On Mates' Puzzle

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Abstract

The purpose of this paper is to explore how to extend the concept generator technology devised by Percus and Sauerland 2003 to account for Mates' puzzles, that is, sentences where co-intensional expressions cannot be substituted *salva veritate*. These sentences are interpreted as reporting *de re* beliefs about specific expressions of a language, and the concept generator technology is deployed to derive such interpretations compositionally.

Nobody doubts that any rational agent who believes that Fiona is a lawyer believes that she is a lawyer. But surely we can think of *some* rational agent who believes that Fiona is a lawyer but does not believe that she is an attorney.[1] Let's consider an example: suppose that Andrea doesn't know that attorneys are just lawyers (she thinks that 'attorney' is a technical term for prosecutor). When asked about her friend Fiona, who Andrea knows to be a lawyer, she may respond: 'Fiona is a lawyer, not an attorney'. We may then report Andrea's beliefs by saying the following:

(1)   Andrea thinks that Fiona is a lawyer.

(2)   Andrea doesn't think that Fiona is an attorney.

Andrea is not crazy or irrational; she is simply wrong about what attorneys are. And yet, this seems to get us into trouble: do not 'lawyer' and 'attorney' mean the same thing? But then, should not the words 'lawyer' and 'attorney' be interchangeable in (1) and (2), thereby representing Andrea as believing something crazy and/or irrational (a contradiction)? This is, roughly, Mates' puzzle (Mates 1952, p. 215).

Similarly, nobody doubts that any rational agent who believes that Ortcutt is a spy fails to believe that Ortcutt is not a spy. But surely we can think of *some* rational agent who believes of Ortcutt both that he is and that he is not a spy. To refresh an old example: Ralph sees a man sneaking around the docks at night and concludes that he is a spy. Ralph watches his neighbour Ortcutt at the beach one day and thinks that he is a pillar of the community—definitely *not* a spy. Unbeknownst to him, the man he saw at the docks was Ortcutt. We may then report Ralph's beliefs by saying the following:

(3)   Ralph believes that Ortcutt is a spy.

(4)   Ralph believes that Ortcutt is not a spy.

It does not follow from (3) and (4) that Ralph is crazy or irrational; he simply failed to recognize the man he saw on each occasion as one and the same. And yet, that seems to get us into trouble: does not 'Ortcutt'

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[1]I assume that 'lawyer' and 'attorney' are synonymous, which may not be case in some variants of English. The reader may substitute these words for others, such as 'dentist' and 'odontologist'. The choice of example is immaterial.

denote the same thing in (3) and (4) (namely, the individual called 'Ortcutt')? And in that case, how is it possible that these sentences do not represent Ralph as believing something crazy and/or irrational (a contradiction)? This is, roughly, Quine's double vision puzzle (Quine 1956).

The purpose of this paper is to defend that a standard solution to Quine's double vision puzzle can be made to work towards solving Mates' puzzle. The standard solution to the double vision puzzle is that the pair (3)/(4) can report Ralph as standing in different relations of acquaintance to an individual without requiring him to recognize that individual as one and the same. The proposed solution to Mates' puzzle is that the pair (1)/(2) can report Andrea as standing in different relations of acquaintance to the words 'attorney' and 'lawyer' without requiring her to recognize those words as synonymous. In other words, sentences like (1) and (2) can report *de re* belief about particular words.[2]

Moreover, a particular compositional implementation of the proposed solution is offered, relying on the *concept generator* (CG) semantic machinery of Percus & Sauerland (henceforth P&S, Percus and Sauerland 2003, see also Charlow and Sharvit 2014). The CG machinery was devised with an aim to provide specialized LFs for *de se/re* belief reports in a possible world semantics for attitude verbs, and has been applied in order to account for double vision cases (Rieppel 2017). The basic idea behind CGs seems to be intuitively applicable to Mates' puzzles: CGs map the *res* in a belief report to the attitude holder's individual concept of that *res*. In other words, it maps the individual that the belief is about to a way in which the attitude holder thinks of that individual. Such way of thinking about an individual is an *individual concept* (for my purposes, a function from possible worlds to individuals) that picks up the *res* in the actual world but may pick up other individuals at the attitude holder's doxastic alternatives. Mates' puzzles are generated, *inter alia*, by sentences that report the beliefs of a subject who is confused about the meaning of a word. If we are in the business of giving a semantics for (1) and (2) that does not report Andrea as believing a contradiction, a theory that manages to swap the usual denotation of the word 'attorney' for Andrea's idiosyncratic concept of 'attorney' in (2) would be ideal.

The paper is distributed as follows. §1 presents and discusses Mates' puzzle, as well as some of the early reactions that the puzzle gave rise to, and in particular the metalinguistic interpretation of belief reports offered by Church (1954) and Sellars (1955); §2 defends the specificity of Mates' puzzle by showing that Mates puzzle is different from various species of quotation, as the initial statement of our proposal might suggest. §3 introduces the standard account of *de re* belief reports about individuals relying on relations of acquaintance; §4 presents P&S's original implementation of the concept-generator technology in providing specific LFs for *de re* reports. §5 introduces the possibility of *de re* thought about linguistic expressions, and §6 introduces the notion of a *metalinguistic* concept and of a metalinguistic concept generator, as well as the notion of a *generalized* concept generator, capable of generating both individual and metalinguistic concepts and thus unifying *de re* belief about individuals and words. §7 discusses two possible objections to our view, and rejects them. §8 concludes.

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[2] A potentially confusing aspect of the phenomenon should be pointed out at the outset. When we speak of *de re/dicto* belief reports about individuals, the former type of reports are characterized by the admissibility of substitution of co-referential expressions *salva veritate*. Thus, interpreting (3) *de re*, we can substitute 'Ortcutt' for 'the man Ralph saw at the beach' *salva veritate*. By contrast, if we interpret the sentence *de dicto*, substitution is blocked. When we consider *de re* belief about expressions, things work exactly the other way around: in the interpretation of (2) where Andrea has a *de re* thought about the word 'attorney', 'attorney' is no longer substitutable for a co-intensional expression, e.g., 'lawyer'. By contrast, in its plain, non-*de re* interpretation, (2) allows substituting 'attorney' for 'lawyer'. So in this view, a *de re* interpretation blocks, rather than allows, the relevant substitutions. The rationale behind this is that *de re* reports require that the *res* is preserved. In the case of *de re* reports about individuals, we can substitute co-referential expressions because co-referential expressions preserve the *res*, that is, the individual. But in the case of *de re* reports about particular linguistic expressions that contain those very expressions, substituting the expression for a different one changes the *res*, and therefore substitution is blocked.

1 Mates' puzzle

Mates' puzzle appears in the context of Mates' (1952) discussion of the notion of synonymity. Mates is assuming the principle that synonymous expressions are substitutable *salva veritate*, and uses that principle as a test against various accounts of synonymity:

Definition 1 (*Substitutivity*) *Any two expressions D and D'are synonymous iff they can be substituted* salva veritate *anywhere they occur.*

In particular, Mates considers Carnap's (1947) notion of *intensional isomorphism* as a criterion for synonymity, and presents the possible divergence in truth-value between sentences (5) and (6) as a challenge to Carnap's proposal:

> Carnap has proposed the concept of intensional isomorphism as an approximate explicatum for synonymity. It seems to me that this is the best proposal that has been made by anyone to date. However, it has, along with its merits, some rather odd consequences. For instance, let 'D' and 'D'' be abbreviations for two intensionally isomorphic sentences. Then the following sentences are also intensionally isomorphic:
>
> (5)   Whoever believes that D, believes that D.
> (6)   Whoever believes that D, believes that D'.
>
> But nobody doubts that whoever believes that D believes that D. Therefore, nobody doubts that whoever believes that D believes that D'. This seems to suggest that, for any pair of intensionally isomorphic sentences—let them be abbreviated by 'D' and 'D','—if anybody even doubts that whoever believes that D believes that D', then Carnap's explication is incorrect (Mates 1952, p. 215, *our numbering and quotation style*).

