Specific Opaque Readings and Proportional Determiners

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Abstract. We explore the arguments for and against the recognition of so-called specific opaque readings of propositional attitude reports. The data calling for the revision of the traditional picture being convincing, more elaborate scenarios are shown to be needed to establish whether the readings in question indeed involve evaluation of the determiner and of its restrictor at different indices. We discuss both possible outcomes of the debate and present a modification to the mechanism of predication required to handle “genuine” specific opaque readings.

1 Introduction

Two readings have been traditionally recognised for propositional attitude reports involving DPs in embedded clauses. That is, a sentence like (1) can mean either (1a) or (1b).

(1) John believes that an alien lives in the town.

(1a) ‘There is an alien s.t. John believes that he lives in the town’. (de re)
(1b) ‘John believes that some alien or other lives in the town’. (de dicto)

Janet Fodor [4] has argued that two more readings are available.

(1c) ‘John believes that some creature or other with certain properties (e.g. flying a UFO) lives in the town, and the speaker associates those properties with alienhood’. (non-specific transparent)
(1d) ‘There is an object John believes to live in the town, and moreover, John believes that object to be an alien’. (specific opaque)

The reading in (1c) is well established in the literature (see [1, 11, 3, 20] a.m.o. and especially [17] where crucial evidence is presented against treating (some cases of) transparency as de re about property extensions; cf. also [19] for another way of getting specificity with narrow scope, perhaps envisaged already

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by [7, 243–244]). As regards (1d), however, Szabó [21, 34] complains that “the consensus these days” treats this reading as “an illusion”. One argument (cf. in [9, 29–30]) for such a view may be that (1) only scarcely allows for the following continuation:

But actually he is not an alien but an illusionist. \[2\]

1.1 Defending Specific Opacity

Such a judgement is nevertheless not unanimous. Szabó himself presents several examples that, as he claims, establish the presence of specific opaque readings. One case in point is what he calls summative reports.

Scenario 1 (Multi-agent summative report) Imagine that John and Mary, citizens of the same town, grow mad and come to believe the town is full of aliens. They scroll through the city council’s citizen database and then report their suspects independently of each other. John has 11 suspects, and Mary suspects 9 different people. In fact no one is an alien.

In Scenario 1, the following is true:

John and Mary believe twenty aliens live in the town. \[3\]

This is taken to mean that the determiner (twenty in this case) sometimes has to outscope the content of the main clause: it is only together that John’s and Mary’s suspects make 20. The restrictor aliens, however, has to stay below because its denotation is empty in the world of utterance.

According to Szabó, single-agent summative reports exist as well.

Scenario 2 (Single-agent summative report) John has grown mad and is looking for aliens in the citizen database. He singles out 20 people who look suspicious to him. In fact no one is an alien; moreover, John does not take the trouble to count his suspects.

For Szabó, (4) would be true in Scenario 2.

John believes twenty aliens live in the town. \[4\]

This might look unsurprising because a de dicto reading of (4) seems available. Here Szabó disagrees: as the first pages of his paper indicate, he is concerned with the coarse-grainedness of classical logic and therefore argues that no belief about aliens John holds should entail that John “has a general belief about the number” (p. 32) of suspects unless the belief includes that number in some straightforward way. In other words, no “arithmetical” inference is allowed by default within an attitudinal context.

I am not sure if one must subscribe to this, but luckily for specific opaque readings, sentences like (4) only represent one of the arguments for their existence: at least we have (3) as well.\[1\]

\[1\] Note, however, that even besides specific opacity, something quite unusual is going on in the semantics of (3): suppose we manage to get the wide scope for the determiner,
1.2 Not Specific Opaque After All?

