

Apparent *de re* Construals of *de se* Anaphor in Japanese*

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1. Non-local binding of *zibun*

Japanese reflexive pronoun *zibun* self is sometimes bound by a non-local antecedent. This is possible for *because*-clauses, but not available for *when*-clauses.

- (1) Mari-ga zibun_i-ni mizu-o kake-ta {*toki/node},
Mari-NOM self_i-DAT water-ACC pour-PAST {*when/because},
Takasi_i-wa zubu-nure-ni nat-ta.
Takasi-TOP drenched becomes-PAST
{*When/Because} Mari poured water on self_i, Takasi_i became
drenched.’ (Nishigauchi 2014: 162,(12))

One might argue that the matrix subject c-commands the adverbial clauses in its base position, as shown in (2). If this is the case, (1) is not really a case of

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non-local binding.¹

- (2) Takasi_i-wa, Mari-ga zibun_i-ni mizu-o kake-ta
 Takasi_i-TOP Mari-NOM self_i-DAT water-ACC pour-PAST
 {??toki/node}, zubu-nure-ni nat-ta.
 { when/because}, drenched becomes-PAST
 ‘Takashi_i became drenched because Mari pour water on self_i.’

We check if the matrix subject c-commands the adverbial clause in its base position by using bound variable anaphora. (3) shows that the universal quantifier *dono-IT-kigyo-mo* ‘every IT company’ binds the pronoun *soko* ‘there’, resulting in a co-varying reading.

- (3) dono_i-IT-kigyo-mo [soko_i-no kyogoo-kaisha-ga
 every_i-IT-company-MO [there_i-GEN competitor-company-NOM
 kigyo supai-o okut-ta {toki/node}], shinseihin-no
 company’s spy-ACC send-PAST {when/because}], new product-GEN
 hanbai-seiseki-ga nobi-nakat-ta.
 sales-performance-NOM increase-NEG-PAST
 ‘Because its competitor’s company sent a company spy, every IT
 company didn’t increase the sales-performance.’

If the matrix subject c-commands the adverbial clause in its base position, (4) should allow a bound variable reading of *soko* ‘there’. However, (4) lacks a co-varying reading, i.e. *soko* ‘there’ cannot be bound by *dono-IT-kigyo-mo* ‘every IT company’. This shows that (3) is rather a structure after the movement of the matrix subject.

- (4) * [soko_i-no kyogoo-kaisha-ga kigyo supai-o
 [there_i-GEN competitor-company-NOM company’s spy-ACC
 okut-ta {toki/node}], dono_i-IT-kigyo-mo
 send-PAST {when/because}], every-IT-company-MO
 shinseihin-no hanbai-seiseki-ga nobi-nakat-ta.
 new product-GEN sales-performance-NOM increase-NEG-PAST
 ‘Because its competitor’s company sent a company spy, every IT
 company didn’t increase the sales-performance.’

Thus, we conclude that the matrix subject *Takasi* does not c-command the adverbial clause in (1), and (1) is indeed a case of non-local binding of *zibun*.²

¹Note that this non-local binding of *zibun* in the *when* clause in (1) is not bad as (2). Although this subtle contrast is interesting on its own, this is irrelevant to our argument here.

²We thank to D. Oshima (p.c.) for pointing out this potential problem.

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Another relevant example is a psych-verb construction as in (5a); *Takasi* can bind *zibun* in (5a), but not in (5b).³

(5) a. Psych-verb constructions:

[C kyoozyu-ga zibun_i-o in'yoo-sita koto]-ga Takasi_i-o
 [Prof. C.-NOM self-ACC quote-Past that]-NOM Takashi-ACC
 utyooten-ni si-ta.
 crazy-DAT make-Past

‘That Prof.C quoted him make Takashi crazy.’

b. Causative verb constructions:

* [C Kyoozyu-ga zibun_i-o in'yoo-shita koto]-ga
 [Prof. C.-NOM self-ACC quote-Past that]-NOM
 Takasi_i-o yuumei-ni si-ta.
 Takasi-ACC famous-DAT make-Past

‘That Prof. C quoted him made Takashi famous.’

