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Motivating a Symmetric Copula 'Be' in Attitude Reports

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Abstract

Natural languages generally use such patterns as 'A is B' or 'A and B are the same' to mean an identity relation. However, it remains unclear what the cognitive mechanism actually is in using these identity statements. In this study, I embed the identity statements in attitude reports and investigate possible and impossible readings for such attitude reports as 'John thinks A is B', 'John thinks A and B are the same', etc. Intriguingly, the study reveals that felicitous 'de dicto' identity reports have no corresponding 'de re' reports. To account for this effect, I propose that the identity relation between A and B as encoded in natural languages means the contextually salient properties coerced from the expression A hold in a certain world (e.g., in the belief worlds of an attitude holder) for the individual named B and vice versa. The current analysis also suggests that natural language users can have access to some expressions in two different ways simultaneously: both as descriptions to describe certain objects and as variable names to refer to certain objects.

Motivating a Symmetric Copula ‘Be’ in Attitude Reports

Linmin Zhang*

1 Introduction

The identity relation in natural languages has traditionally been considered as a primitive and formally represented simply with the symbol ‘=’. For example, Frege 1892, the pioneering work on the meaning difference between ‘ $A = A$ ’ and ‘ $A = B$ ’, represents the meaning of natural language identity statements, such as *A is B*, *A is the same as B* or *A and B coincide*, simply as [$A = B$] and investigates the semantic ontology of the two things involved in the identity relation (here *A* and *B*), leaving the meaning of the symbol ‘=’ unscrutinized. In various recent accounts of internal or external readings of *same* (e.g., Heim 1985, Solomon 2009, Hardt and Mikkelsen 2015), it also seems sufficient to formalize, e.g., [[John and Mary read the same book]], as [the book that John read = the book that Mary read] (see Heim 1985 and Solomon 2009), with little or no discussion on the exact meaning of ‘=’ used in such a formalization.

In this paper, based on empirical evidence from attitude reports, I argue against the view that the identity relation as encoded in natural languages is a primitive. Here is the reasoning in a nutshell: I start with a brief introduction to the *de re/de dicto* distinction and present the relatively uncontroversial assumption that felicitous *de re* attitude reports are derived from felicitous *de dicto* reports through the substitution of co-referring names of a *res*. Based on this, I provide new empirical data in this paper, showing that when a *de dicto* report expresses an identity relation between two *res*, no *de re* report can be derived via the substitution of co-referring names of a certain *res*. The failure of deriving a *de re* report from a *de dicto* identity report suggests that the expressions of *res* names in a *de dicto* identity report contribute not only **extensionally**, i.e., as *res* names, but also **intensionally**. Thus I propose that in natural languages, the identity relation between two *res* is essentially a mutual predication between them, as informally described in (1):

- (1) Main claim on the semantics of the identity relation expressed in natural languages:
[[A is B]] is a **mutual predication**: the contextually relevant property coerced from the expression *B* holds for the *res* referred to with the expression *A*, and the contextually relevant property coerced from the expression *A* holds for the *res* referred to with the expression *B*.

The argumentation and analysis presented in this paper focus on the uses of English copula *be* and such identity statements of the pattern *A is B*. Section 2 and Section 3 present backgrounds of the current study: Section 2 introduces the *de re/de dicto* distinction; Section 3 presents Percus and Sharvit 2014’s analysis on the **asymmetric** use of English copula *be* in attitude reports. Section 4 presents empirical data motivating the current study: I show that different from a ***de dicto* predication report X thinks A is B** , which contains an **asymmetric *be***, a ***de dicto* identity report X thinks A is B** contains a **symmetric use of *be*** and has **no** corresponding *de re* report. Based on this empirical contrast, in Section 5, I propose that the **symmetric** use of *be* can be analyzed as a mutual (or double) use of **asymmetric *be***, and on the base of this proposal, I account for the data presented in Section 4 and explain why *de dicto* identity reports cannot give rise to felicitous *de re* reports through the substitution of co-referring names. Section 6 and Section 7 discuss two consequences: Section 6 shows that with regard to the phenomena discussed in this paper, imagination reporting predicates such as *dream* actually behave similarly to the canonical belief reporting predicate *think* (cf. Percus and Sauerland 2003, Sudo 2014), and argues that, at least with regard to the phenomena under discussion, a separate treatment for imagination reports (e.g., Ninan 2008, 2012) seems unnecessary (see also Yanovich 2011); Section 7 shows how the current analysis converges with Fine 2007 and sheds light on Frege’s puzzle on identity statements. Section 8 concludes the paper and suggests avenues for further research.

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2 Background I: The *De re/De dicto* Distinction

In this section, I first use examples to illustrate the intuitive difference between a *de dicto* report and a *de re* report; then I introduce the basic assumption in studying *de re* reports; finally, following the strategy of Sudo (2014), I show a compositional derivation of the truth condition of a *de re* report.

To begin with, (2–4) show three slightly different contexts, and the attitude reports (2a–4a) and (2b–4b) are all felicitous in these contexts, i.e., each of these utterances of Sam has at least one natural and true reading in its context.