For two expressions to be *intensionally isomorphic* is for them to be *co-intensional*, that is, to pick out the same set of individuals at every possible world. 'Lawyer' and 'attorney' are co-intensional. Hence, the sentence 'Fiona is a lawyer' and 'Fiona is an attorney' are intensionally isomorphic, and so are Mates' examples (5) and (6) if we substitute 'Fiona is a lawyer' and 'Fiona is an attorney' for 'D' and 'D'' respectively. But as we have seen, (5) is truistic, while (6) could very well fail to be true (to wit: Andrea's case).

Importantly, Mates goes on to highlight that this puzzle does not rely specifically on Carnap's view of synonymity (that is, intensional isomorphism): any two synonymous sentences—under *any* account of synonymity—may be substituted for 'D' and 'D'' in Mates' (5) and (6) to obtain the same result.[3]

As Putnam (1954) pointed out, Mates' puzzle brings out a tension between two *prima facie* desirable principles of the theory of meaning. The first is the foregoing **Substitutivity**, which in turn relies on the principle of compositionality of meaning:

Definition 2 (*Compositionality*) *The meaning of a complex expression is determined by the meanings of its constituent expressions and the rules used to combine them.*

Given **Compositionality**, substituting an expression for another with the same meaning inside a complex expression should not alter the meaning of the whole. The second principle is the possibility that different expressions be synonymous:

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[3] 'What is more, any adequate explication of synonymity will have this result, for the validity of the argument is not affected if we replace the words 'intensionally isomorphic' by the word 'synonymous' throughout' (Mates 1952, p.215).

Definition 3 (*Synonymity*) *Some expressions are synonymous.*

If we hold fast to **Compositionality**, then Mates' sentences should lead us to deny that the expressions 'lawyer' and 'attorney' are synonymous (and for that matter, any other pair of expressions presumed to be so). Thus, we would end up denying **Synonymity**. On the other hand, if we insist on the possibility that different expressions be synonymous, we should give up **Compositionality** on the face of Mates' sentences.

Putnam declares Goodman (1949) to have taken the first route; Putnam himself set out to modify **Compositionality** in a way that the meaning of a complex expression is also sensitive to its *logical structure*, then insisting that sentences of the form 'all Ps are Ps' and 'all Ps are Qs', where P and Q are synonymous, fail to have the same logical structure. The first option seems strikingly counter-intuitive; but Putnam's view that the meaning of a complex expression should be sensitive to its structure paved the way for a rich history of research on finer-grained notions of meaning than Carnap's *intensional isomorphism* (starting with Lewis 1970 and Cresswell 1973, 1975; see Pollard 2015 sect.1 for an overview; Bealer 1993 follows Putnam in adapting this style of solution to Mates' sentence; see also Égré 2014).

However, a third way out was proposed independently (though almost simultaneously) by Church 1954 and Sellars 1955. The solution is to hold that a sentence like (2) is ambiguous between what Sellars calls a 'covert *mentioning* use' and its 'pure *using* use' (Sellars 1955, p. 119 and ff). On its 'pure *using* use', (2) is false and its negation ('Andrea thinks that Fiona is an attorney') follows logically from (1). On its 'covert *mentioning* use' however, (2) is equivalent to

> (7) The sentence 'Fiona is an attorney' *as used by Andrea* expresses something that she doesn't believe.

In contrast to the 'pure *using* use' of (2), (7) is true and logically independent from (1). This is the reading of (2) that blocks substitution of co-intensional expressions, because the sentences 'Fiona is an attorney' and 'Fiona is a lawyer' *as used by Andrea* express different beliefs, of which she has only one.

More generally: this proposal implies that the only way in which Mates' sentences (5) and (6) could differ in truth value is if we interpret (6) under its 'covert *mentioning* use'. So the thing to say about Mates' puzzle is the following: notwithstanding appearances to the contrary, for any two synonymous sentences 'D' and 'D'' nobody doubts—strictly speaking—that whoever believes that D, believes that D'. Nonetheless, we may very well doubt that everyone to whom the sentence 'D' *as used by them* expresses something that they believe is such that the sentence 'D'' *as used by them* expresses something that they believe.

That is, broadly speaking, the solution to Mates' puzzle defended in this essay. In terms of the *desiderata* that we hope to fulfill, the aim is to provide a theory under which, relative to the context given at the outset, (1) and (2) have two interpretations: a 'covert *mentioning* use' under which both are true (and appropriately sensitive to Andrea's confusion), and a 'pure *using* use' under which (1) and (2) are mutually exclusive. The proposal raises a few immediate questions: isn't this proposal simply the view that Mates' sentences involve quotation? Can we distinguish 'covert *mentioning*' and 'pure *using*' uses in a principled way? How can we ensure that the former uses of these sentences track the believer's idiolect? And how can we derive those uses compositionally?

2 Mates' puzzle is not quotation

Answering the first question posed just now is a way of motivating the specificity of Mates' puzzle. Given what we said just now, it would seem as though our proposed solution to Mates' puzzle (basically Sellars')

is the view that sentences such as (1)/(2), in their 'covert *mentioning* use', are simply cases of (covert) quotation. In this section, we aim to show that things are not so straightforward. As we will see, our solution to Mates' puzzle involves the presence of mentioned material in the logical form of these sentences, but it is rather different from standard cases of quotation.

Focusing on (2)—in its 'covert *mentioning* use', there are broadly two ways of spelling out the quotation view, depending on whether we think that (2) involves quotation of the whole complement clause (*full-clause* quotation) or only part of it (*mixed* quotation). Let's review both options in turn.

Consider the full-clause quotation analysis. The idea would be that, when a speaker utters (2), she is quoting Andrea as failing to either say or think the sentence 'Fiona is an attorney'. Since we know that Andrea is confused about the meaning of 'attorney' but not about the meaning of 'lawyer', this view would explain why (2) can be true and logically independent from (1): given Andrea's confusion, it is to be expected that she does not apply the predicate 'attorney' to Fiona.

However, there are two broad problems with the full-clause quotation view. To spell them out, let's start by considering two putative "reconstructions" of the meaning of (2), according to this view. We would find the sentence 'Fiona is an attorney' embedded under the verb 'say' or verb 'think'.

(8)   a. ≈ Andrea doesn't say 'Fiona is an attorney'
       b. ≈ Andrea doesn't think (to herself) 'Fiona is an attorney'

The former comes closer to standard cases of direct discourse, where one finds a speaker, a speech verb and whatever the speaker says (or fails to say) enclosed within quotation marks. The latter reconstruction is, on the other hand, more faithful to our actual example (2), which contains an attitude verb ('think') instead of a speech verb ('say').

The first problem is that none of the above reconstructions of (2) does justice to the intuitive meaning of the original sentence: one can believe without saying as well as say without believing, and therefore (8a) just has different truth conditions from (2). (8b) comes closer, but seems logically weaker than (2): certainly, if Andrea does not think that Fiona is an attorney, she will not think (to herself) 'Fiona is an attorney'; but she might fail to think to herself 'Fiona is an attorney' while thinking that Fiona is an attorney. She might simply not have tokened that particular sentence in her internal monologue. The truth of (2), by contrast, does not require attesting any mental going-ons in Andrea's head, and in particular it does not require her tokening any sentence. It suffices to know that Andrea thinks that 'attorney' means prosecutor, and that she does not believe that Fiona is a prosecutor. Moreover, on this view, (8b) could be true even in a situation in which Andrea knows perfectly well that 'attorney' and 'lawyer' are synonymous. Perhaps she fails to think the sentence 'Fiona is an attorney' simply because she hardly ever uses that word.

The second problem with this analysis is that it is hardly defensible that the complement clause in (2) is quoted *in full*. To see this, we may recruit arguments given in the literature on indexical shifting against the hypothesis that indexical shifting amounts to quotation (Anand and Nevins 2004; Deal 2017). We will consider two of them: first, we can *wh*-extract components from the complement clause in (2). That should not be possible if the clause was quoted:

(9)   a. Who doesn't Andrea think is an attorney?
       b. # Who doesn't Andrea think (to herself) 'is an attorney'?