Numerals as predicates. As long as (3) is concerned, even given its acceptability in Scenario 1, one can still ask if it is indeed a manifestation of the specific opaque reading. The reason is that to classify twenty as a determiner is not the only option in hand. According to de Jong \[8, 109\], for instance, “[n]umerals can occur in DET-position and in A[djunct]-position”; the same goes for the (Dutch analogue of) many. Therefore, the configurations twenty aliens and many aliens (also claimed by Szabó to allow for a “specific opaque” reading) are not necessarily full DPs. In fact, English does have overt determiners with numerals: The fifteen cookies I ate were all great, You have to wait for another three years etc. If twenty in (3) is actually an adjunct to aliens, we can follow Krifka \[12\] and assume a null indefinite determiner as the DP’s head: \[DP \emptyset \exists [NP \text{twenty aliens}]\].

This move alone does not give us much, in fact it does not give anything: the whole DP is still within the scope of believes. What remains is only one step though: just recognise (3) and (assuming Szabó’s inference argument) also (4) as cases of the (non-specific) transparent reading w.r.t. the NP twenty aliens. This reading is a problem in its own right (cf. \[3\], chapter 8), and its most simplistic treatments would not do for the case in point: if we just assume that this reading amounts to evaluating the whole restrictor predicate three aliens in the world of utterance (call it @), then the whole sentence (4) would mean that in all John’s doxastic alternatives \(w\) there is there is some plural individual (i.e. the mereological sum of some singular individuals) s.t. it is (composed of) three aliens in @ and lives in the town in \(w\). Of course this is not desired, because the raison d’être of specific opaque readings is to avoid evaluating the restrictor in the world of utterance.

So a more sophisticated semantics for non-specific transparent readings should be employed, and such semantics is independently motivated \[17, 20\]. This sort of semantics, following Schwager \[17\] (cf. also \[19, 241–242, esp. before footnote 6\]), requires that there be a property subsumed under \(\lambda X. \text{three aliens}(X)\) in the \(@\)-closest worlds where the latter property is instantiated. If we follow Sudo \[20\] instead, what is required is a property that is known to the speaker and to the hearer of (4) to be contextually equivalent to \(\lambda X. \text{three aliens}(X)\). I suggest that this role is played by the (unnamed and probably indexical) property like ‘those aliens’ which serves John as a guise for his suspects. Although the component ‘aliens’ essentially remains the same, the aforementioned mechanisms deriving the transparent reading do not in general apply to a single part of a complex predicate obtained through the Predicate Modification rule, but rather to the whole complex (cf. Keshet’s \[10\] Intersective Predicate Generalization); therefore, transparency targets the whole NP three aliens.

but not the restrictor, compositionally, as desired. What still remains is to show how the intended disjunctive interpretation ‘Twenty objects \(x\) are s.t. John or Mary believes that \(x\) is an alien and lives in the town’ is obtained. Additionally, any account of (3) should take into consideration that in different scenarios, the conjunctive reading seems also available.
What is more, the same solution may work for another lexical item mentioned in Szabó’s [21] in connexion with specific opaque readings, namely *most*. If viewed as a determiner, it is assigned the denotation

$$[\text{most}]^w = \lambda P.\lambda Q : \#(\{x \mid P_w(x)\} \cap \{y \mid Q_w(y)\}) \geq \frac{1}{2}(\#(\{x \mid P_w(x)\})) \quad (5)$$

If, on the other hand, one adopts a version of what Landman [13] calls the adjectival theory for *most* (cf. [18, 460]), then *most* is a predicate modifier interpreted as

$$[\text{most}]^w = \lambda P.\lambda X : (\forall x \subseteq X : x \in D_w) \land \left(\#(\{x \mid x \subseteq X \land P_w(x)\}) \geq \frac{1}{2}(\#(\{x \mid P_w(x)\}))\right) \quad (6)$$

and *most aliens* denotes a property, namely

$$[\text{most aliens}]^w = \lambda X : (\forall x \subseteq X : x \in D_w) \land \left(\#(\{x \mid x \subseteq X \land \text{alien}_w(x)\}) \geq \frac{1}{2}(\#(\{x \mid \text{alien}_w(x)\}))\right), \quad (7)$$

i.e. it is a predicate true of pluralities *X* s.t. each member of *X* is in *D*_w and *X* contains more than a half of all aliens-in-*w*. To complete the DP, we need a null determiner quantifying over pluralities. There are always multiple ways of taking most *X*s for all sets *X* having more than two elements, therefore the determiner cannot be definite, whereas ∅ would yield wrong truth conditions; so we assume it is ∅∃.

