

# NOTES ON THE REFERENTIAL TRANSPARENCY OF PERCEPTION AND FACTIVE VERB COMPLEMENTS\*

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## 1. Introduction

Referential opacity of the complements of verbs of ‘propositional attitude’ has been a major research topic since Frege (1892). While (1a) implies the existence of a unicorn, (1b) does not.

- (1) a. Mary saw a unicorn
- b. John said/thought that Mary saw a unicorn

At the same time, it is known that some clausal complements are referentially transparent. Higginbotham (1983) discusses small clause complements of perception and causative verbs, as in (2), and attributes the referential transparency to the interpretation of those complements as indefinite descriptions of events.

- (2) a. Mary saw John hit a unicorn
- b. Mary made John hit a unicorn

Kiparsky and Kiparsky (1970) examine the properties of factive verb complements, including their referential transparency. Representative examples are provided in (3).

- (3) a. John regrets that he hit a unicorn
- b. Mary forgot that she hit a unicorn

The purpose of this paper is to discuss the referential transparency of perception and factive verb complements in the light of some relevant Japanese data. Japanese employs two distinct complementizers, *to* and *no*, for what appears to be propositional complements. As shown in detail in Saito (2012), *to* heads the CP complements of verbs of saying and

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thinking whereas *no* heads complements that are interpreted as events, states or actions. This distinction allows us to draw a number of conclusions on the semantics of clausal complements and their referential opacity and transparency. For example, although perception verbs and factive verbs have been analyzed independently with respect to the referential transparency of their complements, the Japanese counterparts of (2a) and (3) both contain CP complements headed by *no*. This suggests that they should be analyzed in the same way. I argue in this paper that Higginbotham's (1983) individual event analysis of perception verb complements should be extended to factive verb complements.

In the following section, I survey the complementizer system of Japanese and show that the distributions of *to* and *no* provide direct evidence for Davidson's (1967, 1968-69) theory, which assumes 'events' and 'utterances' to be fundamental concepts in semantic representation. In Section 3, I go over Higginbotham's (1983) individual event analysis of perception verb complements and apply the analysis to the corresponding Japanese examples. I show that the Japanese examples provide evidence for the analysis and that the analysis should be extended to finite CPs. In Section 4, I turn to factive verb complements. I first argue that the individual event analysis should be extended to them. Then, I suggest that the differences between the complements of perception verbs and factive verbs are due to independent factors. Section 5 concludes the paper.

## 2. Types of Clausal Complements in Japanese: Evidence for Davidsonian Semantics

There are three complementizers, *no*, *ka*, and *to*, in Japanese, as shown in (4)-(6).

- (4) Taroo-wa [<sub>CP</sub> Ziroo-ni atta no]-o kookaisiteiru  
 -TOP -DAT met *no*-ACC regret

'Taroo regrets that he met Ziroo'

- (5) Taroo-wa [<sub>CP</sub> Hanako-ga dare-ni atta ka] tazuneta  
 -TOP -NOM who-DAT met *ka* inquired

'Taroo asked who Hanako met'

- (6) Taroo-wa [<sub>CP</sub> Hanako-ga Ziroo-ni atta to] omotteiru  
 -TOP -NOM -DAT met *to* think

'Taroo thinks that Hanako met Ziroo'

*Ka*, as instantiated in (5), is employed for questions. For the other two, I argued in Saito (2012) that CPs headed by *no* are interpreted as descriptions of events, states or actions whereas *to* embeds paraphrases of direct discourse in the sense of Plann (1982). In this section, I briefly go over the properties of these complementizers and point out the initial implications for the analysis of clausal complements. I show that the distinction in distribution between *no* and *to* provides clear evidence for Davidson's (1967, 1968-69)

proposal that ‘events’ and ‘utterances’ play important roles in semantic analysis.

Let us start with the examination of *to*. *To* can be a marker of direct quotation as in (7) but can also embed indirect discourse as in (8).

(7) Hanako-ga, “Watasi-wa tensai da,” to itta /omotta (koto)  
 -NOM I-TOP genius be *to* said/thought fact  
 ‘(the fact that) Hanako said/thought, “I’m a genius”’

(8) Hanako-ga [zibun-ga tensai da to] itta /omotta (koto)  
 -NOM self-NOM genius be *to* said/thought fact  
 ‘(the fact that) Hanako said/thought that she is an genius’

*To* as in (8) has been widely considered the Japanese counterpart of the English complementizer *that* because it appears in the CP complements of typical bridge verbs such as *iw* ‘say’ and *omow* ‘think’. However, there are many notable differences between *to* and *that*. For example, *to* can embed questions as in (9).

(9) Taroo-wa Hanako-ni [<sub>CP</sub> [<sub>CP</sub> zibun-no imooto-ga soko-ni ita ka] to] tazuneta  
 -TOP -DAT self-GEN sister-NOM there-at was *ka to* inquired  
 ‘Taroo asked Hanako whether his sister was there’

Examples like (9) indicate that *to* is more similar to the Spanish *que*, discussed in Plann (1982) and Rivero (1994). Plann points out that *que*, unlike *that*, can embed questions. Her examples are shown in (10).

(10) a. Te preguntan que para qué quieres el préstamo  
 you ask(3pl.) that for what want(2sg.) the loan  
 ‘They ask you what you want the loan for’

b. Pensó que cuáles serían adecuados  
 thought(3sg.) that which ones would be appropriate  
 ‘He wondered which ones would be appropriate’

c. Sabía que corría  
 knew(3sg.) that run(3sg.)  
 ‘He knew that he was running’

Questions are embedded under *que* in (10a-b) whereas *que* embeds a ‘propositional complement’ in (10c). Plann goes on to show that the matrix verbs that allow *que* to embed questions are not those that select questions but instead verbs of saying and thinking, that is, verbs that can co-occur with direct quotation. Thus, *que* is disallowed

with the matrix verbs in (11).

