

# Iterated *de re*: A New Puzzle for the Relational Report Semantics

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## Abstract

I present and solve a puzzle involving iterated *de re* reports in a relational attitudes framework. The investigation shows that *de re* reporting is even more non-compositional than hypothesized earlier.

## 1 Introduction

*De re* belief reports are sentences that ascribe to someone a belief about some external entity or *res*. If the content of the ascribed belief is itself a *de re* belief we have an iterated *de re* report. For instance:

- (1) John believes that Mary thinks I'm cool

I'll show that the doubly embedded *I* in (1) is problematic in a context where John *thinks* there is a *de re* belief between Mary and me, while *in fact* Mary's belief was about someone else. I reconcile the intuitive truth of (1) in such a scenario with the fact that *I* picks out the current speaker, me.

Outline: after fleshing out the scenario and intuitions in section 2, I introduce the framework of relational attitudes in section 3. In section 4 I examine the problematic predictions of this relational analysis with respect to mistaken iterated *de re*. In section 5 I propose a solution, and in 6 I discuss some implications of that solution.

## 2 Iterated *de re* and mistaken identity

Consider the following scenario:

- (2) John and Mary are friends. Mary says: "That guy is cool". John thought she was pointing to me. In fact, she's pointing to Peter.

From Mary's utterance it follows that she has a *de re* belief, not about me, but about Peter. I would be entitled to report her belief as (3a), but not (3b):

- (3) a. Mary thinks Peter is cool  
 b. #Mary thinks I'm cool

John also has a *de re* belief, about Mary. Since he is confused about the object of her belief he would disagree with our judgments in (3). Because he thinks Mary's belief is about me, we intuitively judge (4b) true:

- (4) John believes that Mary thinks I'm cool [=(1)]

The puzzling observation is that we use a first person pronoun in (4) even though neither John's nor Mary's belief appears to be *de re* about me. More precisely, I will show that the intuitive, relational paraphrase *John believes of Mary that she believes of me that I am cool* of (4) fails to capture the correct truth conditions.

### 3 Background: the relational analysis of *de re*

A traditional way to cash out the difference between modalities *de re* and *de dicto* is in terms of scope. Take the following attitude ascription:

- (5) John hoped the new president would be pro-life

On the *de dicto* reading John merely hopes for a pro-life president. On a *de re* reading on the other hand John hoped of a certain individual, the actual new president, Obama, that he would be pro-life. Crucially, in the *de re* reading, John's hope is about Obama regardless of whom he believed or hoped would be president; the report would be true if John's thought were of the form 'I know he won't win the election, but I hope that Obama is pro-life'.

The scope analysis represents this truth-conditional difference between *de re* and *de dicto* as a difference between wide and narrow scope of the description with respect to the attitude operator:

- (6) a. *de dicto*:  $\text{HOPE}_j \text{prolife}(\lambda x[\text{president}(x)])$   
 b. *de re*:  $\lambda x[\text{president}(x)] \lambda y \text{HOPE}_j [\text{prolife}(y)]$

In a standard possible worlds framework (intensional first-order logic, with only extensional variables) this seems to make the right predictions.  $\llbracket (6a) \rrbracket_w = 1$  iff in all of the worlds  $w'$  compatible with John's hopes in  $w$ , the new president of  $w'$  is pro-life in  $w'$ , which indeed corresponds to the *de dicto* interpretation.  $\llbracket (6b) \rrbracket_w = 1$  iff there is a unique individual that is the president in  $w$ , and that individual has the property of being pro-life in all worlds  $w'$  compatible with John's hopes.

Unfortunately, the wide scope representation of *de re* beliefs is too weak, as Quine (1956) demonstrated with his famous Orcutt example (now often referred to as the double vision thought experiment):

There is a certain man in a brown hat whom Ralph has glimpsed several times under questionable circumstances on which we need not enter here; suffice it to say that Ralph suspects he is a spy.