(Nishigauchi 2014: 188–189,(79)–(80))

Thus, the question is how non-local binding of *zibun* is licensed in these environments. A crucial factor here is attitude *de se*. Although non-locally bound *zibun* is often argued to be obligatorily *de se*, there are some counterexamples. In particular, a *de se* reading is only optional with the possessive *zibun* (Hara 2006). However, we will show that a *de se* reading is obligatory with non-local *zibun* in an argument position. In this paper, we focus on this issue and discuss the conditions for *zibun* at the possessor position to be *de se*. Specifically, we argue that the distribution of *de se* readings shows that *zibun* is sensitive to self-ascriptivity of a relation, but a non-self-ascriptive relation can also non-locally bind *zibun* as long as it can take a property-type argument. That is, the availability of *de se* readings relies on self-ascriptivity, but the availability of non-local binding relies on the semantic type of its binder. This is an extension of the *de se* binding approach (Chierchia 1990; Pearson 2016, among others) and we will call it a *property binding* approach. We will show a novel interaction of attitudinal *de se* and non-locally bound *zibun* with respect to complex verbs and *because*-clauses.

The rest of this paper is organised as follows: §2 introduces the notions of property-binding and self-ascriptivity with reference to Chierchia (1990). §3 discusses independent diagnostics to check if a predicate takes a property-taking argument and denotes self-ascriptive relations. The result shows that

³ Although we will not discuss it here, it has been argued in the literature that object experiencer verbs take a sentential subject as an external argument (cf. Landau 2010), but not as an internal argument that is later raised to the subject position (pace Belletti and Rizzi 1988).

these diagnostics predict when *zibun* can bind non-locally and when it is obligatorily *de se*. We conclude this paper in §4.

2. *Zibun* as an obligatorily *de se* anaphor

In this section, we start with the hypothesis that *zibun* in Japanese is an obligatorily *de se* anaphor. However, it suffers from counterexamples, namely the apparent *de re* construal of *zibun*. §2.1 introduces the notion of *de se* readings and exemplifies them with English PRO. In §2.2, we introduce Chierchia’s (1990) *de se* binding approach to English PRO and assimilate it to *zibun*. §2.3 lays out the main challenge to this idea: non-locally bound *zibun* does not always induce a *de se* reading.

2.1. PRO and attitude *de se*

Briefly put, attitude *de se* is a phenomenon that requires *self-ascription* of the attitude holder. On the other hand, the attitude holder does not have self-ascription in cases of *de re* readings. Some anaphor only allow a *de se* reading, whereas others allow both. In English, PRO is usually obligatorily *de se*, whereas overt pronouns are not. It becomes clear under **mistaken identity scenarios** such as (6).

- (6) **Context:** Ann was watching an old video. A girl was winning in a race and she expected her to win. However, she didn’t realise that the girl was Ann when she was a child.
- a. Ann expected [that she will win].
⇒ TRUE (*de se* reading or *de re* reading)
 - b. Ann expected [PRO to win]. ⇒ FALSE or # (only *de se* reading)

In the context (6), Ann is not aware that the girl she expected to win was herself. In other words, this context lacks self-ascriptivity of Ann. Although the overt pronoun “she” can be felicitously and truthfully used in this context, as in (6a), PRO leads to either falsity or infelicity, as in (6b). Thus, PRO in English is an obligatorily *de se* anaphor.

In this regard, *zibun* in Japanese behaves like PRO in English. (7) is false or infelicitous under the same scenario as (6).