- (11) Ya supieron /entendieron /recordaron (\*que) por qué lo  
 already found out(3pl.)/understood(3pl.)/remember(3pl.) that why it  
 habías hecho  
 had(2sg.) done

‘They already found out/understood/remembered why you had done it’

Given this, Plann proposes that *que* is ambiguous. It embeds paraphrases of direct discourse in (10a-b) and heads a ‘propositional complement’ in (10c).

If *que* can embed paraphrases of direct discourse, then it is predicted that it can take various kinds of sentences as its complements. Rivero (1994) points out that the prediction is indeed borne out. In her example (12a), an imperative sentence is embedded under *que*.

- (12) a. Dijo que a no molestarle  
 said (3sg.) *que* to not bother-him

‘He said not to bother him’

- b. Dijo, “A no molestarme!”  
 said (3sg.) to not bother-me

‘He said, “Don’t bother me!”’

(12b) contains a direct quotation and the embedded object clitic is first person. In (12a), *que* embeds an imperative sentence with a third person object clitic.

The Japanese *to* provides explicit evidence for Plann’s dual analysis of *que*. First, it embeds various kinds of sentences as shown in (13).

- (13) a. Hanako-wa Taroo-ni [<sub>CP</sub> kanozyo-no ie-ni iro to] meizita  
 -TOP -DAT she-GEN house-at be *to* ordered

‘Hanako ordered Taroo to be at her house’

- b. Hanako-wa Taroo-o [<sub>CP</sub> kanozyo-no ie-ni ikoo to] sasotta  
 -TOP -ACC she-GEN house-to go-let’s *to* invited

‘Hanako invited Taroo to go to her house’

The embedded sentence in (13a) is an imperative and that in (13b) expresses an invitation. Secondly, while *que* is ambiguous, *to* is specialized for embedding paraphrases of direct discourse. (14) is a partial list of matrix verbs that select *to*.

- (14) Japanese verbs that select *to* : *omou* ‘think’, *kangaeru* ‘consider’, *sinziru* ‘believe’, *iu* ‘say’, *sakebu* ‘scream’, *syutyooosuru* ‘claim, insist’, *tazuneru* ‘inquire’, *kitaisuru* ‘expect, hope’, *kakuninsuru* ‘confirm’, *kanziru* ‘feel’ (all in non-past tense)

These are all verbs of saying and thinking, and are compatible with direct quotation. (10c) shows that *que* can head a ‘propositional complement’. The complementizer *no* appears in the Japanese counterpart of the example, as shown in (15).

- (15) Taroo-wa [<sub>CP</sub> Hanako-ga kare-no ie-ni kuru no]-o sitteita  
 -TOP -NOM he-GEN house-to come *no*-ACC knew  
 ‘Taroo knew that Hanako was coming to his house’

Then, the counterparts of the two *que*’s are distinguished phonetically in Japanese.

The matrix predicates that select *no* are listed in (16).

- (16) Japanese predicates that select *no* : *wasureru* ‘forget’, *kookaisuru* ‘regret’, *miru* ‘see’, *matu* ‘wait’, *tamerau* ‘hesitate’, *kyohisuru* ‘refuse’, *ukeireru* ‘accept’, *kitaisuru* ‘expect, hope’, *kakuninsuru* ‘confirm’, *kanziru* ‘feel’ (all in non-past tense)  
*akiraka-da* ‘clear-is’, *kanoo-da* ‘possible-is’, *kantan-da* ‘easy-is’, *muzukasii* ‘difficult-is’, *taihen-da* ‘big deal-is’ (all in non-past tense)

Those in the last two lines select *no*-headed CPs as subjects. The list shows that CPs headed by *no* are interpreted as descriptions of events, states or actions. For example, what one forgets is a past event/state or to perform an action. What one regrets is a past event or action. And what one waits for is a future event or state.

The difference in distribution between *to* and *no* indicates that ‘paraphrases of direct discourse’ and ‘descriptions of events, states and actions’ are clearly distinguished in language. This is not obvious with the English examples in (17) but the distinction can be observed in the Japanese examples in (18).

- (17) a. John thinks [<sub>CP</sub> that his sister went in London]  
 b. John forgot [<sub>CP</sub> that his sister went in London]

- (18) a. Taroo-wa [<sub>CP</sub> kare-no imooto-ga Rondon-ni itta to] omotteiru  
 -TOP he-GEN sister-NOM London-in went *to* think  
 ‘Taroo thinks that his sister went in London’

- b. Taroo-wa [<sub>CP</sub> kare-no imooto-ga Rondon-ni itta no]-o wasurete ita  
 -TOP he-GEN sister-NOM London-in went *no*-ACC forgot  
 ‘Taroo forgot that his sister went in London’

One semantic analysis that makes this distinction is Davidson's (1967, 1968-69). First, he assigns the semantic representation in (19b) to the event sentence in (19a).<sup>1</sup>

- (19) a. Mary opened the door with the key  
 b.  $\exists e$  [opened (Mary, the door, e) & with (e, the key)]

Among the arguments for (19b) is that it enables us to capture the inference from (19a) to 'Mary opened the door.' On the other hand, it is proposed in Davidson (1968-69) that sentences with verbs of propositional attitude have semantic representations that include 'utterances'. An example is shown in (20).

- (20) a. Galileo said that the Earth moves  
 b.  $\exists u$  [said (Galileo, u) & SS (u, that)] [The Earth moves]

(20b) states roughly that Galileo made the utterance *u* and *u* has the 'same-saying relation' with 'that', where the content of 'that' is that the Earth moves. Thus, events and utterances occur as individuals in semantic representations.