- (2) **IGNORANCE CONTEXT:** Bill meets an unfamiliar beautiful girl with red hair in a party and gets attracted to her without even knowing her name. Sam and Jennifer know the girl very well: She is Victoria. Seeing that Bill is obsessed with the girl, Sam says to Jennifer:
- a. ‘Bill surely thinks that the girl with red hair is attractive.’ *de dicto*: ✓
 b. ‘Bill surely thinks that Victoria is attractive.’ *de dicto*: ✗; *de re*: ✓
- (3) **MISAPPREHENSION CONTEXT:** Bill meets an unfamiliar beautiful girl with red hair in a party and gets attracted to her, thinking that she must be Lola, a supermodel he has only heard about. Sam and Jennifer know the girl very well: Her name is actually Victoria. Seeing that Bill is obsessed with the girl, Sam says to Jennifer:
- a. ‘Bill surely thinks that the girl with red hair is attractive.’ *de dicto*: ✓
 b. ‘Bill surely thinks that Victoria is attractive.’ *de dicto*: ✗; *de re*: ✓
- (4) **CORRECT KNOWLEDGE CONTEXT:** Bill meets an unfamiliar beautiful girl with red hair in a party and gets attracted to her; soon he correctly learns her real name: Victoria. Sam and Jennifer also know the girl. Seeing that Bill is obsessed with the girl, Sam says to Jennifer:
- a. ‘Bill surely thinks that the girl with red hair is attractive.’ *de dicto*: ✓
 b. ‘Bill surely thinks that Victoria is attractive.’ *de dicto*: ✓; *de re*: ✓

Evidently, in all these three scenarios (2–4), if Bill, the attitude holder here, hears somebody say ‘the girl with red hair is attractive’, he will naturally agree with the claim himself. Thus, these attitude reports (2a–4a) are felicitous in the *de dicto* sense.

In contrast, only in the **correct knowledge context** (4), but not in the **ignorance context** (2) or the **misapprehension context** (3), will Bill agree with the claim that ‘Victoria is attractive’ if he hears somebody say so, because in context (2) or context (3), Bill is unable to recognize that the name Victoria refers to the red-haired girl. Nevertheless, even under these two contexts, Sam’s utterances (2b–3b) are still intuitively true, indicating that substituting the expression *the girl with red hair* in the *de dicto* reports (2a–3a) with *Victoria* does not affect the truth value. Thus, attitude reports **with a substitution of expressions *salva veritate***, such as (2b–3b), are felicitous in the *de re* sense.^{1,2}

De re attitude reports have been much studied in philosophy of language. According to neo-Russellianism, which represents a pretty standard view on this, the fact that *de re* reports (2b–3b) are true in the ignorance context (2) or the misapprehension context (3) can be traced back to the fact that the expression *Victoria* in these *de re* reports and the expression *the girl with red hair* in the corresponding *de dicto* reports (2a–3a) play the same role: They are both **extensional** expressions and share the same reference.³ In other words, differing from what Frege might claim, in these attitude reports, although syntactically, *the girl with red hair* and *Victoria* are in the scope of an

¹These examples also show that such an attitude report as *Bill surely thinks that Victoria is attractive* is unambiguously a *de re* report only in an ignorance or misapprehension context; In a correct knowledge context, such an attitude report is ambiguous between a felicitous *de dicto* reading and a felicitous *de re* reading. In other words, empirically, the *de re/de dicto* distinction only shows up in an ignorance or misapprehension context.

²In these contexts, Sam is the narrator who produces the attitude reports. Anna Szabolcsi (p.c.) points out that *de re* readings are only possible when (i) there is a narrator and (ii) the narrator (here Sam) is involved in the situation. Thus, in this paper, when analyzing attitude reports, the free variable w_0 that I use to refer to the **reference/actual world** should actually be considered as a world in the set of the **narrator’s** belief worlds.

³See McKay and Nelson 2014 for a detailed review on the neo-Russellian view on attitude reports.

attitude reporting predicate (here *think*), these expressions are semantically extensional: They denote an extensional reference, i.e., a *res* of type *e*, not an intensional concept of type $\langle se \rangle$ that varies with possible worlds (or attitude holders). Based on this reasoning, neo-Russellianism assumes (5):

- (5) Basic assumption on the reducibility of *de re* reports:
 For any felicitous *de re* report *p*, there is a felicitous *de dicto* report *p'* such that the *de re* report *p* is derived from the *de dicto* report *p'* via a substitution of co-referring *res* names. Thus, a felicitous *de re* report is necessarily reducible to a *de dicto* report.

Notice that assumption (5) says that each *de re* report is necessarily derived from a *de dicto* report, but it does not say that for any *de dicto* report, there is necessarily a corresponding *de re* report derived from it. Indeed, certain *de dicto* reports don't even contain a *res* and thus it is impossible that any *de re* report be derived from such *de dicto* reports. For example, suppose that Ralph has the general opinion that the longest linguistics paper has more than 100 pages, with no particular long paper in his mind, and suppose that the paper Orcutt has just finished is in fact the longest linguistics paper: In this context, the attitude report *Ralph thinks that the paper Orcutt has just finished has more than 100 pages* is intuitively false, because the *de dicto* report *Ralph thinks that the longest linguistics paper has more than 100 pages* is about no particular individual paper that Ralph is acquainted with (i.e., no *res*) and thus no substitution of co-referring *res* names can happen.

Under the neo-Russellian assumption, much work has been done on the definition of an appropriate *res*. In this paper, I mainly follow Kaplan 1969 and Lewis 1979 and assume that an appropriate *res* for an attitude holder needs to stand in **an acquaintance relation** with the attitude holder so that the *res* becomes **a character in the inner story of the attitude holder**.