And secondly, (2) admits negative polarity items (NPIs) in its complement clause. But in the full-clause quotation view, this would imply that Andrea is tokening an ungrammatical sentence:

(10)   a. Andrea doesn't think that anyone is an attorney.

        b. # Andrea doesn't think (to herself) 'anyone is an attorney'.

These observations motivate a first deviation from Sellar's formulation of the 'covert *mentioning* use' of a sentence. For the reasons just given, the right analysis of (2) under this interpretation cannot include a quotation of the full complement clause. So rather than (7) (repeated here), Sellars' analysis of (2) should be stated as in (11):

(7)   The sentence 'Fiona is an attorney' as used by Andrea expresses something that she doesn't believe.

(11)   The word 'attorney' as used by Andrea expresses something that she doesn't believe is true of Fiona.

But here the putative defender of the quotation view could retort that what we are dealing with in cases like (2) is not quotation of the full complement clause, but only part of it. That is, they could argue that (2) involves *mixed quotation* (Cappelen and Lepore 1997; Maier 2007, 2014, 2020). Mixed quotations are sentences in which we report someone's utterance quoting only some of the exact words used by the reporter. Here are some standard examples:

(12)   a. Bush said that the enemy 'misunderestimated' him.

        b. Quine said that quotation 'has a certain anomalous feature'.

Following this model, it could be argued that (2) should be understood as equivalent to:

(13)   Andrea doesn't think that Fiona is an 'attorney'.

However, this reconstruction of (2) is not immediately transparent as a case of mixed quotation. First and foremost, (2) does not have overt quotation marks (which, in mixed quotation, are necessary to delimit the quoted material).[4] Secondly, mixed quotations are standardly preceded by a verb of reported speech, such as 'say' or 'tell'. That is not the case in (2). Thirdly, mixed quotations carry an inference that the quoted words were uttered: (12a) implies that Bush uttered the word 'misunderestimated'; (12b) implies that Quine uttered the words 'has a certain anomalous feature'. By contrast, (2) does not imply that Andrea uttered the word 'attorney' (not even *in her head*, as we've discussed).

This last point, that is, the fact that Mates' sentences do not imply that any utterance took place, is the most important point of contrast between Mates' puzzle and standard cases of mixed quotation. This observation, again, motivates a calibration of Sellars' statement of a 'covert *mentioning* use', as we should make it clear that the expression that the attitude holder is confused about need not have actually been uttered.

(14)   The word 'attorney' as <u>would be</u> used by Andrea expresses something that she doesn't believe is true of Fiona.

Notwithstanding the contrast with standard cases of mixed quotation, we should not conclude that Mates' sentences are a *wholly* different phenomenon from mixed quotation. The 'covert mentioning use' of (2)

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[4]It might be argued that some cases of mixed quotation equally fail to showcase quotation marks, e.g., 'my name is Fiona' (Cappelen and Lepore 2017; Maier 2007). But that is about the only clear example, and it is very *sui generis*: in such cases, it is intuitive to think that quotation marks have been left out progressively, as there is no way of interpreting that sentence without assuming that the proper name is mentioned rather than used. The same explanation clearly fails for (2).

is different from paradigmatic cases of mixed quotation in that (a) it lacks overt quotation, (b) it does not feature a verb of speech and (c) it does not imply that an utterance took place. But (2) does share some features with mixed quotation: as we will see, (2) involves mentioning the word 'attorney'; and although (2) does not imply that Andrea uttered the word 'attorney', (2) together with facts about her confusion does imply that Andrea *would* utter the word 'attorney' *if* she wanted to talk about prosecutors. Based on these facts, it could be argued that Mates' sentences showcase a special type of mixed quotation (perhaps something like "dispositional" or "conditional" mixed quotation).

3   *De re* belief about individuals

Our view takes direct inspiration from accounts of *de re* attitude reports that rely on the idea that what is crucial to *de re* thought in a possible world semantics for attitude verbs is that the relation of acquaintance that holds between the believer and the individual that her belief is about (the *res*) is preserved across the believer's set of doxastic alternatives. What we want to explore, then, is that what is crucial for Mates' sentences (in their 'covert *mentioning* use') is to preserve the relation of acquaintance that holds between the believer and the *expression* whose meaning she is confused about.

Following Kaplan 1968, *de re* belief reports introduce tacit existential quantification over modes of presentation of the *res* that the belief is about. Lewis (1979, 1983) proposes to think of such modes of presentation in terms of the self-ascription of properties by the believer; *de re* ascriptions in particular involve the self-ascription of the property of inhabiting a world where a certain relation of acquaintance holds between the believer and the *res*. In a possible world semantics for attitude verbs (e.g., Heim and Kratzer 1998, p.306 and ff), *de re* belief imposes the requirement that such acquaintance relations be preserved across the believer's set of doxastic alternatives. A standard formulation (after Cresswell and Stechow 1982) of the target truth conditions for a *de re* belief report in this framework is the following:

(15) $[\![a \text{ thinks}^{\text{DE RE}} \text{ that } b \text{ is } P]\!]^{w,g} = 1$ iff
$\exists R \forall x ((R(a,x,w) \leftrightarrow x = b) \land DOX_{a,w} \subseteq \{w' : \exists y \forall z ((R(a,z,w') \leftrightarrow z = y) \land P(y)(w'))\})$

In words: there is some acquaintance relation R that holds uniquely between a and b at w such that, at all of a's doxastic alternatives w' at w ($DOX_{a,w}$), the individual to which a is uniquely R-related in w' has property P.[5]

To see this proposal in action, recall Ralph's confusion, which resulted in (3) and (4) (repeated here).

(3)   Ralph believes that Ortcutt is a spy

(4)   Ralph believes that Ortcutt is not a spy

By giving truth-conditions to (3) and (4) along the lines of (15), we can block the conclusion that Ralph believes a contradiction:

(16) $[\![(3)]\!]^{w,g} = 1$ iff $\exists R \forall x ((R(\text{Ralph}, x, w) \leftrightarrow x = \text{Ortcutt}) \land DOX_{\text{Ralph},w} \subseteq$
$\{w' : \exists y \forall z ((R(\text{Ralph}, z, w') \leftrightarrow z = y) \land \text{Spy}(y)(w'))\})$

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[5]Note that, strictly speaking, the individual referred to as 'a' within the proposition that represents the complement clause of (15) is not a themself, but rather the individual that a identifies as themself across their doxastic alternatives. The *de se* literature shows that who you really are and who you take yourself to be can come apart in interesting ways. A standard way of avoiding this issue is to state these truth-conditions in terms of centered worlds rather than possible worlds (Lewis 1979). But we will not present things in this way to prevent clutter.

(17) $[\![(4)]\!]^{w,g} = 1$ iff $\exists R \forall x ((R(\text{Ralph}, x, w) \leftrightarrow x = \text{Ortcutt}) \wedge DOX_{\text{Ralph},w} \subseteq$
$\{w' : \exists y \forall z ((R(\text{Ralph}, z, w') \leftrightarrow z = y) \wedge \sim \text{Spy}(y)(w'))\})$

In Ralph's predicament, there exists a relation of acquaintance between Ralph and Ortcutt—being the man seen sneaking around in the docks—and, since Ralph thinks that the man he saw is a spy, that same relation also holds between him and a spy across Ralph's doxastic alternatives: all of them are such that the man Ralph saw sneaking around in the docks is a spy. That makes (3) true. On the other hand, there exists a different relation of acquaintance between Ralph and Ortcutt—being seen at the beach—but, since Ralph thinks that the man he saw at the beach is no spy, that same relation holds between Ralph and a non-spy across his doxastic alternatives. That makes (4) true as well. Crucially however, in Ralph's doxastic alternatives, the individuals picked up by the witnesses of R in (3) and (4) are not the same. According to this proposal, Ralph's doxastic alternatives paint a picture where the spy and the non-spy are different people, even if they are one and the same in real life. And that is why Ralph does not believe a contradiction.

4   Individual concept generators

Arguing for the need to distinguish between *de re* and *de se* readings of belief reports,[6] P&S (2003, p.10 and ff.) provide a perspicuous way of generating the previous truth conditions for *de re* reports compositionally. A *de re* report requires some relation of acquaintance to hold between the believer and the *res* that the belief is about, and that this relation of acquaintance be preserved across the former's doxastic alternatives. P&S show that one can generate such relations of acquaintance with a function that they dub a *concept generator*.