It follows that Ralph has a *de re* belief about this man in the brown hat, which we might report with (7a), which has wide scope representation (7b):

- (7) a. Ralph believes *de re* of the man with the brown hat that he is a spy  
 b.  $\lambda x[\text{man\_brown\_hat}(x)]\lambda y[\text{BEL}_x[\text{spy}(y)]]$

The story continues:

Also there is a grey-haired man, vaguely known to Ralph as rather a pillar of the community, whom Ralph is not aware of having seen except once at the beach

We conclude:

- (8) a. Ralph believes *de re* of the man at the beach that he is not a spy  
 b.  $\lambda x[\text{man\_beach}(x)]\lambda y[\text{BEL}_x[\neg\text{spy}(y)]]$

“Now,” Quine adds, “Ralph does not know it, but the men are one and the same”, viz. the spy B.J. Orcutt. It follows from this and (7) that Ralph believes *de re* of Orcutt that he is a spy and from (8) that he believes *de re* of Orcutt that he is not a spy. Given our possible worlds semantics and wide scope scope representations of *de re* belief we can deduce that Ralph believes *de re* of Orcutt that he is both a spy and not a spy. In other words, not only is Ralph confused about Orcutt’s identity, he is also confused about logic, believing a true contradiction. The absurdity of the latter consequence is commonly regarded as proof of the inadequacy of the wide scope analysis of *de re*.

A popular solution to this problem is the so-called relational analysis of *de re*, based on Kaplan’s (1969) ‘vivid names’ (more conveniently captured in Lewis’ (1979) terminology, using acquaintance relations, below). The starting point is that  $x$  believes *de re* of  $y$  that it has property  $P$  iff there is an actual acquaintance relation between  $x$  and  $y$ , and  $x$  believes that the individual she herself is so acquainted with has  $P$ . The actual acquaintance relation connecting the subject and the *res* is taken into the logical form (henceforth,  $lf$ ) to give the descriptive mode of presentation under which the belief is held. This analysis, summarized in (9), thus reduces a *de re* belief about  $y$  that it’s  $P$  to a propositional, descriptive belief, viz. that whoever the subject is  $R$ -acquainted with is  $P$ .

- (9) a.  $x$  believes *de re* of  $y$  that he is  $P$   
 b.  $lf: \exists R[R(x, y) \wedge \text{BEL}_x[P(\lambda z[R(x, z)])]]$  [to be refined]

Before showing how the relational analysis solves the Orcutt paradox, let me introduce two refinements to Kaplan’s original proposal as reconstructed in (9).

First, in (9b) we see that the acquaintance relation ( $R$ ) and *res* ( $y$ ) are represented outside the actual belief operator. This requires a separation of *res* from ascribed content, introducing an aspect of non-compositionality, or, in more syntactic terms, a ‘*res* movement’. Note that this separation can be made explicit on the surface by means of

the (not quite natural) reformulation of *believes that ... as believes of ... that ...*. I'll return to this matter in sections 5 and 6 below. For now, we'll assume that syntax parses belief complements into structured representations of the form  $\langle res, predicate \rangle$ . We'll use the notation  $BEL\langle \dots, \dots \rangle$  for *de re* If's, i.e. as an abbreviation of the existentially quantified relational representation.

- (10) a.  $x$  believes *de re* of  $y$  that he is  $P$   
 b. If:  $BEL_x\langle y, P \rangle$   
 c.  $BEL_x\langle y, P \rangle =_{\text{def}} \exists R[R(x, y) \wedge BEL_x[P(\lambda z[R(x, z)])]]$  [to be refined]

Second, the representation of the subject  $x$  as a variable inside the belief operator in (9b) (or (10c)) will lead to similar kinds of problems as the wide scope representation of Ortcutt. We will not go into this matter too deeply here, but note that the  $x$  there really denotes the attitude holder himself, from his own first person perspective. Rather than just *de re* beliefs of the subject about the subject, a subject's beliefs about himself are typically *de se*. For a full discussion about *de se*, and especially the relation between *de re* and *de se* belief in the relational framework, I refer the reader to Maier (2006). Suffice it to say that, to avoid problems with *de se*, the 'believes' in (10a) is further explicated as a property-self-ascription (SELFASCR), following Lewis (1979). That means that the *res*-separated If (10b) can be taken to abbreviate the following property self-ascription:

- (11)  $BEL_x\langle y, P \rangle =_{\text{def}} \exists R[R(x, y) \wedge SELFASCR_x \lambda u[P(\lambda z[R(u, z)])]]$

In words, there is an acquaintance relation  $R$  between subject  $x$  and *res*  $y$ , and  $x$  self-ascribes the property of being uniquely  $R$ -acquainted with someone, who is also  $P$ .

By way of an illustration, let's see how this relational semantics solves the Ortcutt puzzle. From the first part of the Ortcutt story (p.348), and the 'punch line', we concluded that Ralph has a *de re* belief about Ortcutt, viz. (12a). We now represent this as (12b), rather than (7b):

- (12) a. Ralph believes *de re* of Ortcutt that he is a spy  
 b.  $BEL_r\langle o, \lambda z[\text{spy}(z)] \rangle$

From the second part we gather:

- (13) a. Ralph believes *de re* of Ortcutt that he is not a spy  
 b.  $BEL_r\langle o, \lambda z[\neg \text{spy}(z)] \rangle$

Crucially, we cannot combine these two to conclude that Ralph believes *de re* about Ortcutt that he is and is not a spy:

- (14)  $(12b) \wedge (13b) \not\equiv BEL_r\langle o, \lambda z[\text{spy}(z) \wedge \neg \text{spy}(z)] \rangle$

This lemma is easily checked by writing out the definitions of the formulas. What the left hand conjunction says is that there is an acquaintance relation between Ralph and Ortcutt under which Ralph believes himself to be acquainted with a spy, and there is another acquaintance relation under which he believes to be acquainted with a non-spy. These two existential statements are indeed non-paradoxically true in our scenario, The

first acquaintance relation would be seeing the guy in the brown hat, the second would be seeing the guy at the beach. The statement on the right hand side is much stronger, and indeed ascribes to Ralph a contradictory belief: Ralph bears an acquaintance relation to Ortcutt and believes the person he is so acquainted with is both a spy and not a spy.

The relational analysis thus avoids the unwanted inference to a contradictory belief. At the same time it preserves the *de re/de dicto* distinction, in that the former is characterized by the *res* being scoped out of the logical belief operator, and by the existence of an acquaintance relation that also serves as the mode of presentation of the *res* inside the belief.

## 4 The puzzle: embedded double vision

Given the relational system, the most natural parse and logical form of our iterated report (1) would be:

- (15) a. John believes *de re* of Mary that she believes *de re* of me that I am cool  
 b.  $BEL_j \langle m, \lambda x [BEL_x \langle i, \lambda z [cool(z)] \rangle] \rangle$

Surprisingly, with the relational semantics specified above, (15) does not represent a sensible reading. This can be brought out by expanding the structured beliefs as specified by (11):

- (16)  $\exists R [R(j, m) \wedge SELFASCR_j \lambda u [ \exists R' [R'(1v[R(u, v)], i) \wedge SELFASCR_{1v[R(u, v)]} \lambda u' [cool(1v'[R'(u', v')])]]]]]$

The problem with (16) is that there is an indexical, *i*, occurring inside a semantic belief operator (SELFASCR). Because indexicals are rigid designators (Kaplan, 1989), i.e. they function like variables bound from outside, they create a singular proposition, similar to that created by the wide scope representation rejected in (6). In other words, we should be able to create an Ortcutt scenario to disqualify it. We achieve this by adding to our scenario (2) a second encounter between John, Mary and me:

- (17) John and Mary meet me again. John doesn't recognize me from the first encounter. Mary to me: "You're a dork"

John might report this to me as (18a), which I in turn could report with (18b):