Here I need to emphasize that a *res* is a character in the inner story of an attitude holder, and there is not necessarily a one-to-one relation between a *res* and a real character in the actual world.⁴ This means that (i) the same real character in the actual world can be two different characters in the inner story of an attitude holder (imagine that some people fail to recognize that Dr. Jekyll and Mr. Hyde are the same actual person), and (ii) it is also possible that different real characters in the actual world become one single *res* in the inner story of an attitude holder (imagine that a few Hogwarts staff members mistakenly take the Weasley twins George and Fred as the same person). Thus, we need to bear in mind that a *res* is different from a real character in the actual world; nevertheless, a *res* is an objective extensional being of type *e*, potentially accessible to more than one attitude holders and not necessarily private to a single attitude holder; otherwise, if *res* were necessarily private, interlocutors would not be able to refer to and discuss the same thing, and the communication would be impossible.

Based on this informal analysis of *res* and *de re* reports, I show a compositional derivation of the truth condition of a *de re* report in (6). (6) follows the strategy of Sudo 2014: First, the truth condition of a *de dicto* report is compositionally derived; then, based on the truth condition of a *de dicto* report and a co-reference relation between *res* names, the truth condition of a *de re* report can be derived.

- (6) Deriving the truth condition of a *de re* report:
- a. Lexical items:⁵

$$\llbracket \text{Bill} \rrbracket_e \stackrel{\text{def}}{=} \text{Bill}; \llbracket \text{Victoria} \rrbracket_e \stackrel{\text{def}}{=} \text{Victoria}; \llbracket \text{think} \rrbracket_w \stackrel{\text{def}}{=} \lambda p_{\langle sr \rangle} . \lambda x_e . \forall w' \in \text{Dox}_w(x) [p(w')]$$

$$\llbracket \text{the} \rrbracket_{\langle et, e \rangle} \stackrel{\text{def}}{=} \lambda P_{\langle et \rangle} . \text{Ix}[P(x)] \text{ (i.e., the contextually unique } P)$$

$$\llbracket \text{girl with red hair} \rrbracket_{\langle s, et \rangle} \stackrel{\text{def}}{=} \lambda w_s . \lambda x_e . [\text{red-haired-girl}(w)(x)]$$

$$\llbracket \text{is attractive} \rrbracket_{\langle s, et \rangle} \stackrel{\text{def}}{=} \lambda w_s . \lambda x_e . [\text{attractive}(w)(x)]$$
 - b. Step 1: Deriving the truth condition of a *de dicto* report

$$\llbracket \text{the girl with red hair is attractive} \rrbracket_{\langle sr \rangle}$$

$$= \lambda w . [\llbracket \text{the} \rrbracket][\llbracket \text{girl with red hair} \rrbracket(w)][\llbracket \text{is attractive} \rrbracket(w)]$$

⁴I often use the expression *the actual world* as a convenient way to say *the possible world serving as the reference*. Thus, *the actual world* does not mean the physically realistic world where we live, and famous fictional characters, e.g. Harry Potter, can be legitimate real characters in certain actual (i.e., reference) worlds.

⁵The meaning of copula *be* will be discussed in later sections; here I follow the analysis of Keshet 2010: a predicate of type $\langle s, et \rangle$ first takes a (free or bound) world variable before combining with $\llbracket \text{the} \rrbracket$; evidently, in the case of *de dicto* readings, this world variable is bound, while in the case of *de re* readings, it is free.

- $= \lambda w. [\text{the contextually unique red-haired-girl in } w \text{ is attractive in } w]$
 $[[\text{Bill thinks that the girl with red hair is attractive}]]_{\text{de dicto}}^{w_0}$
 $= \forall w' \in \text{Dox}_{w_0}(\text{Bill}) [\text{the contextually unique red-haired-girl in } w' \text{ is attractive in } w']$
 i.e., every world w' in the set of Bill's belief worlds is such that the contextually unique red-haired girl in w' is attractive in w' .
- c. Step 2: Substituting co-referring *res* names
- $[[\text{Bill thinks that Victoria is attractive}]]_{\text{de re}}^{w_0} = \forall w' \in \text{Dox}_{w_0}(\text{Bill}) [V \text{ is attractive in } w']$
 The truth condition of this *de re* report is such that (i) the *de dicto* report
 $[[\text{Bill thinks that the girl with red hair is attractive}]]_{\text{de dicto}}^{w_0}$ is true and (ii) the extensional expressions $[[\text{the girl with red hair}]]^{w' \in \text{Dox}_{w_0}(\text{Bill})}$ and $[[\text{Victoria}]]$ co-refer.

3 Background II: Percus and Sharvit's (2014) Analysis of Asymmetric *Be*

My analysis of identity statements and **symmetric *be*** will be based on Percus and Sharvit 2014's analysis of **asymmetric *be*** in attitude reports. Percus and Sharvit 2014 aims to account for the *de re* report (7a) uttered under the mistaken identity context (7) (see also Cumming 2008 for a discussion on such contexts). In this context, *Becky is Dan* has an asymmetric meaning: the *de re* report *Kevin thinks that Becky is Dan* can be felicitously followed by *but he doesn't think that Dan is Becky*. Based on this empirical evidence, Percus and Sharvit 2014 claims that in natural languages, $[[A \text{ is } B]]$ and $[[B \text{ is } A]]$ do not always have the same meaning, which motivates the existence of asymmetric *be*.