A concept generator is a function from individuals (type e) to individual concepts (type $\langle s, e \rangle$). A concept generator for an attitude holder x at a world w is one such function whose domain are the individuals that x is acquainted with at w:

Definition 4 (*Concept generator*) G *is a concept generator for x at w iff*

  (a) G *is an object of type $\langle e, \langle s, e \rangle \rangle$, and*

  (b) $Dom(G) = \{y : x \text{ is acquainted with } y \text{ at } w\}$

A concept generator for an individual x at a world w takes individuals that x is acquainted with at w, and generates individual concepts. An *acquaintance-based* concept generator G for x at w is a more specific type of concept generator that generates acquaintance-based individual concepts *of* the individuals in its domain, in the sense that the individual concepts that G generates preserve the acquaintance relations that, at w, hold between the individuals in its domain and x:

Definition 5 (*Acquainted-based CG*) $\mathcal{G}$ *is an acquaintance-based concept generator for x at w iff*

  (a) $\mathcal{G}$ *is a concept generator for x at w, and*

  (b)   *the individual concepts $\mathcal{G}$ yields are acquaintance-based, in the sense that, for all z in $Dom(\mathcal{G})$,*
  - *there is some acquaintance relation R that x bears R uniquely to z in w, and*
  - $DOX_{x,w} \subseteq \{w' : x \text{ bears } R \text{ uniquely to } \mathcal{G}(z)(w') \text{ in } w'\}$

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[6]These are sentences such as 'John thinks that he will win the election', where the pronoun 'he' refers to John and John either recognizes *himself* as the future winner (*de se*) or not (only *de re*).

For illustration, let us suppose that David is acquainted with Fiona *via* relation R (let us suppose that R stands for 'being the person that comes in everyday at 11:15 and orders an espresso (to David)'), so that R(David, Fiona) holds at w. An acquaintance-based concept generator for David at w is a function $\mathcal{G}$ that, taking Fiona ($\in Dom(\mathcal{G})$) as argument, returns an individual concept of Fiona for David—let us abbreviate it as m_{Fiona}—such that at every one of David's doxastic alternatives w', m_{Fiona} picks out the unique individual to whom David serves an espresso everyday at 11:15 in w' (which may or may not be Fiona).

Introducing concept generators allows the following, simpler formulation of the target truth conditions for *de re* belief reports:

(18) $[\![a \text{ thinks that } b \text{ is } P]\!]^{w,g} = 1$ iff
$\exists G(G \text{ is an acquaintance-based } CG \text{ for } a \text{ in } w \wedge DOX_{a,w} \subseteq \{w' : P(G(b)(w'))(w')\})$

In words: a thinks at w (*de re*) of b that it is P just in case there is some acquaintance-based concept generator G for a in w such that the individual picked out by $G(b)$ at each of a's doxastic alternatives has property P.

However, we have not yet given a compositional derivation of these truth conditions, which are simply a restatement of the truth conditions given in (15). In order to provide a full account of these *de re* belief reports, those truth conditions have to be derived compositionally from the meaning of each constituent in the sentence. P&S's implementation of concept generators proceeds by enriching the LFs of the complement clauses of belief reports with concept generator *variables* and *abstractors* over those variables, in the same way that possible world variables and abstractors are introduced in order for those complement clauses to have an intensional denotation.[7] So just as the complement clauses of attitude reports are assumed to contain world-variables and abstractors over those variables in logical form that are not visible in surface grammar, *de re* reports contain, in addition, variables standing for concept generators and abstractors over such variables. CG variables are placed in LF as sisters of the *res* that we want a CG to generate an individual concept of. To the following *de re* report of David's belief about Fiona,

(19) David thinks that Fiona is a lawyer

we would assign the following LF (CG variables and abstractors are **bolded**):

(20) David thinks-$w_0[\lambda \mathbf{G_1} \lambda w_2[[[[\mathbf{G_1} \text{ Fiona}]w_2] \text{ is a lawyer}]w_2]]$
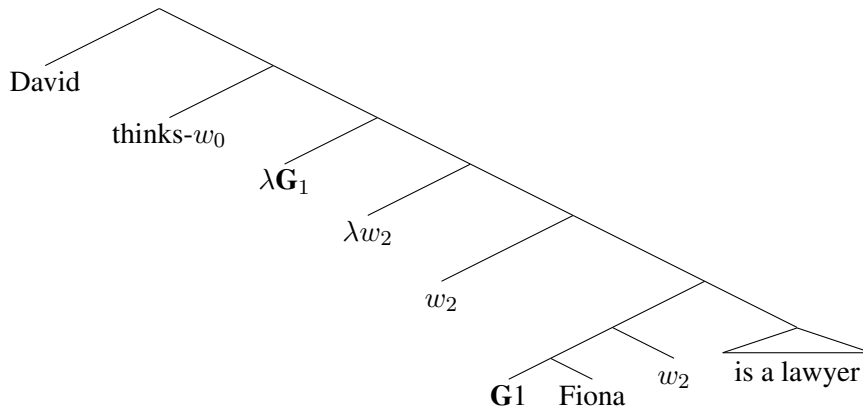
[7]This is one way to go; an alternative is to complement the Rule of Functional Application with the Rule of *Intensional* Functional Application, which is sensitive to the intensions of the expressions it applies to (see Heim and Kratzer 1998, ch. 12).

According to this LF, the attitude verb takes as its internal argument a function from concept generators to propositions. That is, the verb *to think* has the following lexical entry (full derivation of (19) in the Appendix):

(21) $[\![\text{thinks}]\!]^{w,g} = \lambda\omega_{\langle\langle e,\langle s,e\rangle\rangle,\langle s,t\rangle\rangle}\lambda x[\exists G(G$ is an acquaintance-based CG for x at $w \wedge DOX_{x,w} \subseteq \{w' : \omega(G)(w') = 1\})]$

It is important to note that, in this implementation of the CG technology, the *de re* character of a belief report is provided by the presence of a CG variable as sister to the appropriate *res* in the LF of its complement clause. *De dicto* reports are assigned a structure that contains no CG variable as sister to the appropriate *res*. In absence of any such variable, the existential quantifier introduced by the verb *to think* does not bind anything in the complement clause.

Time now for a signpost: we are after a way of deriving two interpretations for Mates' sentences compositionally. Consider specifically (2). The first interpretation (Sellar's 'pure *using* use'), under which (2) is false and its negation follows logically from (1) in virtue of the fact that 'lawyer' and 'attorney' are synonymous, poses no mystery. The second interpretation however (Sellars 'covert *mentioning* use'), under which (2) is true and logically equivalent to (14), is the one that we need to reach in a compositional way. In the following section, we take inspiration from the previously reviewed account of *de re* belief about individuals in order to do so. The basic idea is that, just as one can be acquainted with individuals, one can be acquainted with *expressions of a language*.

5   *De re* belief about words

Before exploring this idea more carefully, let us start by dispelling a possible confusion. We are proposing an extension of the traditional *de re* framework beyond individuals. Thus, one might expect that we look into the varieties of "generalized *de re*" proposals stemming chiefly from Cresswell & von Stechow (1982, also Schwager 2009; Sharvit 1998 a.o.). The basic idea in all these proposals is that we can have *de re* thought about things other than individuals: e.g., numbers, properties, qualities or kinds. However, none of these approaches are useful to us, for the simple reason that the property (or quality or kind) denoted by the predicate 'lawyer' is the same as the one denoted by 'attorney'. Hence, interpreting (1) or (2) as expressing *de re* belief about properties will not result in different truth conditions for each sentence, as the property referred to will be the same in both cases.[8]

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[8]It is perhaps worth it to work through a particular example: Cresswell & von Stechow tackle the problem of ascribing mathematical beliefs in possible world semantics for propositional attitudes. Since mathematical formulae are true in either *all* or *no* possible worlds, any ascription of a mathematical belief in possible-world semantics assigns as its content either the set of all possible worlds or its complement—the empty set. This is counterintuitive, as one person may believe one false mathematical formula but fail to believe a different one. In possible world semantics, one seems committed to ascribing the same belief in both cases. To avoid this, Cresswell & von Stechow propose that ascriptions of mathematical beliefs are sensitive to the properties that they refer to, just as *de re* reports are sensitive to the individual reported. Thus, they propose that the reason why one can ascribe to Ann the false belief that 8 is prime without ascribing to her the false belief that 8 is a multiple of 3 is that in each case we would be ascribing to Ann *de re* beliefs about different properties, namely *being prime* and *being a multiple of 3*. Suppose that we did the same, and claimed that (1) expresses a *de re* belief about the property of being a lawyer, while (2) expresses a *de re* belief about the property of being an attorney. Since the property of being a lawyer *just is* the property of being an attorney, we would be ascribing the same belief in (1) and (2), and these sentences could not have different truth conditions, even on this account. Same considerations apply to variations of this proposal, such as Schwager 2009. Mates' puzzle just seems to be an altogether different phenomenon from the phenomena that these views are designed to tackle.