The distinction between *no*-headed CPs and *to*-headed CPs in Japanese fits very well with Davidson's proposals. The former are interpreted as descriptions of events as in (19b). I will elaborate on this in the subsequent sections. The latter, on the other hand, embed sentences that are in the 'same-saying relation' with direct quotations. The 'same-saying relation' in fact seems identical to Plann's (1982) 'paraphrase'. It is already pointed out in Lahiri (1991) that the distribution of *que* provides strong support for Davidson's analysis of sentences with propositional attitude verbs. The analysis readily accommodates examples where *que* takes question complements, for example. This is illustrated with a Japanese example with *to* in (21).

- (21) a. Taroo-wa [CP [CP dare-ga waratta ka] to] kiita /itta  
 -TOP who-NOM laughed *ka to* asked/said

'Lit. Taroo asked/said that who laughed'

- b.  $\exists u$  [asked/said (Taroo, u) & SS (u, that)]. [Who laughed?]

*No*-headed CPs and *to*-headed CPs are not only selected by different matrix verbs but also occupy different positions in the hierarchy of complementizers. An embedded clause in Japanese can contain all three of the complementizers as shown in (22).

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<sup>1</sup> Tense is ignored in (19b) and subsequent semantic representations in this section. 'e' stands for an event in Davidson's (1967) analysis, but I assume that sentences expressing states have similar representations. (ia) then is interpreted as in (ib).

- (i) a. John is tall  
 b.  $\exists s$  [tall (John, s)]

- (22) Taroo-wa [CP kare-no imooto-ga soko-ni ita (no) ka (to)] tazuneta  
 -TOP he-GEN sister-NOM there-in was *no ka to* inquired

‘Taroo asked whether his sister was there’

As *no* and *to* are optional, there are three possibilities for the complementizer sequence in the embedded clause; *no-ka*, *ka-to* and *no-ka-to*. These are in fact the only possible sequences of complementizers. This indicates that *no*, *ka* and *to* are hierarchically ordered as in (23).

- (23) [CP [CP [CP [TP ... ] *no*] *ka*] *to*]

In Saito (2012), I argued that thematic topics are not allowed within *no*-headed CPs but can appear recursively within CPs headed by *ka* or *to*. Then, adopting the proposal of Hiraiwa and Ishihara (2002) and Matsumoto (2010) that *no* is a Finite head, I concluded that the cartographic structure of the Japanese right periphery is as in (24).

- (24) [CP [CP [CP [CP [TP ... ] Finite (*no*)] Topic\*] Force (*ka*)] Report (*to*)]

This is quite similar to the structure of the left periphery proposed by Rizzi (1997), shown in (25), and hence, suggests the universal nature of the clausal periphery.

- (25) [CP Force [CP Topic\* [CP Focus [CP Topic\* [CP Finite [TP ...]]]]]]

The only differences are that (24) lacks the focus head but has the additional Report head.<sup>2</sup>

But the hierarchy in (23) itself demands an explanation. Further, (23) allows the sequence *no-to* but it is illicit as shown in (26).

- (26) Taroo-wa [CP kare-no imooto-ga soko-ni ita (\*no) to]] minna-ni itta  
 -TOP he-GEN sister-NOM there-in was *no to* all-DAT said

‘Taroo said to everyone that his sister was there’

The semantic distinction between *to*-headed CP and *no*-headed CPs illustrated above leads an explanation for the hierarchy and also accounts for the exception in (26). First, the sequence *no-ka* should be allowed as long as *ka* forms a question with a sentence that has a truth value. Karttunen (1977), for example, builds on Hamblin (1973) and proposes that a question refers to the set of true propositions that constitute answers to the question. This implies that questions are formed on sentences with truth values. Let us take the concrete example in (27).

- (27) a. John laughed ...  $\exists e$  [laughed (John, e)]  
 b. Who laughed

<sup>2</sup> ‘Report’ is the term Lahiri (1991) uses for the *que* that embeds paraphrases of direct discourse.

- c.  $\{\exists e [\text{laughed}(\text{John}, e)], \exists e [\text{laughed}(\text{Mary}, e)]\}$

The semantic representation of ‘John laughed’ is shown in (27a). (27b), according to Karttunen, refers to a set of true propositions. If John and Mary laughed, then it is the set of propositions expressed by ‘John laughed’ and ‘Mary laughed’. The set will be as in (27c) if Davidsonian semantic representations are substituted for ‘propositions’. Details aside, it should be clear that a question makes sense only if it is formed on a sentence that has a truth value (yes/no question) or on a clause that yields a sentence with a truth value when a referring term is substituted for the wh-phrase (wh-questions). As a description of an event as in (27a) has a truth value, it should be possible to form questions on *no*-headed CPs.

The *ka-to* sequence is more straightforward. It should be possible because *to* embeds a paraphrase of direct discourse and the paraphrased direct discourse can be a question, as discussed above. Let us then turn to the illicit sequences, *to-ka*, *to-no*, *ka-no*, and *no-to*. *To*-headed CP express paraphrases of direct discourse, and are not descriptions of states of affairs. It is reasonable to assume, then, that they are not assigned truth values.<sup>3</sup> Given this, it follows that the *to-ka* sequence is disallowed because questions are formed on sentences with truth values as just discussed. The *to-no* and *ka-no* sequences are ruled out because paraphrases of direct discourse and questions are not descriptions of events. Finally, the *no-to* sequence is illicit because *no*-headed CPs are interpreted as descriptions of events and not as paraphrases of direct discourse.