- (7) Ann-ga [zibun-ga kats-u koto]-o kitai-sita.
Ann-NOM [self-NOM win-PRES that]-ACC expect-PAST
‘Ann expected to win.’ ⇒ FALSE or # (only *de se* reading)

2.2. Attitude *de se* and property binding

Let’s see how the obligatory *de se* reading arises in cases of PRO in English. Chierchia (1990) proposes the *de se binding* approach, which is based on Lewis (1979); self-ascription is attribution of properties in a given world to

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an individual. Building on this, Chierchia (1990) proposes that PRO requires a *de se binder* at C^0 as in (8a). Embedded CPs denote properties of $\langle e, \langle st \rangle \rangle$. Attitudes are now modeled as quantification over *centered worlds*, i.e. pairs of worlds and individuals which the attitude holder takes to be candidates of the actual world and him/herself.

- (8) a. $[\text{CP}_1 \lambda w_i [\text{IP}_1 \text{Ann expected in } w_i [\text{CP}_2 \lambda x_j \lambda w_k [\text{IP}_2 \text{PRO}_j \text{ to win in } w_k]]]]$
 b. $[\text{expect}] = \lambda P_{\langle e, \langle st \rangle \rangle} \lambda x \lambda w. \forall \langle y, w' \rangle \in \text{EXPECT}_x^w P(y)(w')$
 (Pearson 2016)

To define those predicates which can bind PRO, Chierchia (1990) defines *self-ascriptivity* of relations.

- (9) **Self-ascriptivity:** an n -place relation R is *self-ascriptive* iff it (asymmetrically) licenses the following entailment;
 $R(\dots x \dots Q \dots) \rightarrow R(\dots x \dots Q(x) \dots)$ (Chierchia 1990: 18,(27))

One can confirm that the control predicate *expect* meets self-ascriptivity.

- (10) a. Ann expected [PRO to win] \rightarrow Ann expect [that she will win.]
 b. Ann expect [that she will win.] $\not\rightarrow$ Ann expected [PRO to win]
 i. Q: [PRO to win] (PROPERTY)
 ii. Q(x): [that she will win](Ann) (PROPOSITION)

Chierchia (1990) notes that this is the semantic aspect of control. So, it should be understood as a way to define control predicates and not as a way to diagnose the semantics of predicates in general. However, at the same time, Chierchia (1990) notes that there are some control predicates which are not self-ascriptive. Some property-taking predicates, i.e. those which take an argument of type $\langle e, \langle st \rangle \rangle$, are obligatorily self-ascriptive, e.g. *believe*, *hope*, *want*, *expect*. However, some property-taking causative or eventive predicates, *force*, *make*, *succeed in* and *be nice of* are obligatorily non-self-ascriptive (Chierchia 1990: 17). This can be diagnosed by the absence of asymmetric entailment.

- (11) a. John forced Mary [PRO to leave]
 \rightarrow John forced Mary to bring about a situation where she leaves
 b. John forced Mary to bring about a situation where she leaves
 \rightarrow John forced Mary [PRO to leave]

Thus, with this approach, we can now understand why some predicates license non-local binding of *zibun*, whereas not every predicates does so. Psych-verb and *because* express a certain type of attitude and thus license attitude *de se* of *zibun*, whereas causative verbs and *when* do not.

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2.3. Apparent *de re* construal of *zibun*

In this section, we discuss some cases in which non-locally bound *zibun* gives rise to an apparent *de re* reading (Hara 2006: 175–176). In (12a), Oedipus is not aware that Jocasta is his mother. And yet, (12b) can felicitously be true in this context. This shows that non-locally bound *zibun* tolerates a *de re* reading.

- (12) a. Context: Jocasta is Oedipus’ mother, but he does not know she is his mother and got married to her. Now, Jocasta fell down the stairs and bumped into Oedipus.
- b. [Zibun-no haha-ga koke-ta kara], Oedipus-wa
self-GEN mother-NOM fall-PAST because, Oedipus-TOP
koke-ta.
fall-PAST
‘Oedipus fell because self’s mother fell.’

(Hara 2006: slightly modified)

If non-local binding of *zibun* is licensed by attitude *de se*, this example is problematic. The same result is reproduced with a causative verb. (13b) is true under this context. This is another case in which non-locally bound *zibun* tolerates a *de re* reading.