We need to extend the *de re* machinery, but in a different direction: in order to make sense of the contrast between (1) and (2) (repeated here), we need to introduce the possibility that Andrea is having *de re* beliefs about different linguistic expressions.

(1)   Andrea thinks that Fiona is a lawyer.

(2)   Andrea doesn't think that Fiona is an attorney.

Recall Andrea's confusion. She knows what lawyers are, but she doesn't know that 'attorney' is just another word for lawyer. She thinks (mistakenly) that 'attorneys' are prosecutors; and she thinks (rightly) that her friend Fiona is a lawyer but not a prosecutor. It seems quite reasonable to say the following: what makes (1) true is, partially, the fact that Andrea has a certain belief about a particular word, 'lawyer'. And we could say, similarly, that what makes (2) true as well is that she does not have the same belief about a different word, 'attorney'. The belief, in both cases, concerns whether the relevant word applies truthfully to Fiona. Andrea thinks that the word 'lawyer', but not 'attorney', applies to Fiona. Consequently, we can say that Andrea believes the sentence 'Fiona is a lawyer' to be true, while she believes the sentence 'Fiona is an attorney' to be false. In other words, the sentence 'Fiona is a lawyer' and 'Fiona is an attorney' *as used by Andrea*, express different beliefs, of which she has only the former.

How can Andrea come to have different attitudes towards synonymous words? Simply put, in virtue of her different *acquaintance* with these words.[9] Andrea is differently acquainted with the words 'lawyer' and 'attorney', as she has come to associate these two words with the properties *being a lawyer* and *being a prosecutor*, respectively. At some point during her process of linguistic acquisition, Andrea associated the word 'attorney' with the property of being a prosecutor and the word 'lawyer' with the property of being a lawyer. Sentences (1) and (2) can be interpreted as revealing a certain sensitivity towards the relation of acquaintance that holds between her and the words used within those sentences, namely 'lawyer' and 'attorney'.

Following this thread, we can adapt the foregoing Kaplan-Lewis story about *de re* reports about individuals in order to obtain the following, informal truth-conditions for (1) and (2), under their 'covert *mentioning use*':

(22) $[\![(1)]\!]^{w,g} = 1$ iff there is a relation of acquaintance R that holds uniquely at w between Andrea and the predicate 'lawyer' such that at all the worlds w' in Andrea's doxastic alternatives at w, Andrea stands in R to some predicate 'P' in w' and Fiona is 'P' in w'.

(23) $[\![(2)]\!]^{w,g} = 1$ iff there is *no* relation of acquaintance R that holds uniquely at w between Andrea and the predicate 'attorney' such that at all the worlds w' in Andrea's doxastic alternatives at w, Andrea stands in R to some predicate 'P' in w' and Fiona is 'P' in w'.

Two comments about these truth conditions are due: first, we should introduce some restrictions in the possible relations of acquaintance that warrant *de re* belief about words. Here's an example of how being too liberal about this can result in excessively weak truth-conditions (incidentally, it also illustrates an important sense in which *de re* belief about individuals and about words come apart). Suppose that Andrea overhears a conversation between Lucía and Tessa about Fiona. Tessa is telling Lucía that Fiona is an attorney; however, Andrea overhears the word 'at Ernie's'. She does in fact think that Fiona is at Ernie's, which is a bar that Fiona likes. In virtue of this, (2) comes out as false in our proposal: first, there exists a relation of

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[9]The reader may complain that 'acquaintance' is not the best term here, but we stick to it in order to preserve the parallelism with *de re* thought about individuals that inspires the view. The sense in which individuals can be acquainted with words is spelled out in the following paragraphs.

acquaintance that holds uniquely between Andrea and the word 'attorney'; this is the relation of *being the word that Andrea overheard*—call that relation E. Secondly, E holds uniquely between Andrea and some predicate 'P' across her doxastic alternatives, namely 'at Ernie's' (because this is what she thinks she heard). And finally, Andrea thinks that that predicate applies truthfully to Fiona. This situation, therefore, seems to make it the case that Andrea thinks that Fiona is an attorney (in its *de re* reading). But this is unexpected; intuitively, we would *not* want to say that Fiona thinks that Andrea is an attorney in virtue of the fact that she misheard 'attorney' as 'at Ernie's'.

That is an unwelcome prediction, but it can be ruled out by restricting the admissible relations of acquaintance appropriately. Let us stipulate that relations of acquaintance with words should only be *semantic*; that is, they should be relations that hold between a subject and a word in virtue of the representation, or meaning, that the word has for that subject. If we assume such a restriction, then the envisaged scenario does not make (2) true: even though there is some relation of acquaintance between Andrea and 'attorney', namely E, E is not semantic; that is, it is not a relation that holds in virtue of the meaning that 'attorney' has for Andrea. If we restrict ourselves to semantic relations of acquaintance, there is no such relation that both holds between Andrea and 'attorney' and in addition holds between Andrea and a predicate that applies to Fiona across Andrea's doxastic alternatives.

But why introduce such restriction? There are two independent motivations for this stipulation: first, one's acquaintance with words occurs *par excellence* in learning contexts; that is, when one is taught the meaning of a word by someone else or looks it up in a dictionary (this, of course, need not happen at a particular moment in time; it can be a gradual process). Secondly, the very nature of a word appears to require acquaintance to it to be of a semantic character. Let us assume a distinction between words, which are more or less abstract objects (or continuants of inter- and intrapersonal stages, see Kaplan 1990) and their utterances, which are emissions of sounds and physical inscriptions. The relation of *having a certain meaning*, or *being associated with a certain representation*, is a relation that holds between an individual and a word (the abstract object) rather than any of its utterances. By contrast, *being overheard* is a relation that holds between a subject and an utterance of a word at that particular time and place. If we are trying to characterize relations of acquaintance with words, rather than with utterances of words, we should consider only the former type of relations.

Note, in addition, that this restriction marks a contrast between the notions of acquaintance with individuals and acquaintance with words. Seeing someone sneaking around the docks is the right type of relation to ground acquaintance between individuals. However, overhearing a word in someone's speech, while similar in some respects to the former type of relation, is not the right type of relation to ground acquaintance to a word. This should not come as a surprise—after all, individuals are spatiotemporal beings, so it is natural that being acquainted to an individual requires standing in certain spatiotemporal relations to that individual. By contrast, words are abstract objects, and so the same type of spatiotemporal relations can hold at most between individuals and *other* spatiotemporal entities, namely its utterances. But being acquainted with an utterance does not guarantee being acquainted with a word.

Restricting relations of acquaintance with words to semantic relations rules out the possibility that mistaking a word for another in virtue of overhearing it can make true a certain ascription of *de re* belief about that word, because overhearing a word is not an acquaintance relation that one stands to to words, but to utterances of words. However, that restriction allows for the possibility that a subject learns the wrong meaning of a word. That is what occurred to Andrea in our envisaged scenario, and this is what justifies our claim that she does not think that Fiona is an attorney. Andrea is *en rapport* with the word 'attorney', but she stands in the wrong kind of relation to that word.