The brief account for the hierarchy in (23) and the illicitness of the *no-to* sequence just presented clearly needs to be made more precise. But it should be clear that the co-occurrence restrictions on the Japanese complementizers make sense only if *no*-headed CPs and *to*-headed CPs are semantically distinguished. The desired distinction obtains if the former are descriptions of events whereas the latter present paraphrases of direct discourse.

### 3. *No*-headed CPs as Perception Verb Complements

The distributions of *to* and *no* in Japanese enable us to reexamine some traditional issues in semantics from a new perspective. For example, let us compare the Japanese examples in (29) with the English examples in (28).

- (28) a. John thought that a unicorn would appear  
 b. John feared that a unicorn would appear

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<sup>3</sup> This does not mean that utterances and their paraphrases lack internal structure. Larson and Ludlow (1993), for example, propose that they refer to interpreted logical forms that specify co-reference and binding relations in addition to quantifier scopes.

- (29) a. Taroo-wa [<sub>CP</sub> kirin-ga arawareru to] omotta  
 -TOP kirin-NOM appear to thought

‘Taroo thought that a kirin would appear’

- b. Taroo-wa [<sub>CP</sub> kirin-ga arawareru no]-o osoreta  
 -TOP kirin-NOM appear no-ACC feared

‘Taroo feared that a kirin would appear’

The matrix verbs in these examples are assumed to be verbs of propositional attitude, and their CP complements are referentially opaque. Thus, none of them entails the existence of a unicorn or a kirin, a Chinese mythical animal. The identical syntactic forms of the CP complements of (28a-b) suggest that these examples are to be analyzed in the same way. But the CP complements in (29a-b) take different forms. According to the analysis presented in the preceding section, the CP complement in (29a) expresses a paraphrase of direct discourse whereas that in (29b) expresses a description of an event. Then, it seems that their referential opacity demands distinct analysis, and this may well be carried over to the analysis of (28a-b).

A similar point can be made on (30a-b), but in the opposite direction.

- (30) a. Mary saw a unicorn kick Bill  
 b. Mary regrets that she kicked a unicorn

The complements (30a) and (30b) are both referentially transparent, and the examples both entail the existence of a unicorn. Yet, as far as I know, their referential transparency has been treated separately because the perception verb complement in (30a) is a small clause whereas the factive verb *regret* in (30b) takes a finite CP complement. However, (31) shows that complements of perception and factive verbs have identical syntactic forms in Japanese.

- (31) a. Hanako-wa [<sub>CP</sub> kirin-ga Ziroo-o keru no]-o mita  
 -TOP kirin-NOM -ACC kick no-ACC saw

‘Hanako saw a kirin kick Ziroo’

- b. Hanako-wa [<sub>CP</sub> *pro* kirin-o ketta no]-o kookaisite iru  
 -TOP kirin-ACC kicked no-ACC regret

‘Hanako regrets that she kicked a unicorn’

Then, it is quite possible that the referential transparency of the complement arises in the same way in (31a-b) as well as in (30a-b).

In this section and the next, I pursue the second point by presenting a preliminary analysis of perception and factive verb complements in Japanese. In this section, I take

Higginbotham's (1983) analysis of perception verb complements in English as the starting point and show that it successfully explains the properties of their Japanese counterparts.

Higginbotham (1983), in reply to Barwise's (1981) argument for situation semantics, presents an extensional analysis for perception verb complements. The analysis directly incorporates Davidson's (1967) event semantics introduced above and proposes that perception verb complements are indefinite descriptions of events, as illustrated in (32).

- (32) a. John saw Mary hit Bill  
 b. John sees [ $\text{an } e$ : hit (Mary, Bill,  $e$ )] (at some time  $t$  in the past)  
 c. [ $\exists e$ : hit (Mary, Bill,  $e$ )] John sees  $e$  (at some time  $t$  in the past)

The small clause complement expresses an indefinite event as in (32b). As *see*, as opposed to *seek*, for example, is an extensional verb as shown in (33), the indefinite object takes scope over the main sentence as in (32c).

- (33) a. John saw a unicorn  
 b. John seeks a unicorn

The referential transparency of the small clause complement follows as the semantic representation for (30a) in (34a), for example, entails (34b).

- (34) a. [ $\exists e$ : [ $\exists x$ :  $x$  a unicorn] hit ( $x$ , Bill,  $e$ )] Mary sees  $e$  (at some time  $t$  in the past)  
 b. [ $\exists e$ ] [ $\exists x$ :  $x$  a unicorn] hit ( $x$ , Bill,  $e$ ) (at some time  $t$  in the past)

Higginbotham goes on to point out that the analysis yields the other properties of perception verb complements Barwise (1981) lists. A couple of those properties are shown below.

- (A) If John sees SC, then S, where SC is quantifier-free and S is the present-tense full clause corresponding to SC (small clause).  
 (B) Existential quantifiers taking scope over the small clause are exportable. In particular, all conditionals of the sort of (i) is true.  
 (i) If John sees somebody leave, then there is somebody whom John sees leave.

(A) is straightforward because (32c), repeated as (35a), for example, entails (35b).

- (35) a. [ $\exists e$ : hit (Mary, Bill,  $e$ )] John sees  $e$  (at some time  $t$  in the past)  
 b. [ $\exists e$ ] hit (Mary, Bill,  $e$ ) (at some time  $t$  in the past)

Higginbotham points out further that (A) holds even when SC contains a quantifier, as long as the quantifier is monotone increasing.<sup>4</sup> Thus, (36) is true.

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<sup>4</sup> A quantifier  $Q$  is *monotone increasing* if [ $Qx$ :  $A(x)$ ]  $B(x) \rightarrow$  [ $Qx$ :  $A(x)$ ]  $C(x)$ , where the extension of  $B(x)$  is contained in the extension of  $C(x)$ .