- (13) a. Context: Laios is Oedipus’ father, but he does not know he is his father and Oedipus killed Laios at Phocis. Later on, Oedipus became the king because Laios was the previous king, but his position became empty due to his death. In effect, Oedipus becomes the king by killing his father, without knowing it.
- b. [Zibun-no chichi-ga korosa-re-ta koto]-ga Oedipus-o
[self-GEN father-NOM kill-PASS-PAST that]-NOM Oedipus-ACC
ou-ni-si-ta.
king-DAT-make-PAST
(Lit)‘That his father is killed makes Oedipus the king.’

However, notice that these exceptional cases of *de re* readings observed so far all involve the possessive *zibun*. As shown in (14), *zibun* in an argument position forces a *de se* reading. In (14a), Masaki is not aware that the dean helped him get a scholarship. Here, (14b) is either infelicitous or false. This shows that *zibun* in an argument position forces a *de se* reading.

- (14) a. Context: The dean strongly pushed the committee board to choose Masaki when they were to decide who gets a scholarship. However, he did not tell him this. So, Masaki is not aware of it and attributes this success to himself.

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- b. [Gakubuchoo-ga kossori zibun_i-o suisen-sita node]
 [Dean-NOM secretly self_i-ACC recommend-PAST because]
 Masaki_i-wa tokutaisei-ni erabare-ta.
 Masaki_i-TOP prioritised student-as chosen-PAST
 ‘Because the dean recommended self, Masaki was chosen as a student with a scholarship.’

In addition, it is not always the case that the possessive *zibun* tolerates a *de re* reading. For example, *zibun* lacks a *de re* reading with a psych-verb, as shown in (15). (15b) is either false or infelicitous in the *de re* context (15a), unlike (12b) and (13b).

- (15) a. Context: Laios is Oedipus’ father, but he does not know he is his father and Oedipus killed Laios at Phocis. Jocasta told him that her ex-husband, Laios was killed at Phocis and Oedipus is worried that he might be the guy who killed her ex-husband, without knowing he is his father.
- b. # [Zibun-no chichi-ga Phocis-de korosa-re-ta koto]-ga
 [self-GEN father-NOM Phocis-at kill-PASS-PAST that]
 Oedipus-o huan’ni-sase-ta.
 Oedipus-ACC uneasy-CAUS-PAST
 ‘That his father is killed at Phocis makes Oedipus uneasy.’

Thus, although the observed *de re* readings of non-locally bound *zibun* poses a challenge to the idea that *zibun* is an obligatorily *de se* anaphor, there seems to be a systematic pattern behind them. First, *zibun* in an argument position always induces a *de se* reading.⁴ Second, the availability of *de re* readings for the possessive *zibun* relies on certain types of predicates. In the next section, we offer two independent diagnostics to check if a predicate allows non-local binding and if it forces a *de se* reading of *zibun*.

⁴That being said, Oshima (2004) reports an interesting case in which *zibun* in an argument position allows a *de re* reading.

- i. Context: Amnesiac David, unknowingly reading his own biography, becomes fond of a female character, Mary. In a scene of the book, the hero of the book (David) saves her from death.
- ii. David_i-wa [zibun_i-ga Mary-o sukutte-kure-ta] to omotte-i-ru.
 David_i-TOP [self_i-NOM Mary-ACC save-BEN-PAST] that believed-ASP-PRES
 ‘David_i believes that he_i saved Mary.’ (Oshima 2004: 182)

Let us note two things here. First, both of the current authors do not agree with his judgment, so it might allow some inter-speaker variation. Second, he suggests that this case involves pragmatically provided empathic focus, which our current proposal has nothing to say about at this point. We will leave this for the future extension of this work.