The second comment about the proposed truth conditions of (1) and (2) concerns the metalinguistic variable

' 'P' '. It stands for an expression together with facts about the way in which the relevant linguistic community uses that expression; e.g., the truth of 'some expression 'P' is such that R holds between Andrea and 'P' ' would be witnessed by an expression that is used by Andrea and members of her linguistic community to talk about prosecutors and that *does really refer* to prosecutors in Andrea's doxastic alternatives, meaning that, in Andrea's doxastic alternatives, both her and her linguistic community use that expression to talk about prosecutors. This is important, because the crucial difference between language use in the actual world and in Andrea's doxastic alternatives lies in the fact that Andrea is wrong to use 'attorney' the way she does, although she obviously does not take herself to be wrong. This way, we capture the intuition that Andrea's use of language is *sui generis* and wrong in the actual world, but it's perfectly correct across her doxastic alternatives.

Now, the truth of (1) is witnessed by the fact that there exists a semantic relation of acquaintance such that (i) Andrea stands in that relation to the word 'lawyer' in w, (ii) that relation holds between Andrea and some expression 'P' in Andrea's doxastic alternatives and (iii) 'P' applies to Fiona in Andrea's doxastic alternatives. But there is no semantic relation of acquaintance such that (i) Andrea stands in that relation to the word 'attorney' in w, (ii) that relation holds between Andrea and some expression 'P' in Andrea's doxastic alternatives and (iii) 'P' applies to Fiona in Andrea's doxastic alternatives. Hence, the truth of (2) obtains. This is because the semantic relation of acquaintance that Andrea stands in to 'attorney' at w is being a word that she picked up to talk about prosecutors, and there's no such expression that applies to Fiona in Andrea's doxastic alternatives, because Fiona is no prosecutor and Andrea knows this. These are the informal, target truth-conditions for our sentences. We will consider now how to adapt the concept generator machinery in order to generate these readings compositionally.

6 Metalinguistic concept generators

As we saw, concept generators are functions from individuals to individual concepts. In this account, we require concept generators to be functions from expressions to functions from worlds to expressions (type $\langle \epsilon, \langle s, \epsilon \rangle \rangle$, where ϵ is the type of expressions; and we may call an object of type $\langle s, \epsilon \rangle$ a 'metalinguistic'—instead of 'individual'—concept). So let us define a metalinguistic concept generator (following the model of Percus and Sauerland 2003) as such:

Definition 6 (*Metalinguistic CG*) $\mathcal{H}$ *is a metalinguistic concept generator for x at w iff*

- *(a)* $\mathcal{H}$ *is an object of type $\langle \epsilon, \langle s, \epsilon \rangle \rangle$*
- *(b)* $Dom(\mathcal{H}) = \{ \epsilon : x$ *is acquainted with ϵ at $w \}$*

More specifically, we want the relevant metalinguistic concept generators to preserve acquaintance relations between x and the expressions in its domain. That is, the metalinguistic concept generators should be *acquaintance-based*:

Definition 7 (*Acquaintance-based metalinguistic CG*) $\mathcal{J}$ *is an acquainted-based metalinguistic concept generator for x at w iff*

- *(a)* $\mathcal{J}$ *is a metalinguistic concept generator for x at w and*
- *(b)* *the metalinguistic concepts that $\mathcal{J}$ yields are acquaintance-based, in the sense that for all ϵ in $Dom(\mathcal{J})$, there is some acquaintance relation R that x bears R uniquely to ϵ in w, & $DOX_{x,w} \subseteq \{ w' : x$ bears R uniquely to $\mathcal{J}(\epsilon)(w')$ in $w' \}$*

Now, regular and metalinguistic CGs are similar in that they both lift a non-functional expression to an intensional type. Hence, we can unify the two kinds of CGs into a single *generalized* CG of type $\langle v, \langle s, v \rangle \rangle$ (where v is of variable type; which may be, as far as we know, an individual or an expression). Acquaintance-based *generalized* CGs might be defined accordingly:

Definition 8 (*Acquaintance-based generalized CG*) $\mathcal{K}$ *is an acquainted-based generalized concept generator for x at w iff*

- *(a)* $\mathcal{K}$ *is a generalized concept generator for x at w and*
- *(b)* *the concepts $\mathcal{K}$ yields are acquaintance-based, in the sense that for all v—be it an expression or an individual—in $Dom(\mathcal{K})$, there is some acquaintance relation R that x bears R uniquely to v in w, & $DOX_{x,w} \subseteq \{w' : x$ bears R uniquely to $\mathcal{K}(v)(w')$ in $w'\}$*

In P&S's original proposal, the way to obtain the desired *de re* interpretations was to assume that there were concept generator variables in the appropriate places in logical form. In order to introduce generalized concept generators, we need to take the following steps: first, we need to allow for LFs where, not only there are concept generator variables next to a predicate (as well as abstractors over the pertinent clauses), but furthermore, the predicate has to be *mentioned*, rather than used. So what we see in LF is not the usual denotation of the predicate, but the predicate itself, as sister to the appropriate CG variable. Secondly, we modify the lexical entry of *thinks* so that it quantifies over *generalized* concept generators:

(24) $[\![\text{thinks}]\!]^{w,g} = \lambda\omega_{\langle\langle v,\langle s,v\rangle\rangle,\langle s,t\rangle\rangle}\lambda x[\exists G(G$ is an acquaintance-based generalized CG for x at w & $DOX_{x,w} \subseteq \{w' : \omega(G)(w') = 1\})]$

At this point however, we encounter the following issue: we defined metalinguistic concept generators as functions from expressions (type ϵ) to metalinguistic concepts (type $\langle s, \epsilon \rangle$). This means that the result of applying a concept generator to an expression at a possible world is another expression. But we cannot combine *that* kind of semantic value with an individual *via* Functional Application, because there would be a type mismatch. The issue might have already caught the eye of the reader in the statement of the target truth conditions for (1) (or (2)), repeated here:
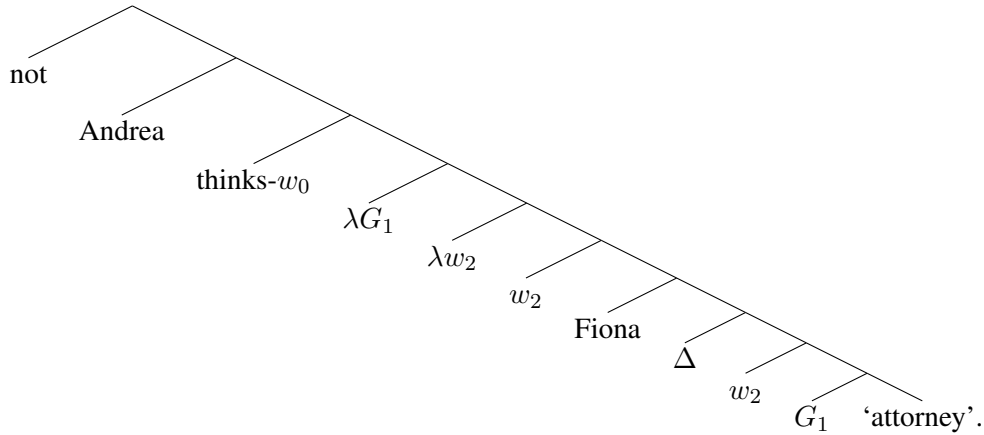
(22) $[\![(1)]\!](w) = 1$ iff there is a relation of acquaintance R that holds uniquely at w between Andrea and the predicate 'lawyer' such that at all the worlds w' in Andrea's belief set at w, Andrea stands in R to some predicate 'P' in w' and **Fiona is 'P' in w'.**

Strictly speaking, it doesn't make sense to say that Fiona is 'P' (for some predicate 'P'), as ' 'P' ' denotes a linguistic expression and not a predicate denotation. To overcome this obstacle, we need to posit a type-shifting 'disquotational' function that maps any mentioned material to its standard semantic value. This function should take as its argument the attitude holder's idiolectal expression ('P') that the concept-generator has swapped the original expression ('attorney') for. In this way, after the CG variable swaps the expression 'attorney' for an expression that means *prosecutor* for the believer, that function again swaps that new expression for its semantic value, namely *prosecutor*, so that it can be applied to Fiona at Andrea's doxastic alternatives. To be more precise:

Definition 9 (*Disquotational function*) *A disquotational function is a function Δ from linguistic expressions to set-theoretical objects of any type such that, for any linguistic expression 'F' and set-theoretical object F, $\Delta('F') = F$ just in case F is what 'F' means.*

The LF for (2)—in its 'covert *mentioning* use'—would be as follows (full derivation in the appendix):

14

(25) not [Andrea [thinks-w_0[$\lambda G_1 \lambda w_2$[w_2 [Fiona [Δ [w_2 [G_1 'attorney']]]]]]]]]

not
  Andrea
    thinks-w_0
      λG_1
        λw_2
          w_2
            Fiona
              Δ
                w_2
                  G_1 'attorney'.