(36) If John saw somebody leave, then somebody left

He shows that this also follows from his individual event analysis as (37a) entails (37b).

- (37) a.  $[\exists e: [\exists x: x \text{ a person}] \text{ leave } (x, e)]$  John sees  $e$  (at some time  $t$  in the past)  
 b.  $[\exists e] [\exists x: x \text{ a person}] \text{ leave } (x, e)$  (at some time  $t$  in the past)

(B) is straightforward as well for the example because (38) is a logical consequence of (37a).

- (38)  $[\exists x: x \text{ a person}] [\exists e: \text{leave } (x, e)]$  John sees  $e$  (at some time  $t$  in the past)

Perception verb complements in Japanese fit well with Higginbotham's analysis. They uniformly take *no*-headed CPs as complements, as illustrated in (39).

- (39) a. Hanako-wa  $[_{CP}$  kirin-ga Ziroo-o keru no]-o mita (= (31a))  
 -TOP kirin-NOM -ACC kick *no*-ACC saw  
 'Hanako saw a kirin kick Ziroo'

- b. \*Hanako-wa  $[_{CP}$  kirin-ga Ziroo-o keru to] mita  
 -TOP kirin-NOM -ACC kick *to* saw

According to the analysis presented in the preceding section, *no*-headed CPs express descriptions of events. Then, Japanese provides explicit syntactic evidence for the individual event analysis. The semantic representation of (39a) is as in (40).

- (40)  $[\exists e: [\exists x: x \text{ a kirin}] \text{ kick } (x, \text{Ziroo}, e)]$  Hanako sees  $e$  (at some time  $t$  in the past)

As noted above, the CP complement in (39a) is referentially transparent. Thus, the sentence entails that there is a kirin. Examples like (39a) also exhibit the properties in (A) and (B). (39a) entails that a kirin kicked Ziroo and that there is a kirin such that Hanako saw it kick Ziroo. All these follow from the individual event analysis as Higginbotham demonstrated for the English examples.

As Higginbotham (1983) notes, one of the key ideas behind the individual event analysis is that perception verb complements are interpreted as noun phrases (that is, as indefinite descriptions of events) although they are syntactically small clauses. It is worth mentioning in relation to this that perception verb complements, and more generally *no*-headed CP arguments, in Japanese require Case, as can be seen in (39a).<sup>5</sup> Thus, perception verb complements in the language pattern with noun phrases in the syntax as well.

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<sup>5</sup> For this reason, *no* is often glossed as a "nominalizer." It is obviously nominal in nature in this context. But I am not concerned here with its precise categorial status, and continue to call it a complementizer.

One context in which a *no*-headed CP does not take Case is when it is embedded under the question C, *ka*, as in (42).

- (42) Taroo-wa [<sub>CP</sub> kare-no imooto-ga soko-ni ita no ka] tazuneta (cf. (22))  
 -TOP he-GEN sister-NOM there-in was *no ka* inquired

‘Taroo asked whether his sister was there’

If the analysis presented in the preceding section is correct, the *no*-headed CP is a sentence with a truth value in this case. I do not have a concrete proposal at this point on this dual interpretation of *no*-headed CPs. I tentatively assume that *no* is interpreted mainly as an event and takes an event sentence as its restriction as in (43).

- (43) [ $e: \varphi(e)$ ]

Then, in sentential context, a *no*-headed CP is interpreted as a clause with existential quantification as in (44a), which is equivalent to (44b).

- (44) a. [ $\exists e: \varphi(e)$ ]  $e = e$   
 b. [ $\exists e$ ]  $\varphi(e)$

I leave it for future research to make this more precise and principled.

Returning to Higginbotham’s analysis, it is also possible to make a small refinement on the basis of Japanese examples. He proposes that perception verb complements are subject to the individual event analysis precisely because they are small clauses. He points out in support of this that the small clause complements of causative verbs have the same properties. A relevant example is shown in (45).

- (45) a. John made somebody leave  
 b. [ $\exists e: [\exists x: x \text{ a person}] \text{leave}(x, e)$ ] John causes  $e$  (at some time  $t$  in the past)

Causative verb complements share all the properties of perception verb complements discussed above, and this follows from the representation in (41b).

The Japanese causative verb (*s*)*ase* also takes small clause complements although it is realized as a verbal suffix on the surface as (46) shows.

- (46) Hanako-ga Taroo-o zibun-no heya-de benkyoos-ase-ta  
 -NOM -ACC self-GEN room-in study-make-Past

‘Hanako made Taroo study in her/his room’

Since Kuroda (1965), it is widely accepted that (*s*)*ase* takes a clausal complement. In (46), the subject-oriented reflexive *zibun* can take either *Hanako* or *Taroo* as its antecedent. This shows that the latter is a subject of the embedded clause at the appropriate level of

representation. The absence of Condition (B) effect in (47) leads to the same conclusion, as Oshima (1979) points out.

- (47) Hanako-ga Taroo-ni kanozyo-o suisens-ase-ta  
 -NOM -DAT she-ACC recommend-make-Past

‘Hanako made Taroo recommend her’

But the embedded clause in (47) is headed by *suisens* ‘recommend’ and lacks tense. It is assumed in more recent literature, such as Murasugi and Hashimoto (2004), that *(s)ase* takes a *vP*, that is, a small clause, as its complement. Then, Japanese causative sentences, which share the properties of their English counterparts, are consistent with Higginbotham’s proposal that the individual event analysis applies to small clauses.

However, perception verb complements in Japanese, examined above, are finite CPs. An additional example is provided in (48).