3. Control-free diagnostics of attitude *de se*

In this section, we propose ways to diagnose (i) if a relation can take a property-type argument and (ii) if a relation is semantically self-ascriptive. These are independent of control constructions. Specifically, we check if a relation (i) can take a deverbal noun as its complement and (ii) is sensitive to the belief state of its argument. Non-local binding of the possessive *zibun* just requires (i), whereas a *de se* reading of it requires both.

3.1. Causative / Psych verbs

First of all, we classify complex verbs of the form “[... koto]-ga *x*-o *P*-ni-{*si* / *sase*}-ta” ([that...] makes *x* *P*) into two classes, namely *causative complex verbs* and *psychological complex verbs*. Then, we argue that causative complex verbs are non-self-ascriptive, whereas psychological complex verbs are self-ascriptive.

- (16) a. **Causative complex verbs are non-self-ascriptive.**
 e.g., *dame-ni-suru* (make someone spoiled), *ou-ni-suru* (make someone the king) ...
- b. **Psychological complex verbs are self-ascriptive.**
 e.g., *uchooten-ni-suru* (make someone crazy), *huan'-ni-sase-ru* (make someone uneasy) ...

The first thing to check is if these predicates can take a property-denoting argument. Availability of such an argument structure can independently be checked with compatibility of these with a deverbal nominal subject.

- (17) Causative complex verbs:
- a. Naganen'-no insyu-ga Taro-o dame-ni-sita.
 long years-GEN drinking-NOM Taro-ACC bad-DAT-PAST
 ‘(Taro’s / *Someone’s) drinking for long time ruined Taro.’
- b. CAUSE(λx [*x* drinks for long time])(λx [*x* is ruined])(Taro)
 \leftrightarrow Taro’s drinking for long time brings about Taro’s being ruined.
- (18) Psychological complex verbs:
- a. Kokosaikin-no seikoo-ga Taro-o uchooten'-ni-sita.
 these days-GEN success-NOM Taro-ACC crazy-DAT-PAST
 ‘(Taro’s / *Someone’s) being successful these days made Taro crazy.’
- b. CAUSE(λx [*x* is successful these days])(λx [*x* becomes crazy])(Taro)
 \leftrightarrow Taro’s being successful these days brings about Taro’s becoming crazy.

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Now, these complex verbs can take a property-denoting argument. The next question is if their causal relation is self-ascriptive or not. Unlike causative complex verbs, psychological complex verbs additionally require the object to believe the content of the sentential subject.

- (19) a. [Kyoogoo-ga jigyoo-ni shippai-sita koto]-ga
 [competitor-NOM project-DAT fail-PAST that]-NOM
 Masaki-o kanriskyoku-ni-si-ta.
 Masaki-ACC manager-DAT-make-PAST.
 (Lit) ‘That the competing company failed with their project made Masaki a manager.’
- b. Sikasi, Masaki-wa [kyoogoo-ga jigyoo-ni
 However, Masaki-TOP [competitor-NOM project-DAT
 shippai-sita koto]-ni kidui-tei-na-i.
 fail-PAST that]-DAT notice-PERF-NEG-PRES
 ‘However, Masaki did not notice that the competing company failed with their project.’
- (20) a. [Kyoogoo-ga jigyoo-ni shippai-sita koto]-ga
 [competitor-NOM project-DAT fail-PAST that]-NOM
 Masaki-o uchooten’-ni-si-ta.
 Masaki-ACC crazy-DAT-make-PAST.
 ‘That the competing company failed with their project made Masaki crazy.’
- b. # Sikasi, Masaki-wa [kyoogoo-ga jigyoo-ni
 However, Masaki-TOP [competitor-NOM project-DAT
 shippai-sita koto]-ni kidui-tei-na-i.
 fail-PAST that]-DAT notice-PERF-NEG-PRES
 ‘However, Masaki did not notice that the competing company failed with their project.’

The original idea of Lewis (1979) is that self-ascription is attribution of propositions true in a world *w* to an individual *x*. In this sense, the contrast above shows that psychological complex verbs involve self-ascription.

