Dreaming *de re* and *de se*: Experimental evidence for the Oneiric Reference Constraint

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Abstract. We present findings from three experiments investigating the interpretation of pronouns in dream reports and belief reports. Percus and Sauerland (2003a) discuss reports of dreams where the dreamer is someone other than who she actually is, and investigate the range of possible interpretations of pronouns in this environment. They claim that when two pronouns are embedded, a reading where the higher pronoun refers to the subject of *dream* (*de re*) and the lower one to the 'dream-self' (*de se*) is excluded. This observation motivates a theory that derives *de se* interpretations via pronoun movement. The core judgment behind this idea is delicate, however, and Anand (2006) found that some of his informants were able to detect the reading in question. Moreover, he claimed that the *de re* + *de se* reading is available when the embedding verb is *believe*. We bring experimental evidence to bear on these issues in the form of a picture choice task. Our data support Percus and Sauerland's claim that the *de re* + *de se* reading is unavailable in dream reports, suggesting that the empirical basis of their theory of *de se* is sound. In addition, we confirm Anand's claim that this reading is available in belief reports.

Keywords: Experimental semantics; attitude reports; pronouns; *de se*/*de re* distinction

1. Introduction

A *de se* pronoun is one that is interpreted from the first personal perspective of an attitude holder, such as the subject of *believe* in (1):

1. Pooh$_i$ believed that **he$_i$** was a bear.

On its most salient reading, (1) reports a belief that Pooh might articulate by saying, 'I am a bear'. But an embedded clause containing a pronoun co-indexed with an attitude holder need not report a first personal attitude – the pronoun may instead be construed *de re*. To see this, consider the following story, told to us by A.A. Milne.[1] One day, Winnie the Pooh found some footprints in the woods, and believing them to have been made by an animal called a Woozle, decided to follow the tracks to see where they would lead. What he did not realize was that he had been walking in circles: the footprints were left by no other animal but himself. It seems that in this situation, there is a reading of (2) upon which it is true:

2. *Scenario: Pooh believed that the creature that had left the footprints was a Woozle, but in fact he had left the footprints himself.*
Pooh$_i$ believed that **he$_i$** was a Woozle.

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[1] See Chapter 3 of A.A. Milne's 1926 book, *Winnie-the-Pooh*.

Of course, Pooh would not be disposed to say, 'I am a Woozle'. This shows that there is an interpretation of the pronoun that differs from the *de se* one in that it does not require a first personal perspective. This is known as a *de re* reading.

Reports of dreams in which the dreamer is someone other than who she actually is are useful in shedding light on the *de se*/*de re* distinction (Heim 1994, Percus and Sauerland 2003a, Anand 2006). In such environments, a pronoun picks out (has as its *correlate*) different individuals depending on whether it is construed *de se* or *de re*. Consider (3):

3. Pooh dreamed that he was Piglet and **he** was stealing **his** honey.

A plausible interpretation of (3) is that in the dream, Piglet steals Pooh's honey. On this reading, the two pronouns are associated with the subject of *dream*, Pooh, although in distinct ways. The first pronoun picks out Pooh's 'dream-self' Piglet, while the second pronoun picks out the dreamer himself, namely Pooh. The first pronoun is construed *de se*, and the second *de re*.

Percus and Sauerland (2003a; henceforth 'P&S') noticed that in principle, four interpretations should be available for a sentence like (3), corresponding to the four possible *de se*/*de re* configurations of the two pronouns. They claim that only three of these are attested:

4. Pooh dreamed that he was Piglet and **he** was stealing **his** honey.
    ✓Reading A: Piglet steals Piglet's honey.   (*de se* + *de se*)
    ✗ Reading B: Pooh steals Piglet's honey.   (*de re* + *de se*)
    ✓Reading C: Piglet steals Pooh's honey.   (*de se* + *de re*)
    ✓Reading D: Pooh steals Pooh's honey   (*de re* + *de re*)

They propose that Reading B is ruled out by a constraint against c-command of a *de se* pronoun by a corresponding *de re* pronoun. This so-called 'Oneiric Reference Constraint' is stated in (5):

5. *The Oneiric Reference Constraint (ORC)*
A sentence of the form *X dreamed that … pronoun …* allows a reading in which the pronoun has the *dream-self* as its correlate only when the following condition is met: *some* pronoun whose correlate is *the dream-self* on the reading in question must not be asymmetrically c-commanded by any pronoun whose correlate is X.   [Percus and Sauerland (2003a): ex 14]

P&S take the ORC as evidence for a novel theory of *de se* pronouns whereby they bear a special diacritic '*' and must move to the left periphery of the embedded clause introduced by the attitude verb, resulting in insertion of a lambda abstractor that binds the trace. The embedded clause expresses a property rather than a proposition as with a traditional semantics for attitude reports (Hintikka 1969). Here is a sample LF and interpretation of the embedded clause:

6a. Pooh dreamed [$_{CP}$ **he*** λ_1 [t$_1$ was eating honey]]
6b. ⟦CP⟧ = $\lambda x.$ x is eating honey

(6a) is interpreted roughly as a report of a self-ascription by Pooh, in the form of a dream, of the property of eating honey. P&S reason that if the availability of *de se* construals is subject to movement constraints, then this would support the movement-based theory exemplified in (6). They argue that the impossibility of the *de re + de se* reading is due to this reading involving a configuration that violates Superiority: if a pronoun whose correlate is the subject of *dream* (a *de re* pronoun) c-commands a pronoun whose correlate is the dream-self (a *de se* pronoun), then the attraction of the *de se* pronoun to the left periphery of the clause requires it to cross a structurally closer pronoun with the potential to move to the same position.