John believes that [DP ∅∃ [XP most aliens]] live in the downtown. \( (8) \)

Now, what are the truth conditions of (8), assuming Sudo’s transparent interpretation of the restrictor (sic!) *most aliens*? The following: ‘There is some property *P* known by the interlocutors to be contextually equivalent to the one in (7) s.t. John believes some *P* live in the downtown’.

So far this seems to be a plausible hypothesis,\(^2\) given certain understanding of what “contextual equivalence” is. In Section 2.2 I will provide a scenario which, if *John believes that most aliens live in the downtown* does have a true reading in it, precludes such a treatment.

**Specificity.** Another line of argument against the existence of specific opaque readings I can envisage is also worth mentioning, although it tackles only a subset of examples provided by the defenders. As already discussed above, the sceptics would sometimes say that (9) is not a plausible discourse – and deny specific opacity on these grounds.

Mary wants to meet an alien. But in fact he is not an alien, but a freak. \( (9) \)

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\(^2\) On the other hand, while treating numerals as property-type expressions (together with e.g. a choice-functional analysis of indefinites) helps to deal with specific readings of sentences like *If three friends of mine come, the party will be a success*, – treating *most* the same way only blurs the important distinction: *most* does not give rise to such readings.
In a sense, Santorio [16] does just the opposite: he argues that a similar discourse with belief instead of desire (cf. (1) + (2)) would make perfect sense. My worry here is that an inference to the existence of specific opaque readings based on this premise alone might be a non sequitur. The reason for this worry is found in Sternefeld [19] who shows the theoretical merits of introducing quantifier independence (in the sense of Hintikka and Sandu’s Independence Friendly Logic [6]) into syntax and semantics of natural language. For example, (10) (= Sternefeld’s (45)) illustrates cross-sentential anaphora.

\[ \text{Every}_x \text{ man loves } a_{y\setminus x} \text{ woman. She}_y \text{ is pretty.} \quad (10) \]

For Sternefeld, a woman here gets the specific interpretation not due to movement but due to the quantifier corresponding to a being independent of every. Were movement allowed as well, moving a woman would yield the same truth-conditions. The latter is, however, not the case in opaque contexts. As Rebuschi and Tulenheimo [15] demonstrate, quantifier independence does not replace movement but rather allows to express a reading (called de objecto) weaker than de re (because no commitment to actual existence arises) but stronger than de dicto (because specificity is expressed). E.g. the intended interpretation of

\[ \text{Little Mary thinks}^{\mathrm{w}} \text{ someone}_x^{\mathrm{w}} \text{ brought her a present for Christmas.} \quad (11) \]

is ‘Little Mary believes that there is some specific individual (i.e. the same for all her doxastic alternatives – in this case most likely Santa Claus, who does not appear to exist in @) brought her a present for Christmas’. Crucially, no detachment of the restrictor from its quantifier at LF (as in Szabó’s semantics, see Section 2.1) is required to get the specific reading. If we, together with Sternefeld, recognise the possibility of anaphora to deeply embedded DPs (as in (10)), then nothing will prevent us from treating (1) + (2) as de objecto w.r.t. to an alien. Thus construed, (1) does not entail the existence of the individual in question (whether it is an alien or not) but is of course consistent with its existence. Therefore, an additional argument would be needed to establish that (1) + (2) indeed represents a specific opaque reading in the relevant sense.

2 Looking for a solution

Assuming we do really need a special account of specific opaque readings, which way should we go?