The results of the two diagnostics are summarised in Table 1.

	Causative	Psychological
Property-taking	✓	✓
Self-ascriptive	×	✓

TABLE 1 Semantics of complex verbs

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3.2. Because-clause

Now, we can examine if *because*-clauses can (i) take a property-denoting argument and (ii) denote a self-ascriptive relation. We start with the availability of a property-denoting argument. First, *kara* can take a deverbal nominal complement and behaves in parallel with causative complex verbs.

- (21) a. ? [Naganen'-no insyu kara], Taro-ga taichoo-o
 [long years-GEN drinking because₁], Taro-NOM health-ACC
 kuzusi-ta.
 worsen-PAST
 '(Taro's / *Someone's) drinking for a long time made Taro sick.'
- b. CAUSE(λx [x drinks for a long time])(λx [x gets sick])(Taro)
 \leftrightarrow Taro's drinking for a long time brings about Taro's being sick.

In contrast, *node* only takes a clausal complement, but not a nominal complement.

- (22) * [Naganen'-no insyu node], Taro-ga taichoo-o
 [long years-GEN drinking because₂], Taro-NOM health-ACC
 kuzusi-ta.
 worsen-PAST
 'Taro got sick because drinking for a long time ruined Taro.'

Considering that they both encode a causal relation, we assume that they share the same semantics, at least as far as *zibun* is concerned. Thus, *because* can take a property-denoting argument. Next, we discuss self-ascriptivity of *because*. This depends on predicates in the matrix clause.

- (23) a. [Kutsumo-ga hodoke-ta {kara/node}],
 [shoelace-NOM untied-PAST {because₁/because₂}],
 Masaki-wa koke-ta.
 Masaki-TOP fall-PAST
 'Masaki fell because the shoelace was untied.'
- b. Sikasi, Masaki-wa [kutsumo-ga hodoke-ta koto]-ni
 However, Masaki-TOP [shoelace-NOM untied-PAST that]-DAT
 kidui-tei-na-i.
 notice-PERF-NEG-PRES
 'However, Masaki did not notice that the shoelace was untied.'

(23) describes a pure causal chain link which leads to the falling of Masaki. For this, Masaki does not need to know that the shoelace was untied because this chain of events is independent of Masaki's belief. On the other hand, (24) describes the reason for Masaki's intentional action.

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- (24) a. [Kutsuhimo-ga hodoke-ta {kara/node}],
 [shoelace-NOM untied-PAST {because₁/because₂}],
 Masaki-wa tachidomat-ta.
 Masaki-TOP stop-PAST
 ‘Masaki stopped walking because the shoelace was untied.’
- b. # Sikasi, Masaki-wa [kutsuhimo-ga hodoke-ta koto]-ni
 However, Masaki-TOP [shoelace-NOM untied-PAST that]-DAT
 kidui-tei-na-i.
 notice-PERF-NEG-PRES
 ‘However, Masaki did not notice that the shoelace was untied.’

For this, Masaki has to know that the shoelace was untied because Masaki made his decision based on this fact. Thus, we conclude that *because* optionally involves an epistemic modal flavour and it is self-ascriptive with it. If so, *zibun* is expected to be obligatorily *de se* under the epistemic *because*. This is indeed the case.

- (25) a. Context: Jocasta is Oedipus’ mother, but he does not know she is his mother. Now, Jocasta fell down the stairs when Jocasta walked after him. Oedipus stopped walking and ran to her.
- b. # [Zibun-no haha-ga koke-ta {kara/node}],
 [self-GEN mother-NOM fall-PAST {because₁/because₂}],
 Oedipus-wa tachidomat-ta.
 Oedipus-TOP stop-PAST
 ‘Oedipus stopped walking because self’s mother fell.’