The reader may have noticed, however, that this argument depends on very subtle judgments concerning a rather obscure scenario. Furthermore, it may be that the multiply ambiguous nature of these sentences makes it more difficult to isolate particular readings. In informal elicitation work we have found that native speakers have difficulty detecting whether or not Reading B is available. Moreover, Anand (2006) reports that only 15 of his 25 informants share the intuition reported by P&S. This paper reports a series of experiments designed to collect data from linguistically naïve native English speakers concerning the availability of the *de re + de se* interpretation. We found that the core judgment underlying P&S's theory is indeed robust.

Several considerations argue for the importance of establishing the core facts in this domain. Firstly, P&S's proposal has already been employed in theoretical analyses of several different phenomena, such as epithets (Patel-Grosz 2012) and obligatorily controlled PRO (Pearson 2013). These analyses would be undermined if it were found that the core judgment underlying the pronoun movement theory is not sound. We discuss these proposals in greater detail in section 5.

Secondly, P&S's proposal has a key role to play in debates concerning the *de se/de re* distinction. Notice firstly that although P&S explicitly restrict their attention to dream reports, an elegant implementation of the theory would draw no distinction between the interpretation of pronouns in the scope of *dream* and that of pronouns in any other type of attitude report. Such a theory would apply the '*' diacritic to all *de se* pronouns, such as that in the belief report in (1), with pronoun movement serving as the core mechanism responsible for deriving *de se* readings. This approach would amount to an implementation of the 'property-view', whose philosophical roots lie in David Lewis' work (Lewis 1979). According to this view, reports of attitudes *de se* describe self-ascriptions of properties. Thus when Pooh believes (*de se*) that he is a bear, he self-ascribes the property of being a bear. This is not so for a *de re* construal: while it is true in Milne's story that Pooh believes that he is a Woozle, it is false that he is disposed to self-ascribe the property of being a Woozle. Chierchia (1990) showed how this idea can be implemented formally by letting the LF of a report of an attitude *de se* incorporate a lambda abstractor inserted in the left periphery of the embedded clause, which binds the *de se* pronoun, as in (7):

7a. Pooh believes [$_{CP}$ λ_1 [**he**$_1$ is a bear]]
7b. $[\![CP]\!]$ = λx. x is a bear

The pronoun movement proposal is in this tradition, with the core difference between it and Chierchia's theory being that the property expressed by the embedded clause is derived by movement of the pronoun and binding of its trace rather than by binding in situ.

The main competitor to the property-view comes from Reinhart (1990), who argues that a *de se* construal of a pronoun is a special case of a *de re* construal, so that there is no need to posit a dedicated LF for the *de se* reading.[2] *De re* expressions are traditionally taken to require some relation of acquaintance to hold between the attitude holder and the individual denoted by the nominal (Kaplan 1968). Roughly speaking, if an agent α believes *de re* of some individual x that x is P, then (i) there is some acquaintance relation R that holds between α and x and (ii) α believes that the individual to whom she bears R is P. For example, the truth conditions of *Pooh$_i$ believed that he$_i$ was a Woozle* can be paraphrased as in (8).

8. There is some acquaintance relation R such that:
(i) Pooh bears R to Pooh in the actual world w, and
(ii) For each of the worlds w' such that it is compatible with what Pooh believes in w for w' to be the actual world, the individual to whom Pooh bears R in w' is a Woozle in w'.

In the scenario that we are considering, *Pooh$_i$ believed that he$_i$ was a Woozle* is true in virtue of the facts that (i) Pooh bears the relation 'saw the footprints of' to himself, and (ii) Pooh believes that the individual whose footprints he saw is a Woozle. But notice that the truth conditions in (8) leave open the question of which acquaintance relation witnesses the statement. We might suppose that 'is identical to' is also an acquaintance relation – it is that acquaintance relation that each of us bears to ourself. Then *Pooh$_i$ believed that he$_i$ was a Woozle* would also be verified in a scenario where for each of Pooh's belief worlds w', the individual to whom Pooh is identical in w' is a Woozle in w'. Notice that in such a scenario, the relevant belief of Pooh's is a belief *de se*: he ascribes Woozle-hood to the individual that his belief state designates as himself, which is just that individual that Pooh would be disposed to refer to using the first person pronoun. Reinhart argues that this shows that there is no syntactic ambiguity between *de se* and *de re* interpretations: we can get by with a single LF and its corresponding truth conditions, with the appearance of ambiguity being due to the underspecified nature of the acquaintance relation.

We thus have two possible analyses of the *de se*/*de re* distinction. All else being equal, one might think that Reinhart's view should be preferred on parsimony grounds, since it gets by without positing structural ambiguity. If so, then the onus is on proponents of the property-view to provide evidence that there are dedicated *de se* LFs. If the line of argument pursued by P&S is correct, this constitutes one such piece of evidence.[3] This is because Reinhart's view has the consequence that in a dream report like (4) with two embedded pronouns, the array of *de se*/*de re* interpretations are in fact all generated by a single LF, with the locus of the action being the

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[2] This proposal is subsequently taken up and built upon in Maier (2009).
[3] Other pieces of evidence for dedicated *de se* LFs that have been discussed in the literature include the interpretation of *de se*/*de re* pronouns bound by *only* (Percus and Sauerland 2003b) and the existence of expressions that are necessarily interpreted *de se*, such as obligatorily controlled PRO (Chierchia 1990).

contextual acquaintance relation supplied post-semantically. It would then be surprising that any one of the four combinations of *de se*/*de re* construals should be excluded.