- (18) a. John to me: "Mary thinks you're not cool"  
 b. John believes that Mary thinks I'm not cool

We find that in the extended scenario (2)+(17), both (1) and (18b) are true, the latter paraphrased and analyzed below:

- (19) a. John believes *de re* of Mary that she believes *de re* of me that I am not cool  
 b.  $BEL_j \langle m, \lambda x [BEL_x \langle i, \lambda z [\neg cool(z)] \rangle] \rangle$

Combining the logical forms in (15b) and (19b) should yield an Orcutt-like contradiction on account of the *i*, which is replaced by a description in the innermost self-ascription, but which nonetheless creates a so-called singular proposition in the outermost one.

Because of the double embedding, however, we do not immediately get a contradiction. John might well think that Mary knows me under two distinct guises and thus has two distinct beliefs that he knows are *de re* about me. To bring out the inadequacy of (15) and (19) we have to control for this by adding to our story that John thinks Mary met me only once, which, with the same kind of representation as in (15) and (19) looks like this:

- (20) a. John believes *de re* of Mary that she met me only once  
 b.  $BEL_j \langle m, \lambda x [\exists ! R[R(x, m)]] \rangle$

Note that this is assumption entirely compatible with the story thus far. Because John doesn't recognize me on the second encounter, the unique acquaintance he believes to exist between me and Mary is the one underlying the first scene (which, moreover, is *in fact* an acquaintance relation between Mary and Peter).

As expected, the extended scenario has as an unwanted consequence that John believes that Mary believes a contradiction:

- (21)  $(15b) \wedge (19b) \wedge (20b) \models BEL_j \langle m, \lambda x [BEL_x \langle i, \lambda z [cool(z) \wedge \neg cool(z)] \rangle] \rangle$

As Quine showed with his Orcutt example, one cannot believe two contradictory things about a single actual individual, me (*i*), without taking the different 'guises', given by acquaintance relations, of that individual into account.

## 5 Solution: iterated *res* movement

Having pinpointed the problem thus, a solution within the relational framework presents itself. What we must do is 'move' the doubly embedded *res*, *i*, one step further, leaving behind a descriptive guise in John's belief as well as in Mary's. In (22b-c) I use arrows to depict the *res* movements that have taken place to derive this new logical form for (1), repeated as (22a):

- (22) a. John believes that Mary thinks I'm cool  
 b. John believes of Mary and of me that            believes of            that            is cool  
 c.  $BEL_j \langle m, i, \lambda x \lambda y [BEL_x \langle y, \lambda z [cool(z)] \rangle] \rangle$
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An attempt at an explicit semi-natural language paraphrase: John believes of Mary and of me that the former believes of the latter that he is cool. As is clear from (22b-c), the indexical first person pronoun is moved outside both belief embeddings, so the relational interpretation should be Orcutt-proof.

To make sure, let's write out the full definition of the relational beliefs from (11). This requires first a trivial extension to cover beliefs about multiple *res*:

(23) If  $t_1 \dots t_n$  are terms, and  $P$  is an  $n$ -place predicate:

$$\text{BEL}_x \langle t_1, \dots, t_n, P \rangle =_{\text{def}} \exists R_1 \dots R_n [R_1(x, t_1) \wedge \dots \wedge R_n(x, t_n) \wedge \text{SELFASCR}_x \lambda u [P(\mathbf{1}z_1[R_1(u, z_1)], \dots, \mathbf{1}z_n[R_n(u, z_n)])]]$$

In words: believing *de re* about a number of *res* that they're  $P$ , means that you're acquainted with all of them and believe that the representational guises of the *res* under their respective acquaintance relations, stand in the relation  $P$  to each other.