In (25a), Oedipus is not aware that Jocasta is his mother. Unlike (12b) in the context (12a), (25b) can only be infelicitous or false in the context (25a). This contrast is indeed expected: (12b) uses the pure causational *because* just like (23), whereas (25b) uses the epistemic *because* just like (24). The former is non-self-ascriptive and the latter is self-ascriptive.

The results of the two diagnostics are summarised in Table 2.⁵

⁵ This approach does not make an inherent distinction between *because* and *when*. Indeed, a *when*-clause licenses non-local binding of *zibun* in some cases.

- i. [Hanako-ga zibun_i-o hidoku nonosi-tta toki] (mo), Taro_i-wa nani-mo
 [Hanako-NOM self_i-ACC harshly abuse-PAST when] (MO) Taro-TOP nothing-MO
 iikaesoo-to shi-naka-tta.
 respond do-NEG-PAST
 ‘When Hanako harshly abused self_i, Taro_i did not try to say anything about it.’
- ii. [Hanako-ga zibun_i-no kyookasho-ni rakugaki shi-ta toki], Taro_i-wa
 [Hanako-NOM self_i-GEN textbook-DAT doddle do-PAST when], Taro_i-TOP
 sugu-ni sono-koto-o Hanako-no ryooshin-ni tsugeguchi-sita.
 immediately that-thing-ACC Hanako-GEN parents-DAT tell-PAST

<i>Because</i>	Pure causalional	Epistemic
Property-taking	✓	✓
Self-ascriptive	×	✓

TABLE 2 Semantics of *because*

3.3. Summary

We started with the distribution of *de re* readings in §2.3. Whether a predicate can take a property-denoting argument and whether a predicate can denote a self-ascriptive relation are independently testable. The result is summarised in Table 3.

	Causative complex Pure causalional <i>because</i>	Psychological complex Epistemic <i>because</i>
Property-taking	✓	✓
Self-ascriptive	×	✓
Reading	<i>de re</i> allowed	<i>de re</i> disallowed

TABLE 3 Classification of causative predicates

Property-causation and self-ascriptivity can be defined as in (26).

- (26) a. Property-Causation:
 $\text{CAUSE}(P)(Q) \leftrightarrow \lambda x \lambda w [P(x)(w) \text{ brings about } Q(x)(w)]$
- b. Self-ascriptive relation:
 $R(x)(w) \dots (P) \leftrightarrow \forall_{\langle w', y \rangle} \in \text{ATTITUDE}_x^w \{ \langle y, w' \rangle : y \text{ is the candidate of } x\text{'s self in } w' \text{ accessible from } w \text{ based on the given attitude and } R(y)(w') \dots (P) \}$

With these two properties, the relevant aspects of the complex verbs and two-types of *because* are defined as in (27) and (28).^{6,7}

⁶When Hanako scribbled on self_i's textbook, Taro_i immediately told it to Hanako's parents.' (D. Oshima p.c.)

Now, the question is why non-local binding of *zibun* is more restricted for *when*-clauses. Note that the semantics of *when* is underspecified compared with *because*. Thus, one may argue that this underspecification requires contextual support to provide an appropriate semantic ground for property binding. We leave this issue for future research.

⁶We assume that natural language semantics involve the expressive power of object language quantification over possible worlds (Cresswell 1990, among others).

⁷At this stage, we simply assume that psychological complex verbs and epistemic *because* quantifies over doxastic alternatives, whereas causative complex verbs and the causative *because* do not. However, a more appealing alternative would be to say that causative complex verbs and