The role of P&S's proposal in debates concerning the *de se*/*de re* distinction is complicated further by the possibility that the constraint against c-command of a *de se* pronoun by a corresponding *de re* pronoun is confined to particular attitude verbs. Anand (2006) claims that when *dream* is replaced by *believe*, the *de re* + *de se* reading becomes available:

9. Pooh believed that he was Piglet and **he** was stealing **his** honey.
       ✓Reading A: Piglet steals Piglet's honey.   (*de se* + *de se*)
       ✓Reading B: Pooh steals Piglet's honey.   (*de re* + *de se*)
       ✓Reading C: Piglet steals Pooh's honey.   (*de se* + *de re*)
       ✓Reading D: Pooh steals Pooh's honey   (*de re* + *de re*)

If there is indeed a contrast between (9) and its counterpart with *dream*, this too has consequences for the theory of *de se*. Anand proposes that the contrast shows that there are at least two routes to a *de se* construal: one involving binding, and a second where the pronoun is construed *de re* under an acquaintance relation of identity. With a belief report, this second route allows a *de re* pronoun to c-command a *de se* pronoun without violating Superiority. Anand provides a semantics for *dream* that excludes the possibility of a pronoun that it embeds being construed *de re* under an acquaintance relation of identity, so that there is no alternative route to a *de se* construal that would circumvent the ORC. If this is correct, then there is a sense in which both Chierchia and Reinhart were right: there are dedicated *de se* LFs that yield a property-type interpretation for the embedded clause, but the grammar also makes available a second route whereby a *de se* construal is a special case of *de re*. Thus P&S's proposal has a role to play in a more recent and more nuanced incarnation of the debate, where the question is not what *the* route to a *de se* interpretation is, but rather exactly *how many* such routes there are.

It seems then that a firmer grasp of the rather subtle judgments concerning *de re* blocking under *dream* and *believe* is a precondition for the development of theoretical understanding of the semantics of attitude reports. This paper is a contribution towards that goal. The structure of the paper is as follows. Section 2 describes the novel paradigm that we developed in order to establish whether *de re* + *de se* readings are available, and reports the findings of Experiment 1, which provides evidence that the grammar rules out the *de re* + *de se* reading for dream reports. Experiment 2 strengthens our case for this conclusion by providing evidence against an alternative explanation of the findings of Experiment 1; it is reported in section 3. Section 4 discusses our third experiment, which is just like Experiment 2 except for the use of *believe* instead of *dream*. This minimal change alters participants' choices with respect to the *de re* + *de se* reading, providing evidence for the contrast observed by Anand between *dream* and *believe*. The general discussion appears in section 5, and section 6 concludes the paper.

2. Experiment 1

2.1 Logic of the experiment

Our experimental design is informed by the consideration that to introspect about dream and belief reports of the type that we are interested in is a difficult task. Typically, semantic judgments are obtained by asking speakers to evaluate whether a sentence is true or false relative to a given scenario, as described by Matthewson (2004). Our informal observation that even linguists have difficulty assigning a truth value to these sentences led us to believe that this task would be too complex for linguistically naïve participants. Using Amazon Mechanical Turk (AMT; Mason & Suri, 2012), we employed a novel paradigm that provides a more implicit measure of the interpretation assigned to a given sentence by asking participants to choose from a pair of pictures the one that matched the sentence best. This method has the additional advantage that participants do not have to reason about imagined scenarios, but rather about scenarios depicted visually, thereby further reducing task complexity.

In the critical condition, a picture corresponding to the *de re + de se* reading was pitted against one depicting the *de se + de se* reading. All things being equal, a preference for the latter over the former would constitute evidence only that the *de re + de se* reading is dispreferred, and not for the stronger claim that we are interested in – namely that it is ungrammatical. We therefore constructed items where the *de se + de se* reading described a possible but unlikely event. For example, while it is possible for an author to buy her own book, she is unlikely to have reason to do so. We assumed that such a reading is preferred relative to a more plausible reading that is not made available by the grammar, such as (by hypothesis) the *de re + de se* reading. We further assumed that a reading that describes a possible but unlikely event is dispreferred relative to a more plausible grammatical reading, such as the *de se + de re* reading. This latter type of comparison constituted the control condition, where participants had to choose between a picture depicting the *de se + de se* reading, and one depicting the *de se + de re* reading. It was expected that if the ORC holds, then (i) the *de se + de se* reading should be preferred to the *de re + de se* reading in the critical condition but (ii) the *de se + de re* reading should be preferred to the *de se + de se* reading in the control condition. If the ORC does not hold, then the *de se + de se* reading should be dispreferred in both conditions. Data confirming (i) and (ii) would therefore constitute evidence that the core judgment on which P&S's theory is based is sound.

2.2 Materials

Discourses of the format in (10) were presented.

10. There were two authors, Carol and Sandra. Carol dreamt that she was Sandra and she was buying her book.

Reading A: Sandra buys Sandra's book.	(*de se + de se*)
Reading B: Carol buys Sandra's book.	(*de re + de se*)
Reading C: Sandra buys Carol's book.	(*de se + de re*)
Reading D: Carol buys Carol's book.	(*de re + de re*)

In order to ensure that Reading A involved an unlikely but possible event, we conducted two norming experiments. The first was a likelihood rating task run also on AMT.[4] 102 participants used a 7-point Likert scale to judge the likelihood of a particular agent doing something to her own object, as in '*How likely is it for an author to buy his own book?*' or '*How likely is it for a thief to break into his own garage?*' Participants were instructed to use 1 for events they considered highly unlikely and 7 for events they thought highly likely; items rated 2.5 or higher were discarded. With the remaining items we conducted a possibility judgment task with AMT, where participants judged whether a situation where a particular agent does something with her own object is possible, as in '*Is a situation where an author buys his own book possible?*' or '*Is a situation where a thief breaks into his own garage possible?*' Items rated possible at least 65% of the time ($\mu = 84\%$) formed the basis for the experimental materials, thereby ensuring that the embedded clause described a possible but unlikely event on its *de se + de se* reading.