The LF of (1)—also in its 'covert *mentioning* use'—contains a reference to the word 'lawyer' instead of 'attorney', and so requires for its truth a (potentially different) relation of acquaintance to hold between Andrea and 'lawyer'. Thus, both sentences turn out to be truth-conditionally independent from each other under this interpretation, as desired.

On the other hand, in order to account for Mates' sentences in their 'pure *using* use' (under which (1) and (2) are mutually exclusive), we should posit an alternative, simpler LF where the relevant predicates are not mentioned or quoted in LF and there are no CG variables as sisters to them. An LF for (2)—in its 'pure *using* use'—would be as follows:

(26) Andrea thinks-w_0[$\lambda G_1 \lambda w_2$[w_2 [Fiona is an attorney]]]

Andrea
  thinks-w_0
    λG_1
      λw_2
        w_2
          Fiona is an attorney
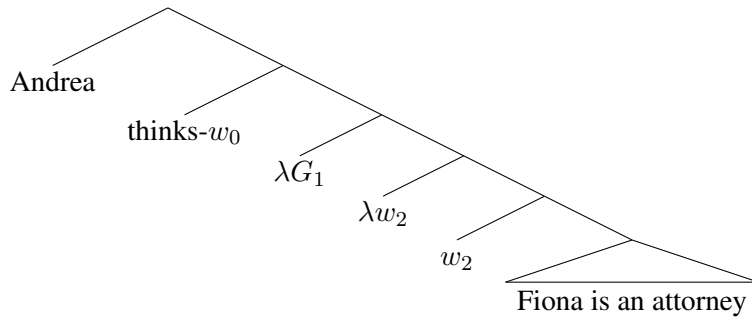
As there are no CG variables in the LF of the complement clause, the existential quantification over concept generators introduced by the attitude verb is idle, and every constituent in the complement clause receives its usual semantic value, as expected.

This extension of P&S's original proposal makes the necessary predictions: quantification over the believer's concept generators ensures that the report is appropriately sensitive to the believer's idiolect, and we compositionally derived independent truth conditions for (1) and (2) in their 'covert *mentioning* use'. The contrast between the 'covert *mentioning* use' and the 'pure *using* use' of sentences (1) and (2) lies on there being two different LFs that the complement of these clauses can have. One of them contains both a concept-generator variable and a disquotational function; the other contains nothing of that sort.

The view is summed up as follows: Mates' sentences (1) and (2) (repeated here) are ambiguous between what Sellars 1955 called a 'pure *using* use' and a 'covert *mentioning* use'.

(1) Andrea thinks that Fiona is a lawyer.

(2)   Andrea doesn't think that Fiona is an attorney.

In the former use, those sentences are mutually exclusive, they allow substitution of co-intensional terms and pose no puzzle; in the latter use however, they are truth-conditionally independent from each other and give rise to Mates' puzzle. Introducing *de re* belief about expressions of a language with the aid of the *generalized* concept generator machinery allows us to compositionally derive truth conditions for (2) ('Andrea doesn't think that Fiona is an attorney') such that (2) is true just in case it is not the case that Andrea stands in some acquaintance relation to the word 'attorney' that she stands to some word that correctly applies to Fiona across Andrea's doxastic alternatives. This is roughly equivalent to our version of Sellar's paraphrase of a 'covert *mentioning* use' for (2), repeated here:

(14)   The word 'attorney' as would be used by Andrea expresses something that she doesn't believe is true of Fiona.

Indeed, that sentence, as used by Andrea, expresses the thought that Fiona is a prosecutor, which Andrea knows Fiona not to be. As we will discuss in the next section, this view incurs certain theoretical commitments that can be called into question. It is unclear, however, that there is any alternative but to assume those commitments.

7   Two possible objections

How plausible is this metalinguistic story about Mates' puzzle? In this section, two possible objections are considered. The first one is closely related to the previous points about the presence of *mentioned* material in (1)/(2). The objection is that our account violates the principle of *semantic innocence* (stemming from Davidson 1968). Semantic innocence is the principle that linguistic expressions always contribute their normal semantic value wherever they appear. And specifically, expressions should not have a different semantic value when embedded under certain operators, and a different one when unembedded. Since our view allows certain constituents of sentences to have a different semantic value from what they normally have when embedded under belief operators, it violates semantic innocence. When unembedded, 'attorney' uniformly means *attorney*. But when embedded under 'think', an ambiguity appears: in its 'pure *using* use', the predicate 'attorney' in (2) has its regular semantic value; whereas in the 'covert *mentioning* use' of (2), 'attorney' does not have its regular semantic value; on the contrary, that predicate is mentioned rather than used. The denotation of 'attorney' is, in that case, the very predicate 'attorney'. Crucially, this is in the absence of any visible quotational devices to that effect—after all, if there was a quotational device, we could of course charge that constituent with generating the new interpretation that we need.

To this it should be replied that the charge of violating semantic innocence is not, strictly speaking, fair. The proposal in this paper does not commit one to the view that sometimes 'attorney' means *attorney* and sometimes 'attorney'. Rather, it commits one to the view that the meaning of 'attorney'—and any other predicate, for that matter—is *systematically ambiguous* between *attorney* and 'attorney', that is, between its 'pure *using* use' and its 'covert *mentioning* use'. It only seems as though the latter meaning is there when the predicate is embedded under 'think'. But that is because the only way in which the 'covert *mentioning* use' of 'attorney' can have an impact on the truth conditions of a sentence is by interacting with a propositional attitude verb. The ambiguity remains regardless of whether the predicate is embedded or unembedded; its 'covert *mentioning* use' does not magically appear when the predicate is embedded. Therefore, the charge of violating semantic innocence is not correct.

The flipside of this is, of course, that positing this type of massive ambiguity is not exactly parsimonious. But there is no clear alternative in the offing. Moreover, ambiguity is widespread and commonly accepted across many linguistic domains, so the theoretical commitments that we are adopting are by no means *sui generis*. Finally, I think we can add an interesting data point in support of this type of proposal. Consider the following contrast:

(27)   a. # Fiona's comments were romonic.
       b. Andrea thinks that Fiona's comments were romonic.

Since 'romonic' doesn't mean anything, (27a) does not mean anything either. That sentence has no semantic value, thus it cannot be interpreted. However, (27b) is clearly interpretable: it means that Andrea thinks that Fiona's comment have a property that she would refer to as 'romonic'. How can it be, given that (27a) is not interpretable? Our view offers a clear answer: (27a) is ambiguous between (at least) a 'pure *using* use', that is, a standard semantic value, and a 'covert *mentioning* use', where the predicate 'romonic' is mentioned and not used. When unembedded, the sentence cannot be parsed under either of those interpretations, as 'romonic' has no standard semantic value and its 'covert *mentioning* use' is idle in absence of further machinery. But when (27a) is embedded under 'think', then its 'covert *mentioning* use' can be combined with the meaning of 'think' to produce a meaning, precisely the only meaning that (27b) can have. We take this data point to offer additional support to the view defended in here.

Secondly, the observed facts about the permissibility of substitutions between (1) and (2) (in our view under their 'pure *using* use') appear to go against the largely accepted claim that, while predicates in subject position of the complement clause of an attitude verb have transparent and opaque readings, the main predicates of these clauses cannot be interpreted transparently (Percus 2000, p. 200 and ff.). For example, while (28) can be uttered truthfully in a context in which David thinks that someone is my boss without him thinking that that person is my brother, it cannot be uttered truthfully in a context in which David thinks someone is my brother without him thinking that that person is my boss.