- (7) MISTAKEN IDENTITY CONTEXT: Peter is throwing a party in honor of his cousin Dan who has just been awarded his PhD. All the guests know that, but they don't all know Dan (and some of them, like Kevin, don't even know the new PhD's name). When Becky arrives, Kevin, who is already completely toasted, walks up to her with a big smile. 'You must be proud to be a doctor now,' he says, 'is your wife coming too?' Seeing this, Jim says to Peter:
- a. 'Kevin thinks that Becky is Dan, (but he doesn't think that Dan is Becky).'
- de re*
- : ✓

The original analysis of asymmetric *be* proposed in Percus and Sharvit 2014 is shown in (8): (8a) shows that asymmetric *be* relates an individual concept of type $\langle se \rangle$ (here k) and an individual of type e (here x), and means the relation '=' between the individual concept and the individual; (8b) shows that when asymmetric *be* is apparently used to relate two expressions of individual names (e.g., in the case of *Becky is Dan*), there is a contextually salient type shifter f , which takes one individual as its argument and returns an individual concept (here $f(y)$), and asymmetric *be* further relates $f(y)$ and x .

- (8) Percus and Sharvit 2014's analysis of asymmetric *be*:

- a. $[[\text{be}_{\text{asymmetric}}]]_{\langle se, et \rangle}^w \stackrel{\text{def}}{=} \lambda k_{\langle se \rangle}. \lambda x_e. x = k(w)$
- b. $[[\text{be}_{\text{asymmetric}}]]_{\langle e, et \rangle}^w \stackrel{\text{def}}{=} \lambda y_e. \lambda x_e. x = [f_{\langle e, se \rangle}(y)](w)$

Percus and Sharvit 2014 doesn't give a definition for the symbol '=' used in (8). Notice that the symbol '=' is traditionally polysemic: ' $x = y$ ' expresses a value equality between two variable names, while ' $x = 3$ ' expresses a predication relation between a variable name and a value. Evidently, all the equality or equivalence relations are necessarily symmetric, and therefore, in Percus and Sharvit 2014's analysis, '=' has to mean a predication, which is asymmetric.

Thus, I rewrite Percus and Sharvit 2014's analysis in (9): (9a) shows that asymmetric *be* relates a property of type $\langle s, et \rangle$ and an individual of type e , and the property holds for the individual in a relevant world; (9b) shows that when asymmetric *be* apparently relates two expressions of individual names, one of the expressions (here y) is coerced into and interpreted as some contextually salient property in a world (represented as $P_{(w,y)}$ here), and asymmetric *be* further relates $P_{(w,y)}$ and x .⁶

⁶In contrast to Percus and Sharvit 2014, I choose not use a type shifter of type $\langle e, \langle s, et \rangle \rangle$ to turn an individual name into a property, because the exact meaning of $P_{(\text{world}, \text{name expression})}$ reflects what property an attitude holder associates with a certain expression in a context and involves a complex cognitive process for the attitude holder in perceiving the name. Thus, the relation between a name expression (e.g., y) and the property coerced from it (e.g., $P_{(w,y)}$) is probably beyond the compositional semantics, and I do not study this issue now.

(9) The analysis of asymmetric *be* (my revised version):

- a. $[[\text{be}_{\text{asymmetric}}]]_{\langle (s,et),et \rangle}^w \stackrel{\text{def}}{=} \lambda P_{\langle s,et \rangle} . \lambda x_e . P(w)(x)$
- b. $[[\text{be}_{\text{asymmetric}}]]_{\langle e,et \rangle}^w \stackrel{\text{def}}{=} \lambda y_e . \lambda x_e . P_{(w,y)}(w)(x)$ $P_{(w,y)}$ is of type $\langle s, et \rangle$.

Based on the semantics of asymmetric *be* in (9), (10) accounts for the asymmetry shown in (7a):

- (10) a. $[[\text{Kevin thinks that Becky is Dan}]]_{\text{de re}}^{w_0} = \forall w' \in \text{Dox}_{w_0}(\text{Kevin}) [P_{(w',\text{Dan})}(w')(Becky)]$
 i.e., every world w' in the set of Kevin’s belief worlds is such that the contextually relevant properties of being Dan (here being a new PhD) holds for the *res* named Becky in w' . Given the context (7), an appropriate *de re* reading is available.
- b. $[[\text{Kevin thinks that Dan is Becky}]]_{\text{de re}}^{w_0} = \forall w' \in \text{Dox}_{w_0}(\text{Kevin}) [P_{(w',\text{Becky})}(w')(\text{Dan})]$
 i.e., every world w' in the set of Kevin’s belief worlds is such that the contextually relevant properties of being Becky holds for the *res* named Dan in w' . Given the context (7), no appropriate *de re* reading is available.

4 New Data: A *De Dicto* Identity Report Has no Corresponding *De Re* Report

In this section, I present new empirical data, showing that (i) *de dicto* identity reports motivate the existence of a symmetric *be*, and (ii) moreover, different from *de dicto* reports with an **asymmetric *be***, felicitous *de dicto* reports with a **symmetric *be*** (i.e., felicitous *de dicto* identity reports) cannot give rise to corresponding felicitous *de re* reports through the substitution of co-referring *res* names.

The anonymous reviewing context (11) provides the common background information for (12) and (13); (12) and (13) show two different sub-contexts as well as the felicity judgment of some *de dicto* and *de re* attitude reports under these two sub-contexts.