2.3 Procedure

The discourse in (10) was presented in two steps. First, we presented the first sentence, followed by two coloured pictures introducing the characters, as shown below.
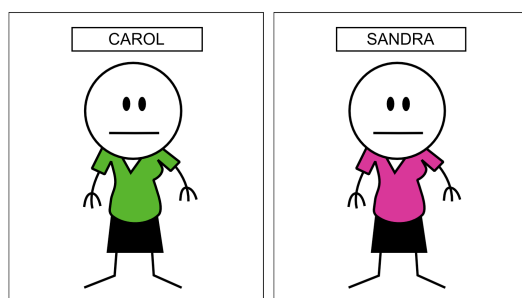

'*There were two authors, Carol and Sandra.*'

Next, the second sentence was presented along with a pair of pictures corresponding to one of the following two comparison types:

11a. Comparison type 1: Reading A (*de se + de se*) vs. Reading B (*de re + de se*)		*Critical*
11b. Comparison type 2: Reading A (*de se + de se*) vs. Reading C (*de se + de re*)		*Control*

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[4] Every 'HIT' cost $0.04 in the norming task and in the following three experiments.
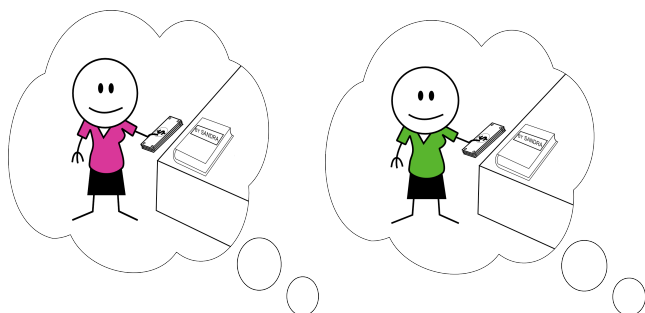
'Carol dreamed that she was Sandra and she was buying her book' (Comparison type 1)
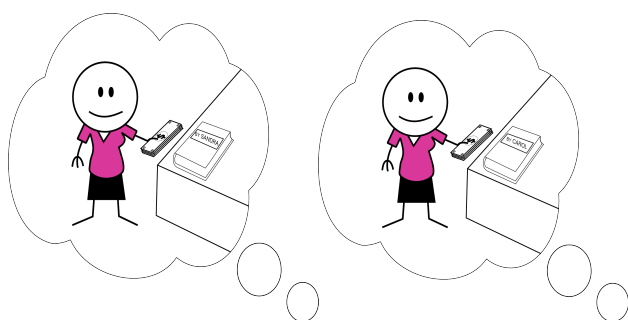
'Carol dreamed that she was Sandra and she was buying her book' (Comparison type 2)

Participants were presented with 18 discourse items and asked to click on the picture that better described the sentence. The comparison types were counterbalanced across two lists. Experimental items were interspersed with fillers (1:3 item:filler ratio); two-thirds of the fillers featured an unambiguous picture selection, enabling us to detect whether participants as a whole were paying attention to the task.

2.4 Predictions

If P&S are correct that a *de se* pronoun cannot be c-commanded by a corresponding *de re* pronoun in a dream report, then Reading B should be dispreferred relative to Reading A. If in addition Reading A is dispreferred to Reading C, this would constitute strong evidence that the *de re + de se* reading is unavailable: a picture depicting this reading is not chosen even when pitted against a picture depicting a reading that is otherwise dispreferred.

2.5 Results

In all three experiments reported in this paper, we only recruited participants who had IP addresses based in the United States. Additionally, we asked every participant whether they speak English natively, and discarded data from those who did not respond in the affirmative. The analyses we report below are from the data provided by the remaining participants.

Judgments from participants (n=182) were analyzed using a binary logistic regression model with Comparison Type as a predictor. We predicted and confirmed a significant effect of comparison type (p<0.0001): participants preferred Reading A when pitted against Reading B, but dispreferred Reading A when pitted against Reading C. T-tests probing the simple effects within comparison type revealed that while participants preferred Reading C (65%) over Reading A (35%) due to the fact that Reading A describes a possible yet unlikely event (p=0.0001), participants preferred Reading A (86%) over Reading B (14%; p<0.0001), overwhelmingly preferring a reading that violates world knowledge constraints over an ORC-violating reading.

2.6 Discussion

The results of Experiment 1 are compatible with P&S's claim that the *de re + de se* reading is ruled out in dream reports. However, the following alternative interpretation of our data is also possible.[5] Suppose that in (10), the information that Carol dreamt that she was Sandra generates an expectation that Sandra will feature as an active participant in the dream. Reading B is the only reading that violates this expectation: on this reading, Sandra is the correlate of the final pronoun, as illustrated in the picture by the labeling of the book with her name. But the featuring of Sandra's name rather than Sandra herself may be insufficient to satisfy the expectation that Sandra will participate in the event described by the embedded clause. If so, then Reading B would be predicted to be ruled out by considerations having nothing to do with the ORC. The goal of Experiment 2 is to rule out this alternative interpretation of our data.

3. Experiment 2

3.1 Motivation

A limitation of Experiment 1 is that in the critical condition, a reading where the dream-self features as an active participant (the *de se + de se* reading) is pitted against one where the dream-self is not an active participant (the *de re + de se* reading). Consequently, we cannot be sure on the basis of the results of this experiment whether the avoidance of the picture depicting Reading B reflects a failure of the grammar to generate this reading, or arises because Reading B violates narrative expectations pertaining to who will be talked about next. We therefore designed a follow-up experiment where the dream-self does not feature as an active participant in either of the readings made available for participants to choose from. This design removed presence or absence of the dream-self in the pictures as a possible confound affecting participants' choices.