- (27) a. Causative Complex Verbs:
 $\llbracket Q \textit{ ni suru} \rrbracket = \lambda P_{\langle e, \langle st \rangle \rangle} \lambda Q_{\langle e, \langle st \rangle \rangle} \lambda x \lambda w [P(x)(w) \& \text{CAUSE}(P)(Q)(x)(w)]$
- b. Psychological Complex Verbs:
 $\llbracket Q \textit{ ni suru} \rrbracket = \lambda P_{\langle e, \langle st \rangle \rangle} \lambda Q_{\langle e, \langle st \rangle \rangle} \lambda x \lambda w [P(x)(w) \& \forall y, w' \in \text{DOX}_x^w [P(y)(w') \& \text{CAUSE}(P)(Q)(y)(w')]]$
- (28) a. Causative *because*:
 $\llbracket \textit{node / kara} \rrbracket = \lambda P_{\langle e, \langle st \rangle \rangle} \lambda Q_{\langle e, \langle st \rangle \rangle} \lambda x \lambda w [P(x)(w) \& \text{CAUSE}(P)(Q)(x)(w)]$
- b. Epistemic *because*:
 $\llbracket \textit{node / kara} \rrbracket = \lambda P_{\langle e, \langle st \rangle \rangle} \lambda Q_{\langle e, \langle st \rangle \rangle} \lambda x \lambda w [P(x)(w) \& \forall y, w' \in \text{DOX}_x^w [P(y)(w') \& \text{CAUSE}(P)(Q)(y)(w')]]$

4. Conclusion

In this paper, we have argued for a property-binding approach to *zibun*, which builds on the *de se* binding approach to English PRO (Chierchia 1990; Pearson 2016, among others). Focusing on the distribution of *de se* readings of the possessive *zibun*, we have shown that non-local binding of the possessive *zibun* just requires a property-taking predicate, whereas *de se* construal of it additionally requires self-ascriptivity of a relation that the predicate denotes. This result is supported by the discussion of two types of complex verbs and two types of *because*. As a contribution, the discussion of this paper offers a better empirical picture of the distribution of apparent *de re* readings of *zibun*.

We have not explained why *zibun* cannot be bound in (5b) despite the fact that *yuumei-ni-suru* (make one famous) is a causative complex verb. Note that the possessive *zibun* allows non-local binding in the same environment, tolerating a *de re* reading.

- (29) a. Context: Takasi noticed that his personal website recently got as many accesses as big names in his field. This is because Prof. C cited Takasi’s paper in his manuscript, but Takasi has not noticed this yet.

causative *because* also involve quantification, but in a different way. One option is to say that causative complex verbs and pure causal *because* quantify over doxastic alternatives of the speaker, instead of the attitude holder. This option correctly accounts for the absence of self-ascriptivity with respect to the subject in the embedded clause. We thank Ezra Keshet (p.c.) for pointing out this possibility. The other option is to adopt a possibilistic version of situation semantics and argue that psychological complex verbs and epistemic *because* involve inter-world quantification over situations. i.e. counterparts in an epistemically accessible possible world, whereas causative complex verbs and the causal *because* involve intra-world quantification over situations. Although both lines of approach would work, we leave this issue for future research.

- b. [C Kyoozyu-ga zibun_i-no-ronbun'-o in'yoo-shita koto]-ga
 [Prof. C.-NOM self-GEN-article-ACC quote-PAST that]-NOM
 Takasi_i-o yuumei-ni si-ta.
 Takasi-ACC famous-DAT make-PAST
 ‘That Prof. C quoted his paper made Takashi famous.’

It seems not to be coincidental that the possessive *zibun*, but not the argumental *zibun*, tolerates *de re* readings. Thus, their difference becomes most clear with non-self-ascriptive relations, as summarised in Table 4.

	Non-self-ascriptive	Self-ascriptive
Possessive	<i>de se / de re</i>	<i>de se</i>
Argument	*	<i>de se</i>

TABLE 4 Difference between the possessive *zibun* and the argumental *zibun*

Examination of this difference between the possessive *zibun* and the argumental *zibun* should be the next step.⁸

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⁸ Under our analysis, local binding of *zibun* requires a binding operator at VP-level. Interestingly, Chierchia (1990) argues that we should admit an operator at CP-level because such operator at VP-level is independently motivated by sloppy readings under VP-ellipsis. We can walk the same path from an opposite direction. If local binding of *zibun* requires VP-level operator, its subject-orientation follows. We will leave this for further research.