- (11) ANONYMOUS REVIEWING CONTEXT: After submitting a paper to a journal, John gets an anonymous review for his paper. The review is actually written by Mary, but of course, John doesn’t know this. Mike is an editor of the journal and he knows that Mary is the reviewer.
- (12) SUB-CONTEXT A – PREDICATION CONTEXT: Afterwards, when John meets Mike, he tells Mike that he finds the review is very old-fashioned and shows a certain empathy for baldness, and John says: ‘I think the author of the review should be a bald man in his 90s.’ Mike discloses nothing to John, but later he tells the whole story to another person, Tim:

<i>de dicto</i> report		<i>de dicto</i> report		corresponding <i>de re</i> report	
a. ‘John thinks that the reviewer is a bald man in his 90s.’	✓	a’. ‘John thinks that Mary is a bald man in his 90s.’	✓		
b. ‘John thinks that a bald man in his 90s is the reviewer.’	✗	b’. ‘John thinks that a bald man in his 90s is Mary.’	✗		
c. ‘John thinks that the reviewer and a 90-year old bald man are the same person.’	✗	c’. ‘John thinks that Mary and a 90-year old bald man are the same person.’	✗		

- (13) SUB-CONTEXT B – IDENTITY CONTEXT: Afterwards, John and Mike go to a party. There John sees a bald man in his 90s talking about John’s paper with others. Based on what he sees, John says to Mike: ‘The old guy must have reviewed my paper.’ Mike discloses nothing to John, but later Mike tells the whole story to another person, Tim:

<i>de dicto</i> report		<i>de dicto</i> report		corresponding <i>de re</i> report	
a. ‘John thinks that the reviewer is a bald man in his 90s.’	✓	a’. ‘John thinks that Mary is a bald man in his 90s.’	✗		
b. ‘John thinks that a bald man in his 90s is the reviewer.’	✓	b’. ‘John thinks that a bald man in his 90s is Mary.’	✗		
c. ‘John thinks that the reviewer and a 90-year old bald man are the same person.’	✓	c’. ‘John thinks that Mary and a 90-year old bald man are the same person.’	✗		

As (12) shows, under Sub-context A, i.e., the predication sub-context, the *de dicto* identity report (12c) is infelicitous, and there is a felicity contrast between the *de dicto* reports (12a) and (12b).⁷ Thus, under this sub-context, [[the reviewer is a bald man in his 90s]] is different from [[a bald man in his 90s is the reviewer]], indicating that the use of *be* in the *de dicto* reports (12a) and (12b) is asymmetric. Moreover, (12a') is judged to be natural, indicating that a felicitous *de re* report can be derived from the felicitous *de dicto* report (12a) through the substitution of co-referring names.

In contrast, under Sub-context B, i.e., the identity sub-context, the *de dicto* identity report (13c) is felicitous, and the *de dicto* reports (13a) and (13b) are both felicitous, suggesting that the use of *be* in the *de dicto* reports (13a) and (13b) is symmetric, so that [[the reviewer is a bald man in his 90s]] and [[a bald man in his 90s is the reviewer]] are the same here, and just similar to (13c), both (13a) and (13b) are *de dicto* identity reports. Intriguingly, under this sub-context, although the *de dicto* identity reports (13a–c) are all felicitous, none of them has a felicitous corresponding *de re* report, as the infelicity of (13a'–c') shows.

Why can't *de re* reports be derived from *de dicto* identity reports? In the next section, I will focus on identity statements of the pattern *A is B* and propose an account for this issue.

5 Proposal: Semantics of Symmetric *Be* and Identity Statements

In the previous section, the contrast between (12) and (13) empirically motivates the existence of a symmetric use of *be*. To fully appreciate the difference between asymmetric and symmetric *be*, we need to take a closer look at the two sub-contexts.

In the predication context (12), John the attitude holder has access only to **one** *res*, the author of the review he reads, and he is acquainted with the *res* only through reading the review written by the *res*. In other words, in the inner story of the attitude holder, there is only one character, i.e., the reviewer, and the attitude holder ascribes the property of being a bald man in his 90s to this character. The analysis of asymmetric *be* in (9a) (repeated here as (14)) fits this sub-context perfectly: asymmetric *be* takes two arguments – the property $\lambda w.\lambda x.[90\text{-year-old bald man}(w)(x)]$ of type $\langle s, et \rangle$ and the individual [[the] [[reviewer]] (*w*)] of type *e* (i.e., the contextually unique reviewer). Under this context, since in the *de dicto* report, the semantic contribution of *the reviewer* is purely extensional, it can be replaced by a contextually co-referring name (i.e., *Mary*).

$$(14) \quad \llbracket \text{be}_{\text{asymmetric}} \rrbracket_{\langle \langle s, et \rangle, et \rangle}^w \stackrel{\text{def}}{=} \lambda P_{\langle \langle s, et \rangle \rangle} . \lambda x_e . P(w)(x) \quad (9a)$$

In contrast, in the identity context (13), there are actually **two** characters in the inner story of the attitude holder, i.e., the reviewer of the paper and the old man standing before the attitude holder. John has access to **two** *res* through two acquaintance relations: He is acquainted with the *res* 'the author of the review' through knowing that his paper is reviewed by this *res*. In addition, he is acquainted with a second *res* 'the bald man in his 90s' through seeing this *res* talking about his paper in a party. Eventually the attitude holder draws the conclusion that there is an identity relation between these two characters. Thus, in a *de dicto* identity report, there are necessarily two *res*.

In sum, as (15) shows, the fundamental difference between (12) and (13) is that *de dicto* predication reports are about **one** *res*, while *de dicto* identity reports are about **two** *res*. The other differences between (12) and (13) are just based on this fundamental difference.

(15) Comparing the empirical data shown in (12) and (13):

	Predication sub-context (12)	Identity sub-context (13)
number of <i>res</i>	1	2
<i>de dicto</i> reports	(12a): predication statement	(13a) and (13b): identity statements
the use of <i>be</i>	asymmetric	symmetric
<i>de re</i> reports	available: see (12a')	unavailable: see (13a') and (13b')

⁷Percus and Sharvit 2014 notices that with a special intonation pattern, an asymmetric attitude report, say *Kevin thinks Becky is Dan*, can be reversed as *Kevin thinks Dan is Becky*, with the felicity/truth condition unchanged; Percus and Sharvit 2014 analyzes this reversed pattern as the result of a focus projection. Such attitude reports with a focus projection and a special intonation pattern will not be considered in this paper.