3.2 Method

The sentences from Experiment 1 were used in Experiment 2, so that the only difference between the two experiments lies in the pictures accompanying the items. All pictures depicting the *de se + de se* reading were replaced with pictures depicting the *de re + de re* reading, as shown below:
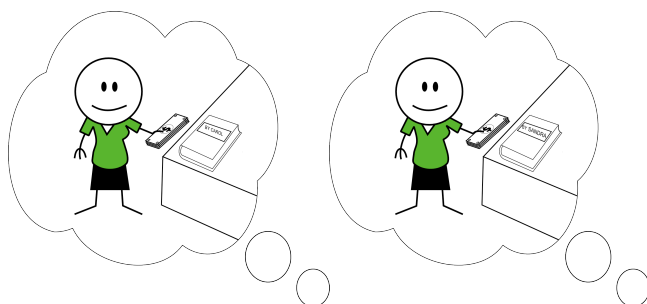
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[5] We thank Jeffrey Lidz for pointing out this alternative interpretation.

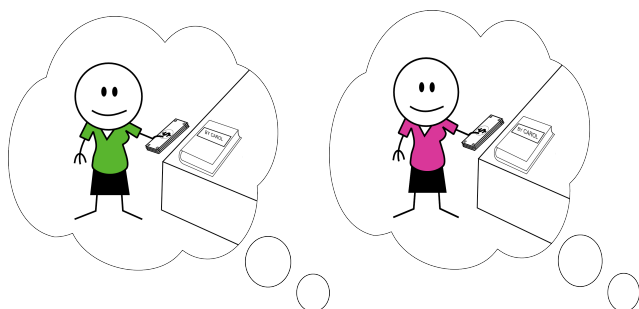12a. Comparison type 1: Reading D (*de re + de re*) vs. Reading B (*de re + de se*)   *Critical*
12b. Comparison type 2: Reading D (*de re + de re*) vs. Reading C (*de se + de re*)   *Control*

'Carol dreamed that she was Sandra and she was buying her book' (Comparison type 1)

'Carol dreamed that she was Sandra and she was buying her book' (Comparison type 2)

Notice that Reading D, like Reading A from Experiment 1, involves a possible but unlikely event such as buying one's own book. This is because Reading D shares with reading A the property that it requires the two pronouns to be construed as having the same correlate.

3.3 Predictions

We predicted that if the avoidance of Reading B in Experiment 1 was due to the ORC, then the results of Experiment 2 should replicate those of Experiment 1: Reading D should be preferred with respect to Reading B, but dispreferred relative to Reading C. If instead Reading B was not chosen because it does not feature the dream-self as a participant in the dream, then Reading B should not be dispreferred with respect to Reading D, since both readings have this property.

3.4 Results

As in Experiment 1, judgments from participants (*n*=153) were analyzed using a binary logistic regression model with Comparison Type as a predictor. Again, we observed a significant effect of comparison type (p<0.0001): participants still preferred Reading D when pitted against Reading B, but dispreferred Reading D when pitted against Reading C. The simple effects T-

tests revealed that Reading D (8%) is still dispreferred in comparison to Reading C (91%) due to Reading D describing a possible yet unlikely event (*p<0.0001*), but participants still prefer Reading D (56%) over Reading B (43%; *p=0.02*), still selecting a reading that violates world knowledge over the ORC-violating reading. This result rules out the alternative possibility that participants may have selected the reading that accommodated narrative expectations that were created by reading the preceding clause.

3.5 Discussion

As in Experiment 1, participants prefer a reading that depicts a possible but unlikely event (*de re + de re*) to one that violates the ORC (*de re + de se*). Unlike in Experiment 1, the avoidance of the *de re + de se* reading cannot in this case be attributed to the absence of the dream-self as a participant in the dream, since this is also a feature of the *de re + de re* reading. We conclude that in dream reports, the *de re + de se* reading is indeed ruled out by the grammar.

4. Experiment 3

4.1 Motivation

Having established that the *de re + de se* reading is unavailable in dream reports, we conducted an experiment to test Anand's claim that the constraint that excludes this reading can be circumvented when the embedded clause is introduced by *believe*. Here again introspection and informal elicitation seem to be too blunt an instrument to gather robust data concerning the alleged contrast between *dream* and *believe*.

4.2 Method

The materials, pictures and procedure were identical to those employed in Experiment 2, except that the verb *dream* was replaced with *believe*.

4.3 Predictions

If Anand is correct that the *de re + de se* reading is available with *believe*, then in the critical trials, this reading should not be dispreferred relative to the *de re + de re* reading. If instead the ORC applies to *believe* as well as *dream*, then the *de re + de re* reading should be preferred to the *de re + de se* reading as in Experiment 2.

4.4 Results

As with the previous experiments, judgments from participants (*n=196*) were analyzed using a binary logistic regression model with Comparison Type as a predictor. We observed a significant effect of comparison type (*p<0.0001*). However, T-tests probing the simple effects within comparison types revealed different patterns of results when compared to the previous two experiments. Reading D (17%) is dispreferred when pitted against Reading C (82%), as expected

(*p*<0.0001). However, unlike in Experiments 1 and 2, participants do not prefer Reading D (45%) when pitted against Reading B (54%). While this difference reaches marginal significance (*p*=0.08), it must be noted that the pattern of results is numerically trending towards a preference toward the ORC-violating reading. This result confirms Anand's claim that the *de re + de se* reading is available with *believe*.

Additionally, in order to determine whether the pattern of results is indeed different as a function of the verb, we conducted an inter-experiment analysis of the data from Experiments 2 and 3. We combined the data from both experiments and conducted a binary logistic regression model with Comparison Type (within participants) and Experiment (between participants) as fixed predictors, as well as their interactions. We found a significant effect of the interaction between experiment and comparison type (*p*<0.0001) as well as a significant main effect of comparison type (*p*<0.0001), indicating that while participants' responses varied as a function of comparison type in both experiments, the pattern of their results were different between experiments. A main effect of experiment was marginally significant (*p*=0.07). Overall, the results suggest that participants' patterns of responses indeed differ as a function of the verb.