2.1 Szabó’s attempt

Szabó’s own analysis of specific opaque readings, called split quantification, rests on that instead of the usual QR, a different raising operation is employed: whereas the determiner head raises obligatorily, its restrictor NP may either raise (in the case of normal de re) or stay in situ; in the latter case the vacant
restrictor position is filled by the dummy “noun” \[\text{thing} = \lambda x. x \equiv x\]. The LF for the specific opaque reading of (4) is then roughly the following:

\[
[\text{DP} [\text{DP twenty] thing]} 1[\text{John believes 2}[t_1 \text{aliens} \text{live-in-the-town}]],
\]

where \([t_1 \text{aliens}]\) is an \(e\)-type “restricted trace” whose restrictor induces a presupposition, filtering out the assignments that fail to assign an alien to the index 1 (i.e. those \(g\) which make \([\text{alien}]^g(g(1)) = \text{false}\)).

Santorio [16], although recognising (p. 47) the relevant reading (and even the discourses like (1) + (2)), has shown that this technique would not do for (1). The reason is that the determiner most, unlike some or twenty, compares the cardinalities of \((\text{the denotation of})\) its restrictor and of the set obtained by intersecting the restrictor with the nuclear scope, as shown in (5) above. Therefore, applying most first to thing results in \(\lambda Q : \#(D_0 \cap \{y \mid Q(y)\}) \geq \frac{1}{2}(\#D_0)\). So Szabó’s account predicts the following truth-conditions for (8):

‘Most things in the world are such that John believes of them that they are aliens and live in the downtown’. This is absurd. An analogous trouble occurs in conditionals, irrespective of the determiner used: if the quantifier is allowed to outscope the conditional with its restrictor left below, the resulting truth-conditions are too weak:

\[
\text{John believes that if an}_i \text{alien is unmasked, his race will attack the Earth. (But he}_i \text{is not an alien.)}
\]

on Szabó’s construal would mean ‘Some actual object is such that John believes: if it is an alien and it gets unmasked, its race will attack the Earth’.

Santorio’s preferred solution, although not spelled out in detail, is to leave the pertinent variable free and to make attitude verbs manipulate the variable assignment. He was able to show how it works for simple determiners like a but abstained from giving an outline of the treatment of most and other proportional determiners, indicating only that Szabó’s split quantifier analysis fails there.

### 2.2 Towards a Treatment

**A new scenario.** At this point I must confess I find the previously mentioned scenarios not quite revealing in one particular respect. Namely, in both scenarios the number of individuals whom John suspects in the world of utterance is just the same as John believes it to be. In other words, in Scenarios 1 and 2 we do not encounter “merging world lines” in the sense of Hintikka and Sandu [5], which means the doxastic agent is never confused as to how many individuals (s)he has seen. Therefore I suggest to contemplate a different scenario.

**Scenario 3 (John’s confusion)** John, looking through the photographs of all people from his town, tries to guess who is an alien. There are ten photographs he identified as depicting aliens. He points to six of them and says: “Those live in the downtown, look what expensive brands they are wearing”. Then he adds: “But you see, five photos out of these six actually feature the same guy”. In fact all the photos feature different people, and the town is alien-free.
Now the question is, which of the following sentences (if not both) has a true reading in the outlined scenario:

John believes that most aliens live in the downtown. \hspace{1em} (15)

John believes that most aliens do not live in the downtown. \hspace{1em} (16)

The sentence (16) may be judged true on its \textit{de dicto} reading, which is unsurprising: John would say there are six aliens, and that only two live in the downtown. Sentence (15) is more important:\footnote{3} the fact that it has a true reading would not only support the existence of specific opaque readings but also discard the transparency approach outlined in Section 1.2. The argument goes as follows.

Recall from Keshet \cite{10} that the whole restrictor has in general to be evaluated at one world index; therefore, once it is recognised that \textit{most aliens} is an NP and not a DP, it is no longer possible to evaluate \textit{most} at \( \emptyset \) and \textit{alien} at John’s belief worlds. But this is exactly what is required for (15) to come out true: the individuals whom John believes to live in the downtown constitute a majority among his suspects in \( \emptyset \), but this is not so in John’s doxastic alternatives.