Now recall that, as shown in Section 2, the derivation of a felicitous *de re* report is based on the co-reference relation between two expressions that refer to the same *res*. Thus, it follows necessarily that any expression in a *de dicto* report can go through such a substitution of co-referring names, if and only if the semantic contribution of this expression in the *de dicto* report is purely extensional.

Given the fact that the *de dicto* identity report (13a) is felicitous but such an attitude report as (13a') is judged to be infelicitous, we can deduce that in identity statements of the pattern *A is B*, the semantic contribution of the expressions related by symmetric *be* (here *A* and *B*) cannot be purely extensional: It has to be **both extensional (i.e., as *res* names) and intensional**.

Through our analysis of asymmetric *be* (9b) (repeated here as (16)), we already know how an individual name can contribute intensionally: (16) shows that when asymmetric *be* apparently relates two individual names *y* and *x*, *y* is interpreted as a contextually salient property $P_{(w,y)}$ of type $\langle s, et \rangle$ and contributes intensionally, while *x*, as a *res* name of type *e*, contributes extensionally.

$$(16) \quad \llbracket \text{be}_{\text{asymmetric}} \rrbracket_{\langle e, et \rangle}^w \stackrel{\text{def}}{=} \lambda y_e. \lambda x_e. P_{(w,y)}(w)(x) \quad (9b)$$

Therefore, based on this discussion of identity statements in attitude reports as well as the analysis of asymmetric *be*, I propose (17) as the semantics of symmetric *be*:

$$(17) \quad \llbracket \text{be}_{\text{symmetric}} \rrbracket_{\langle e, et \rangle}^w \stackrel{\text{def}}{=} \lambda y_e. \lambda x_e. P_{(w,y)}(w)(x) \wedge P_{(w,x)}(w)(y)$$

As (17) shows, symmetric *be* relates two individual names *y* and *x* (of type *e*), and there are two contextually salient properties coerced from these two names, i.e., $P_{(w,y)}$ and $P_{(w,x)}$, so that the contextually salient property $P_{(w,y)}$ holds for the *res* named *x* in the possible world *w*, and similarly, the contextually salient property $P_{(w,x)}$ holds for the *res* named *y* in the possible world *w*.

Evidently, in such an analysis, when two individual names are related by a symmetric *be*, both of these names contribute extensionally and intensionally. We can in effect consider the symmetric use of *be* as a double use of asymmetric *be*.

Based on this analysis of symmetric *be*, (18) shows in details why felicitous *de dicto* identity reports cannot have corresponding *de re* reports through the substitution of co-referring names:

- (18) a. Lexical items (see (6a) for the definition of $\llbracket \text{think} \rrbracket^w$ and $\llbracket \text{the} \rrbracket$):
 $\llbracket \text{John} \rrbracket_e \stackrel{\text{def}}{=} \text{John}$; $\llbracket \text{Mary} \rrbracket_e \stackrel{\text{def}}{=} \text{Mary}$; $\llbracket \text{reviewer} \rrbracket_{\langle s, et \rangle} \stackrel{\text{def}}{=} \lambda w_s. \lambda x_e. [\text{reviewer}(w)(x)]$
 $\llbracket \text{bald man in his 90s} \rrbracket_{\langle s, et \rangle} \stackrel{\text{def}}{=} \lambda w_s. \lambda x_e. [90\text{-year-old bald man}(w)(x)]$
 I assume $\llbracket \text{a} \rrbracket_{\langle et, e \rangle}$ can work as a choice function f_{choice} : $\llbracket \text{a} \rrbracket = f_{\text{choice}} \stackrel{\text{def}}{=} \lambda P_{\langle et \rangle}. f_{\text{choice}}(P)$
 (i.e., a certain contextually salient *P*)
- b. Deriving the truth condition of a *de dicto* identity report:
 $\llbracket \text{the reviewer is a bald man in his 90s} \rrbracket_{\langle st \rangle}$
 $= \lambda w. \llbracket \llbracket \text{the} \rrbracket \llbracket \llbracket \text{reviewer} \rrbracket(w) \rrbracket \llbracket \llbracket \text{be}_{\text{symmetric}} \rrbracket [f_{\text{choice}} \llbracket \llbracket \text{bald man in his 90s} \rrbracket(w) \rrbracket]$
 Thus, $\llbracket \text{be}_{\text{symmetric}} \rrbracket$ takes two arguments of type *e*: (i) the contextually unique reviewer in *w* (I will write this as R^w); (ii) a certain contextually salient 90-year-old bald man in *w* (I will write this as B^w). Therefore, $\llbracket \text{the reviewer is a bald man in his 90s} \rrbracket_{\langle st \rangle}$
 $= \lambda w. [P_{(w, B^w)}(w)(R^w) \wedge P_{(w, R^w)}(w)(B^w)]$
 $\llbracket \text{John thinks that the reviewer is a bald man in his 90s} \rrbracket_{\text{de dicto}}^{w_0}$
 $= \forall w' \in \text{Dox}_{w_0}(\text{John}) [P_{(w', B^{w'})}(w')(R^{w'}) \wedge [P_{(w', R^{w'})}(w')(B^{w'})]]$
 i.e., every world *w'* in the set of John's belief worlds is such that the contextually salient properties of the expression 'a certain 90-year-old bald man in *w'*' holds in *w'* for the *res* named 'the contextually unique reviewer in *w'*', and vice versa.
- c. Accounting for the *de re* reading derivation blocking effect of a *de dicto* identity report:
 In the given context, $\llbracket \text{Mary} \rrbracket$ and $\llbracket \text{the reviewer} \rrbracket^{w' \in \text{Dox}_{w_0}(\text{John})}$ co-refer, thus
 (i) \because both $\llbracket \text{Mary} \rrbracket$ and $R^{w'}$ are extensional, from $\forall w' \in \text{Dox}_{w_0}(\text{John}) [P_{(w', B^{w'})}(w')(R^{w'})]$, it follows that $\forall w' \in \text{Dox}_{w_0}(\text{John}) [P_{(w', B^{w'})}(w')(Mary)]$
 (i.e., the substitution based on the co-reference relation can happen);
 (ii) However, in $\forall w' \in \text{Dox}_{w_0}(\text{John}) [P_{(w', R^{w'})}(w')(B^{w'})]$, the semantic contribution of $R^{w'}$