- (48) Taroo-wa [<sub>CP</sub> kirin-ga heya-ni hair-u /hait-ta no]-o mita  
 -TOP kirin-NOM room-to enter-Pres/enter-Past *no*-ACC saw

‘Taroo saw a kirin enter the room’

In this example, the embedded verb can appear with either the non-past suffix *-ru* or the past suffix *-ta*. There is only a slight difference in meaning. The past suffix is interpreted more like an aspect in this context and the sentence with *-ta* is more accurately translated as ‘Taroo saw a kirin complete its entrance into the room’. If the analysis in the preceding section is on the right track, the example shows that a finite CP is also subject to the individual event analysis.

This opens the possibility to apply the analysis to factive verb complements as in (49).

- (49) Taroo-wa [<sub>CP</sub> Hanako-ga Rondon-ni i-ru no]-o wasurete ita  
 -TOP -NOM London-in be-Pres *no*-ACC forgot

‘Taroo forgot that Hanako was in London’

Factive verbs also uniformly take *no*-headed CP complements. This implies that their complements are interpreted as description of events, states or actions. Then, it is only natural to apply the individual event analysis to them. I will pursue this in the following section.

#### 4. An Individual Event Analysis of Factive Verb Complements

Kuno (1973), in his discussion of *no* and *to*, states that *no*-headed CPs, as opposed to *to*-headed CPs, carry factive presuppositions. The examples in (50) are consistent with this.

- (50) a. Taroo-wa [<sub>CP</sub> *pro* soko-ni itta *no*]-o kookaisite iru  
 -TOP there-to went *no*-ACC regret

‘Taroo regrets that he went there’

- b. Taroo-wa [<sub>CP</sub> Hanako-ga soko-ni itta *to*] omotte iru  
 -TOP -NOM there-to went *to* think

‘Taroo thinks that Hanako went there’

Only (50a) presupposes the truth of the complement sentence. However, the list of the verbs that select *no*-headed CPs in (16), repeated below as (51), shows that the generalization cannot be maintained.

- (51) Japanese predicates that select *no* : *wasureru* ‘forget’, *kookaisuru* ‘regret’, *miru* ‘see’, *matu* ‘wait’, *tamerau* ‘hesitate’, *kyohisuru* ‘refuse’, *ukeireru* ‘accept’, *kitaisuru* ‘expect, hope’, *kakuninsuru* ‘confirm’, *kanziru* ‘feel’ (all in non-past tense)  
*akiraka-da* ‘clear-is’, *kanoo-da* ‘possible-is’, *kantan-da* ‘easy-is’, *muzukasii* ‘difficult-is’, *taihen-da* ‘big deal-is’ (all in non-past tense)

*Kitaisuru* ‘expect, hope’, for example, is clearly not a factive verb. The generalization, instead, seems to be that factive verbs, such as *wasureru* ‘forget’ and *kookaisuru* ‘regret’, select *no*-headed CPs and not *to*-headed CPs. They cannot select *to*-headed CPs because what one regrets, for example, is not an utterance but an event or a state.<sup>6</sup> In this section, I apply the individual event analysis to factive verb complements, and examine how their properties can be explained.

First, it is known that factive verb complements share all the properties of the

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<sup>6</sup> The fact that factive verbs select *no*-headed CPs provide support for Haegeman’s (2006) proposal that factive verb complements are smaller than CP complements of verbs of propositional attitude and are FiniteP’s.

It should be noted here that a *to*-headed CP can co-occur with factive verbs as adverbial clauses as in (i).

- (i) Taroo-wa [<sub>CP</sub> zibun-ga baka datta *to*] [<sub>CP</sub> *pro* soko-ni itta *no*]-o kookaisite iru  
 -TOP self-NOM fool was *to* there-to went *no*-ACC regret

‘Taroo regrets that he went there, (thinking/saying) that he was a fool’

In cases like these, it is still the *no*-headed CP that the matrix verb selects.

perception verb complements discussed above. Let us consider the example in (52).

(52) Hanako-wa [<sub>CP</sub> *pro* kirin-o ketta no]-o kookaisite iru  
       -TOP      kirin-ACC kicked *no*-ACC regret

‘Hanako regrets that she kicked a kirin’

The CP complement is referentially transparent: (52) implies that a kirin exists. (52) entails that Hanako kicked a kirin and also that there is a kirin such that Hanako regrets that she kicked it. These properties follow with the application of the individual event analysis. The analysis assigns the representation in (53) to (52).<sup>7</sup>

(53) [ $\exists e$ : [ $\exists x$ : x a kirin] kicked (Hanako, x, e)] Hanako regrets e

(53) entails (54a-c).

- (54) a. [ $\exists x$ ] x is a kirin  
       b. [ $\exists e$ ] [ $\exists x$ : x a kirin] kick (Hanako, x, e)  
       c. [ $\exists x$ : x a kirin] [ $\exists e$ : kick (Hanako, x, e)] Hanako regrets e

Thus, the individual event analysis can be extended to factive verb complements.

There are however notable differences between the complements of perception verbs and factive verbs. First, it is widely accepted since Kiparsky and Kiparsky (1970) that factive verbs accompany factive presuppositions. This was discussed in relation to Kuno’s (1973) analysis of the contrast in (50). Relevant English examples are given in (55).

- (55) a. John forgot that Mary bit a unicorn  
       b. Mary regrets that she bit a unicorn

These sentences presuppose that Mary bit a unicorn. On the other hand, there is no such presupposition in the examples in (56) with perception and causative verbs.

