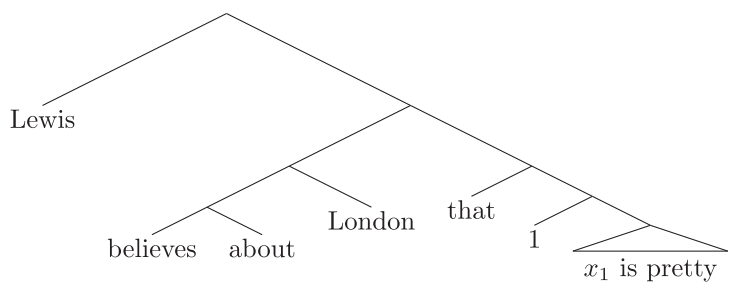
For example, a theorist in the Russellian tradition might take the R-relation to obtain between a proposition Q, property P, and thing x

[21] More generally, a subject stands in the belief-about relation to some things and a property or relation if and only if she stands in the belief relation to a proposition that bears the R-relation to that property or relation and those things.

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, pp. 201–4; Yalcin, 2015, pp. 218–22).[22] 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 in what follows.

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 accordingly at the relevant level of abstraction by a syntax tree like the following:[23]

(24)



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

[23] 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.

We appeal to the semantics developed in §5 for the 'that'-clause, which designates the property of being pretty, that is, 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 $< t, < e, t >>$ which stands for the belief relation, and 'R' is a three-place predicate of type $< t, << e, t >, < e, t >>>$ which stands for the *R*-relation:

(25) $[\![\textit{Lewis}]\!]^g = \text{Lewis}$

(26) $[\![\textit{believes}]\!]^g = \text{BEL}$

(27) $[\![\textit{about}]\!]^g = \lambda Q_{<t,<e,t>>} \lambda x_e \lambda P_{<e,t>} \lambda y_e \exists z (Q(z)(y) = \text{R}(z)(P)(x) = 1)$[24]

(28) $[\![\textit{London}]\!]^g = \text{London}$

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

(29) $[\![\textit{believes about}]\!]^g = \lambda x_e \lambda P_{<e,t>} \lambda y_e \exists z (\text{BEL}(z)(y) = \text{R}(z)(P)(x) = 1)$

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

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

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

[24] 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*.

to prettiness and Lewis in that order, the desired truth conditions result:

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

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.[25] 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, 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 lexical entry for 'about'. The alternatives are either unsatisfactory or unforthcoming: flat-footedly deny the validity of the puzzling arguments or else wait for an alternative solution.

7. 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, Soames and Speaks (2014), propositions earn their keep in our theories

[25] 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.

by uniformly playing a variety of theoretical roles, such as 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, 1997b), Ninan (2010, 2012), and Rabern (2012a, 2012b), all of whom provide reasons for thinking that propositions can't play two or more of these roles simultaneously.[26] 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 sceptical 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 ternary predicate at logical form. But their shared insight was that a ternary doxastic relation 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 descendant of these historical relational analyses of belief, although it is refined for a philosophical landscape friendly to propositions.[27]

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, such as 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, fine-grained doxastic

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

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

similarities 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 thispurpose.

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 judgements concerning validity seriously in an awkward position. Either we must 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 is certain of belief-about reports is what is certain of belief reports more generally, namely, that they will continue to provide fertile ground for continued investigation.[28]

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