is intensional: $P_{(w', R^{w'})}$ means the contextually salient property (of type $\langle s, et \rangle$) coerced from the expression ‘the contextually unique reviewer in w' ’. Therefore, no substitution of co-referring *res* names can take place here.

(iii) Overall, for $\forall w' \in \text{Dox}_{w_0}(\text{John})[P_{(w', B^{w'})}(w')(R^{w'}) \wedge P_{(w', R^{w'})}(w')(B^{w'})]$, no substitution of co-referring *res* names can happen, which accounts for the fact that for a *de dicto* identity report, no felicitous *de re* report can be derived from it.

6 Discussion I: *Think vs. Dream*

Percus and Sauerland 2003 and Sudo 2014 claim that the semantics of imagination reports should be different from the semantics of belief reports: They present the contrast shown in (19) as empirical evidence to support this claim. According to their claim, as (19) shows, the *de dicto* belief report (19a) has a corresponding *de re* report (19a'), while the *de dicto* dream report (19b) has no corresponding *de re* report: (19b') is judged to be infelicitous.

(19) BARE CONTEXT: Mary anonymously reviewed John’s paper.

<i>de dicto</i> report		Corresponding <i>de re</i> report	
a.	John thinks that the reviewer is a bald man in his 90s. ✓	a'.	John thinks that Mary is a bald man in his 90s. ✓
b.	John dreams that the reviewer is a bald man in his 90s. ✓	b'.	John dreams that Mary is a bald man in his 90s. ✗

As I have shown in Section 4 (see (11–13)) and Section 5, in order to judge whether a felicitous *de dicto* report has a felicitous corresponding *de re* report, we need to know how the attitude holder thinks about a certain *res*, and how many *res* are involved in the belief (or other attitudes) of the attitude holder. In other words, such a context as the bare context shown in (19) is insufficient for us to judge whether a felicitous *de dicto* report has a felicitous corresponding *de re* report or not.

Given the background that Mary anonymously reviewed John’s paper, (20) and (21) show that such an imagination reporting predicate *dream* actually patterns with the canonical belief reporting predicate *think*: For a *de dicto* predication dream report (20a), a corresponding *de re* dream report is available, (20a') is judged to be felicitous; in contrast, for *de dicto* identity dream reports (21a–c), no corresponding *de re* dream report is available, (21a'–c') are all judged to be infelicitous.

(20) SUB-CONTEXT C – PREDICATION CONTEXT IN THE DREAM: Afterwards, when John meets Mike, the editor, he tells Mike that he thinks the review is old-fashioned and has a weird empathy for baldness, and John says: ‘I was thinking about the review even in my dream, and in my dream, I came to believe that the one who wrote that must be a bald man in his 90s.’ Mike discloses nothing to John, but later he tells the whole story to another person, Tim:

<i>de dicto</i> report		corresponding <i>de re</i> report	
a.	‘John dreams that the reviewer is a bald man in his 90s.’ ✓	a'.	‘John dreams that Mary is a bald man in his 90s.’ ✓
b.	‘John dreams that a bald man in his 90s is the reviewer.’ ✗	b'.	‘John dreams that a bald man in his 90s is Mary.’ ✗
c.	‘John dreams that the reviewer and a 90-year old bald man are the same person.’ ✗	c'.	‘John dreams that Mary and a 90-year old bald man are the same person.’ ✗

(21) SUB-CONTEXT D – IDENTITY CONTEXT IN THE DREAM: Afterwards, John has a dream: in John’s dream, John and Mike, the editor, go to a party; there John sees an old man talking about John’s paper with others. When John wakes up, he calls Mike and tells Mike: ‘I had a dream. In my dream, I saw an old guy, more particularly, a bald man in his 90s, talking about my paper and I told myself that this guy must be the reviewer.’ Mike says nothing to John, but later Mike tells the whole story to another person, Tim:

<i>de dicto</i> report		corresponding <i>de re</i> report	
a.	‘John dreams that the reviewer is a bald man in his 90s.’ ✓	a’.	‘John dreams that Mary is a bald man in his 90s.’ ✗
b.	‘John dreams that a bald man in his 90s is the reviewer.’ ✓	b’.	‘John dreams that a bald man in his 90s is Mary.’ ✗
c.	‘John dreams that the reviewer and a 90-year old bald man are the same person.’ ✓	c’.	‘John dreams that Mary and a 90-year old bald man are the same person.’ ✗