(28)   David thinks that my brother is my boss.

However, the observations in this paper do not challenge this constraint. To block a transparent reading means here to block substitution of *co-extensional* expressions *salva veritate*. But it is compatible with that constraint that substitution of *co-intensional* expressions in those positions is allowed. This is what we observe in the transparent reading of (1) and (2). In other words, Percus' constraint could be rephrased as the constraint that the main predicate of the complement clause of an attitude verb cannot be *extensionally* transparent; the observation made here is that it can nevertheless be *intensionally* transparent.

And indeed, under a plausible explanation of why that constraint holds, it is not surprising that the constraint does not extend to substitution of co-intensional expressions. Substitution of co-extensional expressions in the main predicate alters the representation of the attitude holder's thought that the sentence reports. For instance, a report like (28) *demands*, as part of its truth conditions, that David represents someone as being the speaker's boss, while it doesn't demand that he represents that person as being the speaker's brother. However, it can be argued that substitution of co-intensional expressions inside a belief report does not alter the representations of the attitude holder that the sentence communicates. If all that it is required is that the person that David's thought is about is represented by him as having a certain property, the speaker of (28) could very well communicate this by saying

(29)   David thinks that my brother is my employer,

even if David has no idea what the word 'employer' means (again, in a 'pure using use' of (29)). Importantly, the representation that either (28) or (29) convey remains stable under substitution of co-intensional expressions.

8   Conclusion

As we have seen, Mates' puzzles seem rather amenable to a treatment using concept generators. In part, this is so because the technology is flexible enough to apply to constituents of various linguistics types through different syntactic implementations. The account presented here defends that Mates' sentences are ambiguous between two interpretations, only one of which actually generates Mates' puzzle. To account for this interpretation, we have explored the idea of adapting a well-known account of *de re* belief about individuals. The basic idea is that Mates' sentences in their 'covert *mentioning* use' are *de re* reports about expressions. Failures of substitutivity across these sentences are due to their truth crucially relying on the attitude holder standing in certain relations of semantic acquaintance to a particular word in the sentence that reports their attitude; change those words, and those relations are altered as well. Furthermore, we have explored a way of implementing that view *via* concept generators. We have put forward an extension of Percus & Sauerland's (2003) proposal, placing concept generator variables and abstractors in LF. A fuller assessment of this proposal remains to be done.

Appendix

Derivation of (19) in P&S's system (§4)

(19)   David thinks that Fiona is a lawyer.

This sentence has the following structure,

- David thinks-$w_0[\lambda G_1 \lambda w_2[[[[G_1 \text{ Fiona}]w_2] \text{ is a lawyer}]w_2]]$

which has the following meaning, relative to a world and assignment function pair:

- $[\![\text{thinks}]\!]^{w,g}([\![\lambda G_1 \lambda w_2[[[[G_1 \text{ Fiona}]w_2] \text{ is a lawyer}]w_2]]\!]^{w,g})([\![\text{David}]\!]^{w,g}) =$

Given the lexical entry for 'think' and the remaining structure, this string is interpreted as follows (using only the standard rule of functional application (FA)):

- $\lambda \omega_{\langle\langle e,\langle s,e\rangle\rangle,\langle s,t\rangle\rangle} \lambda x[\exists G(G \text{ is an acquaintance-based } CG \text{ for } x \text{ at } w \ \& \ DOX_{x,w} \subseteq \{w' : \omega(G)(w') = 1\})](\lambda G_1 \lambda w_2[\text{lawyer}(G_1(\text{Fiona})(w_2))(w_2)])(\text{David}) =$

By FA:

- $\lambda x[\exists G(G \text{ is an acquaintance-based } CG \text{ for } x \text{ at } w \ \& \ DOX_{x,w} \subseteq \{w' : \lambda G_1 \lambda w_2[\text{lawyer}(G_1(\text{Fiona})(w_2))(w_2)](G)(w') = 1\})](\text{David}) =$

By FA:

- $\exists G(G \text{ is an acquaintance-based } CG \text{ for David at } w \ \& \ DOX_{\text{David},w} \subseteq \{w' : \lambda G_1 \lambda w_2[\text{lawyer}(G_1(\text{Fiona})(w_2))(w_2)](G)(w') = 1\}) =$

By FA:

- $\exists G(G$ is an acquaintance-based CG for David at w & $DOX_{\text{David},w} \subseteq \{w' : \text{lawyer}(G(\text{Fiona})(w'))(w') = 1\})$

What the foregoing truth conditions state is that there exists a function (a concept generator) that takes Fiona and returns an individual concept of Fiona for David such that, throughout David's doxastic alternatives, David stands in the same acquaintance relation that he stands to Fiona in w to the individual(s) picked out by this function, and they are lawyer(s) at each of those alternatives.

Derivation of (2) in the extension of P&S's system (§6)

In this subsection, truth conditions for (2) ('Andrea doesn't think that Fiona is an attorney') in its 'covert *mentioning* use' are derived. The negation of doxastic verbs introduces a whole cluster of problems in connection to neg-raising, which is not our focus. It is assumed for simplicity in this and the following derivation that 'not think' is simply the external negation of 'think'.

   (2)   Andrea doesn't think that Fiona is an attorney.

(2) has the following structure,

- not [Andrea [thinks-$w_0[\lambda G_1 \lambda w_2[w_2$ [Fiona [Δ [w_2 [G_1 'attorney']]]]]]]]]

which is interpreted as follows:

- not $([\![\text{thinks}^{GCG}]\!]^{w,g}([\![\lambda G_1 \lambda w_2[w_2[\text{Fiona}[\Delta[w_2[G_1\text{'attorney'}]]]]]]\!]^{w,g})([\![\text{Andrea}]\!]^{w,g})) =$

By our generalized lexical entry for the verb 'think', and given that $[\![\text{Andrea}]\!]^{w,g} = \text{Andrea}$:

- not $(\lambda \omega_{\langle\langle v,\langle s,v\rangle\rangle,\langle s,t\rangle\rangle}\lambda x[\exists G(G$ is an acquaintance-based generalized CG for x at w & $DOX_{x,w} \subseteq \{w' : \omega(G)(w') = 1\})](\lambda G_1 \lambda w_2[w_2[\text{Fiona}[\Delta[w_2[G_1\text{'attorney'}]]]]])(\text{Andrea})) =$

By FA:

- not $(\lambda x[\exists G(G$ is an acquaintance-based generalized CG for x at w & $DOX_{x,w} \subseteq \{w' : \lambda G_1 \lambda w_2[w_2[\text{Fiona}[\Delta[w_2[G_1\text{'attorney'}]]]]](G)(w') = 1\})](\text{Andrea})) =$

By FA:

- not $(\exists G(G$ is an acquaintance-based generalized CG for Andrea at w & $DOX_{\text{Andrea},w} \subseteq \{w' : \lambda G_1 \lambda w_2[w_2[\text{Fiona}[\Delta[w_2[G_1\text{'attorney'}]]]]](G)(w') = 1\})) =$

By FA:

- not $(\exists G(G$ is an acquaintance-based generalized CG for Andrea at w & $DOX_{\text{Andrea},w} \subseteq \{w' : [w'[\text{Fiona}[\Delta[w'[G\text{'attorney'}]]]]] = 1\})) =$

The embedded clause is interpreted as follows in virtue of its structure:

- not $(\exists G(G$ is an acquaintance-based generalized CG for Andrea at w & $DOX_{\text{Andrea},w} \subseteq \{w' : \Delta((G(\text{'attorney'})(w')))(\text{Fiona})(w') = 1\}))$

The resulting truth conditions for (2) state that it's not the case that there exists a function (namely, a generalized concept generator) for Andrea at w that takes the word 'attorney' and returns a metalinguistic concept of 'attorney' for Andrea such that, throughout Andrea's doxastic alternatives, Andrea stands in the same acquaintance relation that she stands in w to the word 'attorney' to the expression(s) picked out by this function, and that in addition correctly applies to Fiona at those doxastic alternatives.

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