- (56) a. John saw Mary bite a unicorn  
       b. John made Mary bite a unicorn

However, it is not clear that this difference is problematic for a uniform semantic analysis of the complements in (55) and (56). Simons (2007) argues that factive presupposition does not demand a semantic account but arises with the information structure. In particular, she points out that there is no such presupposition when a factive

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<sup>7</sup> The factive verb complements may express definite descriptions, rather than indefinite descriptions, of events. In this case, (53) should be more accurately as in (i).

(i) [ $\iota e$ : [ $\exists x$ : x a kirin] kicked (Hanako, x, e)] Hanako regrets e

This, however, does not affect the discussion that follows, as far as I can see.

verb functions as a kind of evidential. One of her examples is shown in (57).

- (57) A. Where did Louise go last week?  
B. a. Henry discovered that she had a job interview at Princeton.  
b. Henry learned that she had a job interview at Princeton.  
c. Henry found out that she had a job interview at Princeton.

In (57B), the truth of the complement clause is not presupposed. The clause provides new information while the matrix part specifies the source of the information. On the basis of detailed examination of examples of this kind, Simons concludes that presupposition is related to information structure rather than semantics. She notes that a factive sentence entails the truth of the embedded clause even when the matrix verb is used evidentially. Thus, (58Bb) is quite odd even as a response to (58A).

- (58) A. Which course did Louise fail?  
B. a. Henry, the idiot, discovered that she failed calculus.  
b. #Henry, entirely incorrectly, realized that she failed calculus.

The entailment relation, then, is to be captured in the semantics, and the individual event analysis achieves this.

The second difference between perception and factive verbs has to do with the generality of the entailment relation just discussed. Recall Higginbotham's analysis of the entailment in (36), repeated below in (59).

- (59) If John saw somebody leave, then somebody left

The point was that this kind of entailment holds even when the small clause complement of a perception verb contains a quantifier as long as the quantifier is monotone increasing. The entailment fails with non-monotone increasing quantifiers as illustrated in (60).

- (60) If John saw nobody leave, then nobody left

On the other hand, a sentence with a factive verb implies the truth of its complement without exception. Thus, (61) hold.

- (61) If Mary regrets that nobody went to London, then nobody went to London

This difference cannot be attributed to the small clause status of perception verb complements. Japanese perception verbs take finite CP complements and yet, the entailment fails with non-monotone increasing quantifiers. This is illustrated in (62) with the quantifier, 'exactly 10 students'.

- (62) a. Hanako-wa [<sub>CP</sub> gakusei-ga tyoodo zyuu-nin hikooki-ni noru no]-o mita  
 -TOP student-NOM exactly ten-person plane-on board *no*-ACC saw  
 ‘Hanako saw exactly ten students board the plane’
- b. Gakusei-ga tyoodo zyuu-nin hikooki-ni notta  
 student-NOM exactly ten-person plane-on boarded  
 ‘Exactly ten students boarded the plane’

(62a) does not entail (62b).

Then, does this difference pose a problem for the unified individual event analysis of the complements of perception verbs and factive verbs? I would like to suggest that the answer is negative. I illustrate the point by discussing the difference in the ways the tense of the embedded clause is interpreted in the two types of sentences. A perception verb individualizes events more finely along the time dimension. As is briefly discussed below, it seems to individualize events in other dimensions as well.

First, in a sentence with the perception verb *see*, for example, the matrix event of seeing and the event the embedded clause expresses must take place simultaneously. This is encoded in the syntax in English. The embedded clause, being a small clause, lacks tense. Thus, (63a) is interpreted as (63b) with a specific time *t* in the past.

- (63) a. John saw Mary leave  
 b. [ $\exists e$ : leave (Mary, e)] John sees e (at some time *t* in the past)

This is true for Japanese as well although perception verb complements accompany tense. Let us consider again (48), repeated below in (64).

- (64) Taroo-wa [<sub>CP</sub> kirin-ga heya-ni hair-u /hait-ta no]-o mita  
 -TOP kirin-NOM room-to enter-Pres/enter-Past *no*-ACC saw  
 ‘Taroo saw a kirin enter the room’

With the non-past *-(r)u*, a kirin entering the room and Taroo seeing the event must take place simultaneously. And this is true with the past *-ta* as well. As noted above, *-ta*, in this context, is interpreted as a perfective aspect, and the sentence roughly means that Taroo saw a kirin complete its entrance into the room. The event of a kirin completing its action and Taroo seeing the event are simultaneous.

Then, what (65a) and its Japanese counterpart entail must be (65b).

- (65) a. John saw exactly ten students board the plane  
 b. Exactly ten students boarded the plane at the time John saw exactly ten students board the plane

c. Exactly ten students boarded the plane

(65b) is not equivalent to the tense-wise more general sentence in (65c). In the case of Japanese, it is possible to specify the time of the perceived event as in (66).

(66) Hanako-wa [<sub>CP</sub>gakusei-ga sono toki tyoodo zyuu-nin hikooki-ni noru  
 -TOP student-NOM that time exactly ten-person plane-on board  
 no]-o mita  
 no-ACC saw

‘Lit. Hanako saw [exactly ten students board the plane at that time]’

(66) entails that exactly ten students boarded the plane at that time.<sup>8</sup>

On the other hand, the tense of the embedded clause need not coincide with the tense of the matrix clause in factive sentences. The point is obvious with the simple examples in (67).

(67) a. John regrets that he boarded the plane

b. Taroo-wa [<sub>CP</sub>pro hikooki-ni notta no]-o kookaisite iru  
 -TOP plane-on boarded no-ACC regret

‘Taroo regrets that he boarded the plane’

These examples are interpreted as in (68).

(68) [ $\exists e$ : board (John, the plane, e) (at some t in the past)] John regrets e (at the speech time)

Similarly, (69a) with the non-monotone increasing *only ten* and its Japanese counterpart are interpreted as in (69b).