4.5 Discussion

Our results lend experimental support to Anand's claim that the prohibition of c-command of a *de se* pronoun by a corresponding *de re* pronoun can be circumvented when the embedded clause is introduced by *believe*. In the critical trials, participants were almost at chance level between the two pictures. The results for the control condition replicate those for Experiment 2 in that the world knowledge violating *de re + de re* reading was dispreferred with respect to the grammatical and pragmatically felicitous *de se + de re* reading. One question that is raised by our data is why the strong dispreference for the *de re + de re* reading in the control condition was not also found in the critical trials, as might be expected if the *de re + de se* reading is indeed available in belief reports. It is possible that the effect of grammar constraints, plausibility, and narrative expectations on participants' judgments may not be strictly additive, nor have equal importance. The most important point for our purposes is the significant interaction of experiment type with comparison type across Experiments 2 and 3, indicating that, as Anand claims, the choice of *dream* vs *believe* affects the availability of the *de re + de se* reading. We conclude from the fact that this reading is dispreferred in dream reports but not in belief reports that the constraint against c-command of a *de se* pronoun by a corresponding *de re* pronoun holds for clauses embedded by *dream* but not for those embedded by *believe*.

5. General discussion

5.1 Limitations of this study and directions for future work

Recall that the Oneiric Reference Constraint entails that a *de re + de se* reading is ruled out in a dream report just in case the *de re* pronoun c-commands the *de se* pronoun; according to Percus and Sauerland, a *de re* pronoun may linearly precede a corresponding *de se* pronoun as long as it does not c-command it. Thus a sentence like (13) is claimed to permit all four readings:

13. Pooh dreamed that he was Piglet and **his** honey was making **him** fat.
    ✓Reading A: Piglet's honey makes Piglet fat.   (*de se + de se*)
    ✓Reading B: Pooh's honey makes Piglet fat.   (*de re + de se*)
    ✓Reading C: Piglet's honey makes Pooh fat.   (*de se + de re*)
    ✓Reading D: Pooh's honey makes Pooh fat.   (*de re + de re*)

That the excluded reading should involve a c-command relationship between the two pronouns is crucial for P&S's analysis: if there were no c-command, the exclusion of this reading could not be blamed on Superiority. It is important to bear in mind, therefore, that while we have established that the *de re + de se* reading is excluded in dream reports but not in belief reports, we have not shown that a c-command relationship between the two pronouns is a prerequisite for exclusion of this reading. We are currently conducting follow-up experiments to test this.

Secondly, while we have focused on P&S's generalization concerning blocking of a *de se* construal by an intervening *de re* pronoun, we should note that subsequent authors have questioned the formulation that we cite here. As Anand (2006) points out, the appeal to Superiority derives only that the structurally highest *de se* pronoun must be '*de re* free' (not c-commanded by a corresponding *de re* pronoun). This is because any lower *de se* pronouns will not move, but will be instead bound in situ, and hence not be subject to Superiority. Anand claims that this is too weak. Here is one of the examples that he offers in support of this claim.

14. *Scenario: I am a guard at a local jail who is known for his harsh treatment of prisoners. One night, I am plagued (perhaps by a just God) with dreams that I am one of the prisoners, and I learn just how terrible I can be.*
✗ I dreamed that I$_{de\ se}$ had to keep my mouth shut or I$_{de\ re}$'d be liable to beat me$_{de\ se}$.
[Anand 2006: 44, ex 104a]

The reading indicated with subscripts in (14) is predicted to be available: the highest pronoun in the embedded clause is not c-commanded by a *de re* pronoun, and should therefore be able to move to the left edge of the complement of *dream*, resulting in insertion of binder for the trace, which is itself coindexed with the lowest pronoun. Anand claims that this reading is unavailable, and offers an alternative account of *de re* blocking that does not appeal to Superiority. The crucial judgments here are again very delicate, so that it would be a worthwhile goal for future work to investigate them experimentally.

5.2 Implications of our findings for the semantics of attitude reports

The evidence that we have found supporting P&S's claim that the *de re + de se* reading is unavailable in dream reports lends weight to the view that there are dedicated LFs that give rise to *de se* interpretations. The proposal that *de se* pronouns move to the left edge of the clause in which they occur offers a ready account for the unavailability of this reading, based on the idea that a *de re* pronoun that c-commands a *de se* pronoun is an intervener for covert movement. By contrast, the view in Reinhart (1990) and Maier (2009) that there is no dedicated LF responsible for the *de se* construal presents no immediate answer to the question of what rules out the *de re +*

de se reading: if *de se* pronouns have no special status with respect to *de re* pronouns at LF, but are merely interpreted *de re* under an acquaintance relation of identity, then the existence of syntactically conditioned constraints on *de se*/*de re* configurations is unexpected.

Secondly, our findings confirm the legitimacy of using pronoun movement based approaches to various puzzles in the literature on attitude reports. We shall mention two examples here.

Patel-Grosz (2012) investigates an intricate array of constraints concerning possible antecedents for epithets such as *the damn traitor*. She notes that when an epithet appears in the complement of an attitude verb such as *think*, it may take the subject of the embedding verb as its antecedent if it is in object position, but not if it is in subject position:

15a. *Nero$_i$ thinks that [the damn traitor]$_i$ will be invited to the reception.
15b. ✓Nero$_i$ thinks that they will invite [the damn traitor]$_i$ to the reception.

Patel-Grosz proposes that epithets are null pronouns modified by a nominal appositive. When the epithet has an attitude holder as its antecedent, the null pronoun bears P&S's '*' diacritic. As such, it must move to the left periphery of the clausal complement of *think*. Following Demirdache and Percus (2011a, 2011b), she assumes that the appositive cannot be anchored to a trace, and that this renders (15a) ungrammatical. The grammaticality of (15b) is explained by positing covert movement of *the damn traitor* to the matrix clause, where it adjoins to the subject of *think*; this rescue strategy is unavailable for (15a), since subjects are islands for extraction.