With (23), the fully specified, double movement relational  $\text{If}$  of (22) looks like this:

$$(24) \quad \exists R_1, R_2 [R_1(j, m) \wedge R_2(j, i) \wedge \text{SELFASCR}_j \lambda u [ \exists R_3 [R_3(\mathbf{1}v[R_1(u, v)], \mathbf{1}w[R_2(u, w)]) \wedge \text{SELFASCR}_{\mathbf{1}v[R_1(u, v)]} \lambda u' [ \text{cool}(\mathbf{1}v'[R_3(u', v')])]]]]]$$

To see why (24) does not suffer from the Orcutt problems of (16), note that in (24) John no longer has to believe his representation of Mary ( $\mathbf{1}v[R_1(u, v)]$ ) to be acquainted with the *actual me* ( $i$ ), as was the case in (16), but rather with *his representation of the actual me* under  $R_2$  ( $\mathbf{1}w[R_2(u, w)]$ ). John's mistaking me and Peter in the first scene, (2), exploits precisely this distinction between whom one is acquainted with and whom one believes to be acquainted with.

No singular propositions are ascribed in (24), every *res* is properly moved outside, leaving behind a descriptive, acquaintance-based guise. Consequently, no paradox arises if we continue the scenario as in (17) and (20), which verify the following formulas, respectively:

$$(25) \quad \begin{array}{l} \text{a. } \text{BEL}_j \langle m, i, \lambda x \lambda y [\text{BEL}_x \langle y, \lambda z [\neg \text{cool}(z)] \rangle] \rangle \\ \text{b. } \text{BEL}_j \langle m, i, \lambda x \lambda y [\exists ! R [R(x, y)]] \rangle \end{array}$$

To see that (22), (25a), and (25b) are indeed jointly verified by our story as a whole, without leading to contradictory beliefs, I will show what acquaintance relations play a role in the various *de re* beliefs.

First, consider (24), the detailed representation of (22), which shows the three existentially quantified acquaintance relations that play a role. For  $R_1$  we can take John's actual relation to Mary in the first scene, i.e. their being friends. For  $R_2$  we must take John's acquaintance with me, but the scenario doesn't explicitly specify any such acquaintance. It does say that John "thinks Mary is pointing to me", which presupposes that John does in fact know me. This way by which John is acquainted with me is our  $R_2$ . Now,  $R_3$  is supposed to hold in John's mind between his representation of Mary under  $R_1$  (*my friend*) and his representation of me under  $R_2$  (*that guy Emar*). We can take  $R_3$  to be the salient seeing and pointing relation witnessed by John according to the story. The content of the belief he ascribes to Mary is then that she believes the person she's pointing at is a hero, which is in line with the story. Note that we can safely assume that

this  $R_3$  is, in John's mind, the only acquaintance relation between "my friend Mary", and "that guy Emar", which verifies (25b).

As for (25a), we can take the same representation of Mary,  $R_1$ , but the acquaintance between me and John is different. The relevant relation here is the perceptual one that goes with the new pointing. John is acquainted with me as *that guy over there that Mary is pointing at*. The third acquaintance relation, between "my friend Mary" and "the person I see Mary pointing at", is, again, that very pointing/seeing relation. The content of the belief ascribed to Mary is that the person she is pointing at is not cool. This, too, fits the story precisely. And since the two beliefs John ascribes to Mary on the basis of our two encounters are really about different representations (of a single me) there is no contradiction.

I conclude from this and the previous section that the interpretation of iterated *de re* belief ascriptions of depth  $n$ , strictly require chains of *nres* movements, as demonstrated in (22) for  $n = 2$ . In the next section I'll look at the consequences of this discovery.

## 6 Discussion: acquaintance and compositionality

To conclude this paper, let me highlight a number of observations, mostly repeating some remarks already made in passing above.

In discussing (24), the proposed If of (1), we noted an interesting novel prediction of the proposed method of iterated *res* movement, not shared by the straightforward but ultimately unsatisfactory If discussed in section 4: (1) can only be true if John is vividly acquainted with me. As I pointed out, this is indeed implicitly assumed in the description of the first scenario: in order for John to think Mary is pointing to me, he must have some prior acquaintance with me. What would it mean to mistake someone for someone you have never been in contact with?