(69) a. John regrets that only ten students boarded the plane

b. [ $\exists e$ : [only10x: x a student] board (x, the plane, e) (at some t in the past)] John regrets e (at the speech time)

(69b) entails that only ten students boarded the plane. As expected, if *at that time* is added to the complement of (69) as in (70a), it only entails (70b) and not (70c).

(70) a. John regrets that only ten students boarded the plane at that time

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<sup>8</sup> Note that this complication does not affect monotone increasing quantifiers. (ia) entails (ib) when Q is monotone increasing.

(i) a. [Qx: A(x)] B(x) at a specific time t in the past.  
 b. [Qx: A(x)] B(x) at some time in the past.

- b. Only ten students boarded the plane at that time
- c. Only ten students boarded the plane

The analysis of the differences between the complements of perception verbs and factive verbs need to be made more precise. What the discussion above suggests is that the event that a perception verb complement expresses is individualized in relation to the time of the matrix event, whereas the event (or state) that a factive verb complement expresses is more general in this respect.<sup>9</sup> Here, it is possible that the events of perception verb complements can be individualized in other dimensions as well. For example, one may raise doubts on the inference from (65a) to (65b) in the following situation. Suppose that John is at the economy class boarding gate, and saw exactly ten students board the plane. Suppose also that there were five students who boarded the same plane through the business class boarding gate at the same time, and John did not see them board the plane. In this situation, one may say that (65a) is true and (65b) is false. Then, the description of the event must be made more specific (for example, by adding *through the economy class gate*) so that the entailment is maintained. The complexity with the individualization of events is more evident in with causative sentences. (71a) does not entail (71b) or (71c).

- (71) a. Mary made exactly ten students board the plane
  - b. Exactly ten students boarded the plane
  - c. Exactly ten students boarded the plane at the time Mary made exactly ten students board the plane

In the case of causatives, events seem to be individualized with respect to cause. Thus, what (71a) implies, roughly, is that exactly ten students boarded the plane because of Mary.

Also, the discussion above treated the perception verb complements in Japanese and English in the same way. There are a few differences. For example, the small clause complement in English completely lacks tense, and hence, the matrix tense extends to it. As the matrix event of seeing is instantaneous, (72) is odd unless Mary's height fluctuates, as Higginbotham points out.

(72) #John saw Mary tall

On the other hand, the Japanese counterpart of (72) is quite natural as shown in (73).

(73) Taroo-wa [CP Hanako-ga se-ga takai no]-o mite, odoriota  
 -TOP -NOM height-NOM tall no-ACC seeing surprised

'Lit. Taroo was surprised to see Hanako tall'

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<sup>9</sup> In this sense, it makes sense to say that factive verb complements are factive whereas perception verb complements are not. It is also understandable that Higginbotham presented the *individual* event analysis for perception verb complements.

This must be because the embedded clause carries its own tense. All that is required is that the event (or state) that the embedded clause expresses occurs (or holds) when matrix event takes place.

Nevertheless, the general point of the discussion, I hope, was clear. It suggests that Higginbotham's (1983) individual event analysis can be extended to finite CPs, in particular, to factive verb complements. The differences between the complements of perception verbs and factive verbs are likely to be due to independent factors. The factive presupposition of the latter should be attributed to the information structure if Simons (2007) is correct. And the truth of a perception verb complement apparently fails to be entailed in some cases because a perception verb forces a finer individualization of the event its complement expresses with respect to time and other dimensions.

## 5. Conclusion

In this paper, I discussed the distributions of the Japanese complementizers, *no*, *ka* and *to*, and argued that the distinction between *no* and *to*, in particular, provides direct evidence for Davidson's (1967, 1968-69) theory of semantic representation. Then, I presented an analysis for perception verb complements in Japanese, which are uniformly finite CPs headed by *no*. I argued that they provide evidence for Higginbotham's (1983) individual event analysis and for the extension of the analysis from small clauses to finite CPs. Finally, I suggested that the analysis should be applied to factive verb complements as well, which are also finite CPs headed by *no* in Japanese.

The discussion in this paper, if it is on the right track, has a number of additional implications for the analysis of English. I argued that the individual event analysis should be extended to the finite CP complements of factive verbs in part because the Japanese counterparts of those CPs are headed by *no* and express descriptions of events. The same point can be made for non-finite CP complements as in (74).

(74) John waited for Mary to come

The Japanese counterpart of *wait*, *mat*, takes a CP complement headed by *no*, as shown in (75).

(75) Taroo-wa [CP Hanako-ga kuru no]-o matta  
       -TOP               -NOM come *no*-ACC waited

‘Taroo waited for Hanako to come’

Then, the individual event analysis should be extended to non-finite CPs as well. The complement of *wait* is referentially opaque simply because *wait* is an intensional verb.

Also, according to the analysis suggested in this paper, the complements in (76a-b) are interpreted differently although they look identical syntactically.

- (76) a. John says that he went to London  
b. John regrets that he went to London

The complement in (76a) expresses a paraphrase of direct discourse whereas that in (76b) expresses an event. Then, *that* in (76a) must be a Report head just like *to* in Japanese. This raises the question why *that* differs from *que* in Spanish and *to* in Japanese, and cannot embed a question, for example.

- (77) \*John asked that what Mary bought

There are a number of possibilities for this. For example, *that* as a Report head may select Finite. Or it may consist of two features, [+Report] and [+Finite], and consequently, must originate at Fin and move to Report. In the latter case, (77) may be ruled out as *that* moves across a question C. I must leave the pursuit of these implications, as well as the refinement of the arguments presented in this paper, for future research.

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