A second application for P&S's pronoun movement analysis is found in Pearson (2013). Pearson examines the logophoric pronoun *yè* in the Niger-Congo language Ewe. This is a pronoun that obligatorily occurs in the scope of an attitude verb, and must take the attitude holder as its antecedent. (16) is an example.

16.   John   be   **yè**   le   cleva
       John   say   LOG   ASP   clever
       'John$_i$ said that he$_{i/*j}$ was clever.'   [Pearson (2013): 454, ex 31]

The distribution of *yè* can be predicted by positing an individual abstractor in the left edge of the complement of the attitude verb that must bind the pronoun (Heim 2002, von Stechow 2003):

17a. John say [$_{CP}$ λx$_1$ [**yè**$_1$ was clever]]
17b. ⟦CP⟧ = λx. x is clever

This predicts that *yè* is obligatorily interpreted *de se*: (17) reports John's self-ascription of the property of being clever. Pearson shows that this prediction is not borne out: (17) is judged true in a scenario where John did not say 'I am clever', but rather said 'the author of this paper is clever', not realizing (perhaps because he has a poor memory) that the author of the paper was himself. Pearson shows that this surprising finding can be accommodated in a theory that

accounts for the distribution of *yè* via obligatory binding by an abstractor introduced by an attitude verb. She assumes that the pronoun may be embedded within a covert constituent called a resP that yields a *de re* construal by introducing a function G from individuals to acquaintance-based concepts such as the concept associated with the description 'the author of this paper' (Percus and Sauerland 2003b). The proposed structure is illustrated schematically in (18):

18. John say $[_{CP} \lambda_5 \lambda_1 [[_{resP} \mathbf{G_5 \ yè_1}]$ was clever]]

This analysis raises the question of why there are any pronouns that are obligatorily interpreted *de se*, given the availability of the option of embedding a pronoun in a resP. For example, obligatorily controlled PRO is well known to be obligatorily construed *de se* (Morgan 1970, Chierchia 1990). (19) is false in the scenario that we have just been considering:

19. John claimed [PRO to be clever].

Suppose that PRO, like *yè*, is obligatorily bound by an abstractor in the left edge of the embedded clause (Chierchia 1990):

20. John claimed $[_{CP} \lambda_1 [PRO_1$ to be clever]]

What rules out the de re LF in (21)?

21. John claimed $[_{CP} \lambda_5 \lambda_1 [[_{resP} \mathbf{G_5 \ PRO_1}]$ to be clever]]

Pearson proposes that whereas *yè* is bound in situ, obligatorily controlled PRO bears Percus and Sauerland's '*' diacritic. Consequently, PRO* must move to the left edge of the infinitive, resulting in insertion of a lambda abstractor that binds the trace:

22. John claimed $[_{CP} PRO^* \lambda_1 [t_1$ to be clever]]

Pearson argues that the obligatory nature of this movement precludes the possibility of embedding of PRO in a resP, which would result in a subextraction violation. While our results do not directly bear on the phenomena discussed in Patel-Grosz and Pearson's work, they lend empirical support to the notion that *de se* pronouns undergo covert movement, thereby paving the way for theories such as Patel-Grosz's and Pearson's that appeal to such movement.

A characteristic of Patel-Grosz's and Pearson's approaches that is worth noting is that they extend the pronoun movement idea beyond the domain of dream reports that P&S originally focused on: Patel-Grosz investigates epithets in the scope of *think* and *convince*, while Pearson's proposal is intended to apply to all attitude verbs that take control complements. Yet Experiment 3 shows that not all attitude verbs behave alike with respect to the *de re* blocking effect that P&S cite as evidence for pronoun movement: our data support Anand's claim that the *de re + de se* reading is available with *believe*. Is it possible to resolve this tension while maintaining that *de se* pronouns undergo covert movement regardless of which attitude predicate embeds them?

Anand proposes that binding of a *de se* pronoun is constrained by locality, but that in the case of *believe*, the *de re* + *de se* reading can be derived by letting the *de se* pronoun be interpreted *de re* under an acquaintance relation of identity. This raises the question of why this option is not available for *dream*, which Anand responds to by providing a lexical entry that prevents *dream* from embedding a nominal that is construed *de re* under an identity-based acquaintance relation. This is obviously highly stipulative, however, and leaves open the question of whether a principled distinction can be drawn between predicates that permit the *de re* + *de se* reading, and those that do not. At the same time, a goal for future experimental work should be to collect more robust data demonstrating that some but not all attitude verbs tolerate the *de re* + *de se* reading, based on a larger range of predicates beyond the two that we have investigated so far.

The hypothesis that we are currently investigating in follow-up experiments is that attitude verbs whose complements are interpreted counterfactually with respect to the attitude holder's belief state prohibit the *de re* + *de se* reading, while those with a non-counterfactual semantics can circumvent the ORC, thereby allowing all four possible combinations of *de se*/*de re* construals. We take it that *dream* is a member of the former class, which also includes *imagine*, *pretend*, *suppose* and *wish*, while *believe* belongs to the latter class along with *think*, *say* and *claim*.