A second consequence of the proposed interpretation procedure, is that we now predict (26a), with If (26b). to be true in the the first scene, (2), as well:

- (26) a. John believes that Mary thinks Peter is cool  
 b.  $BEL_j \langle m, p, \lambda x \lambda y [BEL_x \langle y, \lambda z [cool(z)]] \rangle \rangle$

Let's see why (26) is true. The crucial acquaintance relation hidden in (26b), is the one between John and Peter. If we take that one to be the perceptual link from the story, it follows that John thinks Mary has a belief about the person they are currently seeing, viz. that he's cool.

At first sight, the truth of (26) is counterintuitive. But note that (26a) is ultimately *my* report of what happened. If I know Mary was pointing to Peter, and that John's report was in error, I might well reason that his report was not really *de re* about me but about Peter. In that case, I am certainly not expressing a falsehood if I say (26a), though without explicit further context it is indeed misleading. To bring out the intended interpretation of (26) I could, for instance, preface it with something like, "John believes Mary thinks the guy she's pointing at is cool. Though he thinks she's pointing at me, she is really pointing at Peter. Therefore, actually, [(26) ]"



A final observation concerns the non-compositionality of our solution. von Stechow and Zimmermann (2005) criticize the relational account for requiring what they termed *res* movement, the syntactic analogue of the essentially non-compositional separation between *res* and ascribed predicate that is inherent in any form of the relational approach. Note that the current proposal requires an extra *res* movement for any extra *de re* embedding. In this sense, the current paper shows that the relational analysis of *de re* is even more non-compositional than previously thought.<sup>1</sup> This may be taken as evidence in favor of the main rival of the relational approach, i.e. the approach with characterial (two-dimensional) modes of presentation, following Kaplan's (1989) "Adding 'Says'". In fact, the belief semantics based on Kaplan's analysis of indirect speech is truly compositional—no movements required—and covers *de dicto*, *de re* and *de se* uniformly. However, as von Stechow and Zimmermann show, this approach fails to predict adequate truth conditions for almost every belief ascription. For detailed proof of the inadequacy of a Kaplanian belief semantics, I refer to the proofs in their paper.

Given that Kaplan's compositional analysis is inadequate for beliefs, and that there's no real alternative to characters and acquaintance relations, I submit that the non-compositionality of *de re* is real, and even worse than hypothesized earlier. It remains to be seen though if we can't integrate the as yet purely syntactic movement into a more semantic or pragmatic mechanism.

## References

- Kaplan, David (1969). "Quantifying in" In D. Davidson and J. Hintikka (Eds.), *Words and Objections*. Dordrecht: Reidel.
- Kaplan, David (1989). "Demonstratives" In J. Almog, J. Perry, and H. Wettstein (Eds.), *Themes from Kaplan*, pp. 481–614. New York: Oxford University Press.
- Lewis, David (1979). Attitudes *de dicto* and *de se*. *The Philosophical Review* **88**, 513–43.
- Maier, Emar (2006). *Belief in Context: Towards a unified semantics of de re and de se attitude reports*. Ph.D. thesis, Radboud University Nijmegen.
- Quine, Willard V. (1956). "Quantifiers and propositional attitudes" *Journal of Philosophy* **53**, 101–111.
- von Stechow, Arnim and Ede Zimmermann (2004). "A problem for a compositional account of *de re* attitudes" In: G. Carlson, F. Pelletier (eds.), *Reference and Quantification: The Partee Effect*. Stanford: CSLI Press. pp. 207-228.

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<sup>1</sup>Maier's (2006) version of the relational framework makes *de re* even more non-compositional, in a sense, because it holds that acquaintance relations are to be resolved in the context. On the other hand, the DRT framework employed there allows for different notions of compositionality: contextual resolution plays no role at the first stage of interpretation, the construction of a preliminary DRS, so compositionality at that level is no different from compositionality in the static relational account discussed here.