\textbf{Counterpart-driven predication.} One step towards a treatment is to introduce the device of \textit{counterpart-driven predication} (CDP). The idea behind CDP is that a counterpart relation \( \sim \) in the style of Lewis \cite{14} is assumed; according to Lewis, nothing can exist in more than one world or have a counterpart other than itself in its own world. Then the semantics of predicates is modified so that it now includes reference to the counterpart relation:\footnote{4}

\begin{equation}
[\text{runs}]^w = \lambda x. \exists y \in D_w, y \sim x : \text{runs}(y),
\end{equation}

Similar scenarios can be devised for other determiners: e.g. for \textit{the} we might assume that John finds two photos suspicious, attributing them to different people, whereas in fact they depict one and the same man.

An obvious question is whether we need this contrived sort of predication all the way or we can just introduce a family of operators, say \( \star_i \), for each argument slot of a predicate. The operator would then be defined as

\[ [\star_i P(x_1, \ldots, x_i, \ldots, x_n)]^w = \exists y \in D_w, y \sim x_i : [P]^w(x_1, \ldots, y, \ldots, x_n). \]

The function of \( \star_i \) is to turn normal predication, requiring the individual \textit{itself} to be in the extension of the predicate, into CDP that imposes a weaker requirement that a counterpart of the individual be in the extension. If such operators are allowed, this would perhaps explain why (15), even if true in Scenario 3, is somewhat artificial. (Another reason might be that in case John is confused about the identities of his suspects, it is hard to tell if he has believes alienhood etc. \textbf{about} them, which is a prerequisite for wide scope.)
abbreviated as $\lambda x. \uparrow_w \text{runs}(x)$. Assignments to variables are world-independent.

The resulting mechanism divorces existing in a world from having properties in it; the latter can be done via a counterpart whereas the former is the characteristic of the individual itself.

Note that CDP is not equivalent to modalising all predicates. For what does it mean to possibly sleep in $w$? It means that this individual or its counterpart sleeps in some $v, w \vDash v$. What does it mean to CDP-sleep in $w$? To have a counterpart in $w$ who sleeps (“there” is redundant as in our setting an individual possesses or lacks a property $P$ not in a world but simpliciter$^5$), while yourself belonging to whatever $v$, maybe to $w$ itself (in which case the counterpart is you) – this is why traditional predication is a special case of CDP. In a motto, one might say that to CDP-sleep is to be possible (in the broadest sense) and actually sleep rather than to possibly sleep.

**Variation in determiners.** Schwarz’s [18] approach endows determiners with two situation$^6$ arguments, one for the evaluation of the restrictor and the other for the nuclear scope. The arguments differ by default, but the situation variable on the restrictor can be re-bound to the other variable’s abstractor via an operator which Schwarz borrows from Büring [2]. Such a system likely does not overgenerate and also fares well in terms of undergeneration, especially if supplemented with a choice function analysis of certain indefinites [18, 465, footnote 40]. However, if we just introduce an additional world argument position, let alone an additional abstraction operator, into DP to account for specific opacity, we are at risk of overgeneration.$^7$ If the additional configuration of variables is introduced at the lexical level, there is less chance of trouble.

The entry for *most* in Schwarz’s style would look like

\[
[\text{most}] = \lambda w. \lambda P_{e, (s, t)} \cdot \lambda Q_{e, (s, t)} \cdot \lambda v : \#(\{x \mid P(x)(w) \wedge Q(x)(v)\}) \geq \frac{1}{2} \#(\{x \mid P(x)(w)\}).
\]

(18)

Taking CDP into account, we reformulate (18) as

\[
[\text{most}] = \lambda w. \lambda P_{e, (s, t)} \cdot \lambda Q_{e, (s, t)} \cdot \lambda v : \#(\{x \in D_w \mid \uparrow_w P(x) \wedge \uparrow_v Q(x)\}) \geq \frac{1}{2} \#(\{x \in D_w \mid \uparrow_w P(x)\}).
\]

(19)