Since the judgments under the predication dream context (20) pattern with the judgments under the context (12), and the judgments under the identity dream context (21) pattern with the judgments under the context (13), at least with regard to the phenomena under discussion in this paper, we don’t need to have a fundamentally different treatment for attitude reporting predicates *dream* and *think*. As (22) illustrates, small changes on the specification of possible worlds are sufficient:⁸

$$(22) \quad \begin{aligned} \llbracket (20a) \rrbracket &= \llbracket \text{John dreams that the reviewer is}_{\text{asym}} \text{ a bald man in his 90s} \rrbracket_{\text{de dicto}}^{w_0} \\ &= \forall w'' \in \text{Dream}_{w_0}(\text{John}) [\text{being a bald man in his 90s in } w''(w'') (\mathbb{R}^{w' \in \text{Dox}_{w_0}(\text{John})})] \\ &\text{i.e., every world } w'' \text{ in the set of John’s dream worlds is such that the property of ‘being a} \\ &\text{90-year-old bald man in } w'' \text{’ holds in } w'' \text{ for the } \textit{res} \text{ named ‘the contextually unique reviewer} \\ &\text{in } w' \text{ (} w' \text{ is in the set of John’s belief worlds)’} \end{aligned}$$

7 Discussion II: Frege’s Puzzle on Identity Statements

Frege 1892 formalizes the natural language expression *A is B* as ‘*A = B*’ and raises the following question: Why do ‘*A = A*’ and ‘*A = B*’ have different cognitive values? To solve the puzzle, Frege innovated the distinction between extensional and intensional meanings. However, his analysis suggests that it adopts these two assumptions: (i) the two parts connected by ‘=’ have the same type, i.e., they are either both extensional or both intensional; (ii) ‘=’ represents an equivalence relation. Therefore, Frege 1892 cannot give a satisfactory answer to its puzzle: When *A* and *B* are of the same type, it seems that the cognitive difference between ‘*A = A*’ and ‘*A = B*’ remains unaccounted for.

As I have shown in my analysis, in natural languages, such words as symmetric *be* express an **identity relation**, which is essentially a double predication and thus is fundamentally different from a **(value) equivalence relation**. This analysis very naturally accounts for Frege’s puzzle: Since the property coerced from a *res* necessarily holds for that *res* itself, it follows naturally that such sentences as (23a) are tautologies that do not provide new information; in contrast, (23b) and (23c) are informative, because the predications here are not tautological and provide new information.

$$(23) \quad \begin{aligned} \text{a. } \llbracket \text{Tully is Tully} \rrbracket^w &= P_{(w, \text{Tully})}(w)(\text{Tully}) && \rightsquigarrow \text{ a tautology} \\ \text{b. } \llbracket \text{Tully is}_{\text{sym}} \text{ Cicero} \rrbracket^w &= P_{(w, C)}(w)(T) \wedge P_{(w, T)}(w)(C) && \rightsquigarrow \text{ an identity statement} \\ \text{c. } \llbracket \text{Tully is}_{\text{asym}} \text{ Cicero} \rrbracket^w &= P_{(w, \text{Cicero})}(w)(\text{Tully}) && \rightsquigarrow \text{ a predication statement} \end{aligned}$$

Thus, the current analysis converges with Fine’s (2007) main idea on the semantic relationism: Sometimes, the interpretation of a linguistic expression (e.g., *Tully* in *Tully is Cicero*) does not solely depend on itself, but crucially on its relation with other elements in a sentence.

⁸Ninan (2008, 2012) argues that imagination reports should be analyzed differently from belief reports, and here is his argument: An attitude holder, say Ralph, is acquainted with a *res*, say Orcutt, through seeing this *res* playing football, and in this context, the *de re* report *Ralph imagines that Orcutt is not playing football* is felicitous if Ralph indeed has such an imagination. Ninan (2008, 2012) claim that such data challenge the neo-Russellian-style analysis for *de re* reports, since the property $\lambda w. \lambda x. \text{play football}(w)(x)$ has to both (i) **hold** for the *res* (∴ Ralph is acquainted with the *res* through seeing him playing football) and (ii) **not hold** for the *res* (∴ Ralph imagines the *res* is not playing football). I think Ninan’s (2008, 2012) argumentation is not valid, since here the world variables taken by the property can be different. (Consider also such non-counterfactual/non-imaginary sentences as *The escaped prisoners are back in custody* (see e.g., Keshet 2010); see also Yanovich 2011 for an argumentation against Ninan 2008’s view; my analysis in (22) is similar to Yanovich 2011’s analysis.)

8 Summary and Outlook

In this paper, based on empirical evidence from attitude reports, I motivate the existence of symmetric *be* and argue that in natural languages, the identity relation is not a primitive, but a double predication. In Zhang (to appear), I will extend the current account for symmetric *be* to analyze the adjective *same*.

There is one remaining issue: Orin Percus (p.c.) points out that in the identity context (see (13) and (21)), the sentence *John thinks/dreams that Mary is talking about his paper* has no felicitous *de re* reading. Presumably, in such a context, the felicity of this attitude report depends on whether the character representing the anonymous reviewer in John's inner story (i.e., the *res*) has already some properties (e.g., being a bald man in his 90s) that do not hold for the actual reviewer Mary; if the narrator thinks so, then there is no co-reference relation between $\llbracket \text{Mary} \rrbracket$ and $\llbracket \text{the reviewer} \rrbracket^{w' \in \text{Dox}_{w_0}(\text{John})}$. A full account for Percus' puzzle probably needs a dynamic semantics that keeps track of introducing *res*, adding properties to *res*, and integrating *res*, and this is left for future research.

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