The notion that counterfactuality is the key factor determining the availability of the *de re* + *de se* reading is discussed in Pearson (2013).[6] Pearson observes that the crucial difference between believing that one is someone other than who one actually is and dreaming or imagining that one is someone else, is that in the latter case, one is aware of the counterfactual nature of the supposition in question. This is seen, for instance, in the fact that if I believe that I am Napoleon then you are entitled to conclude that I am not in my right mind, whereas I can be in charge of my mental faculties and in command of the relevant factual information about myself while dreaming or imagining that I am Napoleon. Pearson argues that this means that in the scope of a counterfactual attitude, a pronoun that is construed *de re* under an acquaintance relation of identity does not pick out the same individual as a *de se* pronoun that moves and has its trace abstracted over. If Pooh dreams that he is Piglet, then a *de se* pronoun that undergoes LF movement will pick out Pooh's dream-self – namely Piglet - while a *de re* pronoun construed under an identity-based acquaintance relation will pick out the individual that Pooh's mental state designates as himself – under normal circumstances, Pooh himself. Contrary to Anand's claim, the unavailability of the *de re* + *de se* reading in the scope of *dream* does not show that a pronoun in the scope of this verb cannot be construed *de re* under an acquaintance relation of identity. Rather, this route fails to produce the *de re* + *de se* reading, owing to the non-equivalence in this environment of *de se* via binding and *de se* as a special case of *de re*.

If this line of argumentation is correct, it has the following interesting consequence for the theory of *de se*. Contrary to Reinhart's claim, a *de se* construal that arises via binding is not always

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[6] Percus (2006) noticed that *pretend* patterns with *dream* rather than *believe*, and suggested that what the first two verbs have in common is that they can both describe processes of putting oneself in someone else's shoes. Pearson's proposal can be seen as a development of this idea, with the notion of 'putting oneself in someone else's shoes' being implemented as a counterfactual supposition that one is someone other than who one actually is.

equivalent to a *de re* interpretation under an acquaintance relation of identity: the two can be teased apart in counterfactual attitude reports. If so, then the grammar generates both interpretations, which are in many cases equivalent but can be distinguished from one another in a principled manner in a circumscribed set of linguistic environments. The next step, therefore, is to bring experimental evidence to bear on the question of whether counterfactuality is a factor in determining the availability of the *de re + de se* reading. This paper has set the scene for that project by establishing a paradigm for the identification of (im)possible readings that does not appeal to truth value judgments, and applying that paradigm to two of the verbs of interest.

6. Conclusion

In this paper, we described a method for collecting semantic judgments in cases where introspection is difficult or leads to inconclusive results. We applied this method to the question of whether a particular reading is available in attitude reports. Experiments 1 and 2 provided evidence that the core judgment underlying P&S's theory of *de se* is sound: in dream reports, the *de re + de se* reading is unavailable. Experiment 3 provided evidence for Anand's claim that *believe* is unlike *dream* in that it permits the *de re + de se* reading. We discussed consequences of these findings for the analysis of attitude reports and indicated directions that we are currently pursuing in follow-up experiments. We should emphasize again that all of this is provisional on the assumption that the crucial factor in the exclusion of a *de re + de se* reading is c-command: if it were found that the *de re + de se* reading is also excluded when the *de re* pronoun precedes but does not c-command the *de se* pronoun, the case for Percus and Sauerland's theory of *de se* would be undermined. The present paper should therefore be regarded merely as a status report, but we hope that it has at least been successful in making a case for the fruitfulness of investigating *de re* blocking effects from both an experimental and a theoretical point of view.

References

Anand, P. (2006). *De De Se*. Unpublished PhD dissertation, MIT.

Chierchia, G. (1990). Anaphora and attitudes *de se*. In R. Bartsch, J. van Benthem, & van Emde Boas (eds.), *Semantics and Contextual Expression*. Dordrecht: Foris. 1-32.

Demirdache, H. & Percus, O. (2011a). When is a pronoun not a pronoun? The case of resumptives. In *Proceedings of NELS*.

Demirdache, H. & Percus, O. (2011b). Resumptives, movement and interpretation. In A. Rouveret (ed.), *Resumptive Pronouns at the Interfaces*. Amsterdam: John Benjamins, 367-393.

Heim, I. (1994). Puzzling reflexive pronouns in *de se* reports. Handout.

Heim, I. (2002). Features of pronouns in semantics and morphology. Handout.

Hintikka, J. (1969). Semantics for propositional attitudes. In J.W. Davis & D.J. Hockney (eds.), *Philosophical Logic*. Dordrecht: Reidel. 21-45.

Kaplan, D. (1968). Quantifying in. *Synthese*, 19(1/2), 178-214.

Lewis, D. (1979). Attitudes *de dicto* and *de se*. *The Philosophical Review*, 88(4), 513-543.

Maier, E. (2009). Presupposing acquaintance: a unified semantics for *de dicto*, *de re* and *de se* belief reports.

Mason, W. and S. Suri (2012). Conducting behavioral research on Amazon's Mechanical Turk. *Behavioral Research Methods 44*(1), 1–23.

Matthewson, L. (2004). On the methodology of semantic fieldwork. *International Journal of American Linguistics* 70(4), 369-415.

Morgan, J. (1970). On the criterion of identity for noun phrase deletion. *Papers from the Sixth Regional Meeting of the Chicago Linguistics Society*, Chicago, IL, 380-389.

Patel-Grosz, P. (2012). *(Anti-)locality at the interfaces*. Unpublished PhD dissertation, MIT.

Pearson, H. (2013). *The Sense of Self: Topics in the Semantics of De Se Expressions*. Unpublished PhD dissertation, Harvard University.

Percus, O. and Sauerland, U. (2003a). Pronoun movement in dream reports. *NELS 33: Proceedings of the 33rd Annual Meeting of the North East Linguistics Society*, MIT, Cambridge MA, 347-366.

Percus, O. and Sauerland, U. (2003b). On the LFs of attitude reports. *Proceedings of the Conference 'SuB 7 – Sinn und Bedeutung'*, University of Konstanz, 228-242.

Percus, O. (2006). Uninterpreted pronouns? Unpublished manuscript.

Reinhart, T. (1990). Self-representation. Unpublished manuscript.

Von Stechow, A. (2003). Feature deletion under semantic binding. *Proceedings of NELS*.

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