This formula as it stands corresponds to Schwarz’s treatment of *de re* readings; for *de dicto* he would apply to the complex $\lambda v : \#(\{x \in D_{\alpha} \mid \uparrow_{\alpha} \text{alien}(x) \wedge \uparrow_{\alpha} \text{downtown}(x)\}) \geq \frac{1}{2} \#(\{x \in D_{\alpha} \mid \uparrow_{\alpha} \text{alien}(x)\})$ obtained at some stage of evaluating (15) the Büring operator $\Sigma_{\alpha}$, which would result in $\lambda v : \#(\{x \in D_v \mid \uparrow_v \text{alien}(x) \wedge \uparrow_v \text{downtown}(x)\}) \geq \frac{1}{2} \#(\{x \in D_v \mid \uparrow_v \text{alien}(x)\})$ where all world

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$^5$ The reason is of course that no individual – in the technical sense of being an individual – exists in more than one world. What may exist in or be absent from other worlds is its counterparts.

$^6$ For the purposes of the present paper there is no difference as to whether situation or world pronouns are used. I uniformly stick to possible worlds.

$^7$ Thanks to an anonymous reviewer for highlighting this issue.
variables are coindexed with the nearmost abstractor and therefore semantically bound to the belief verb above. But what if we assume that from the very beginning, at least in the idiolects where (15) has a true reading in Scenario 3, there is another lexical item \( \textit{most}_2 \) with the following semantics:

\[
[\text{most}_2] = \lambda w. \lambda P_{e,(s,t)}. \lambda Q_{e,(s,t)}. \lambda v:\#(\{x \in D_w \mid \uparrow_v P(x) \wedge \uparrow_v Q(x)\}) \geq \frac{1}{2}\#(\{x \in D_w \mid \uparrow_v P(x)\}),
\]

the difference from (19) being that \( P(x) \) is evaluated at \( v \) – the index of the lower abstractor? Note that here it is equally possible to obtain normal \( \textit{de dicto} \) by re-binding the occurrences of \( w \) to \( v \), therefore a \( \textit{de dicto} \) reading with \( \text{most}_2 \) is equivalent to that with \( \text{most} \).

The proposal being more stipulative than explanatory, I readily admit that it is only a preliminary one: quite probably there is not just lexicon but rather a computational mechanism involved, perhaps one similar to devices proposed for non-specific transparent readings in Schwager [17] and Sudo [20].

3 Conclusion

In this paper I have argued that, at least for certain determiners, any diagnostics for the existence of specific opaque readings worth of its name has to be general enough to include cases of “merging world lines”. Once such a diagnostics is in place, one’s intuitions about truth and falsity either decide for the introduction of a novel device, such as CDP, or leave space for more traditional treatments, such as quantifiers as predicates plus transparent evaluation. (In the latter case multi-agent summative reports still present a puzzle.) Despite that, the aim of this paper was not to advocate any particular theory of transparent readings for restrictors, although we provided yet another (indirect) argument against simple extensional treatment of at least certain cases of this phenomenon (cf. [17] and [20, 448–449]).

An anonymous reviewer suggests that Sudo’s [20] \( \textit{de re} \) quantifiers might provide a way to derive specific opaque readings. It is unclear what exactly was meant; perhaps (s)he envisaged something like using Sudo’s \( \textit{De Re} \) Rule for determiner itself or the plural individual approach I used above for a different end. Sudo’s idea for quantifiers is, however, different, and I do not know how an explanation for our problem here can proceed along Sudo’s lines. His target is the sentences like (21).

\[
\begin{align*}
\text{Mary believes that all planets are stars.} \\
\text{(21)}
\end{align*}
\]

The intended meaning for (21) is: ‘Of all objects known to be planets, Mary believes they are stars’. Therefore, the restrictor has to be evaluated in \( @ \), just like in specific opaque readings; but here the quantifier \( \textit{all} \) is \textit{also} interpreted in the world of utterance, which distinguishes (21) from (1d) and other cases we are interested in.
References


