The Syntax of Japanese TACs and a Demonstrative Complementizer in Japanese*

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This paper discusses differences of the internal syntax of temporal adverbial clauses in Japanese. Japanese temporal adverbial clauses have three forms for one subordinator and the three kinds show different behaviors. I claim that the differences are explained by selectional properties and categorial status of functional heads included in the temporal clauses. Moreover, I propose that Japanese has a complementizer originated from a demonstrative, which is analogous to the English complementizer that and that the Japanese complementizer plays an important role in temporal adverbial clauses.

Keywords: temporal adverbial clause, functional category, selection, demonstrative, complementizer

1. Introduction

This paper considers temporal adverbial clauses (henceforth TACs) in Japanese. TACs are subordinate clauses which are constructed by temporal subordinators and express temporal relation between two events. In the literature, it has been widely accepted that TACs (and more generally, other subordinate clauses) involve CP projection (Larson (1990), Haegeman (2009, 2010, 2011, 2012a,b), among others). This predicts that Japanese TACs show the same syntactic behavior as English TACs. There are, however, significant differences between English and Japanese. In this section, I first review analyses of English and Japanese TACs in the literature and then organize problems of Japanese TACs.

1.1. The Structure of English TACs and Geis-Ambiguity

English TACs are constructed by various subordinators but the projection of the embedded clause is considered to be uniform. For example, *when*-clauses headed by a conjunction *when* project CP as a whole and *before*- and *after*-clauses headed by prepositions *before* and *after*, respectively, include CP projection.[1]

(1) Taro came [CP when Hanako left].
(2) Taro came [PP before [CP Hanako left].
(3) Taro came [PP after [CP Hanako left].

According to Larson (1990), the conjunction *when* in (1) is a bare NP adverb (in the sense of Larson (1985)), which moves to Spec, CP. In (2) and (3), the prepositions *before* and *after* take CP complement.

The CP structure is relevant for an important phenomenon. Geis (1970) observes that ambiguity arises when more than one clause is embedded in English TACs. In (4), we have two interpretations according to the reference point of *when*: "I saw Mary in New York when she made a claim that she would arrive," and "I saw Mary in New York at the time of her arrival, according to her claim." Let us call the former *high reading* and the latter *low reading*. The two readings can also be found in (5) and (6).

(4) I saw Mary in New York [CP1 when she claimed [CP2 that she would arrive]].
  a. [CP1 when she claimed [CP2 that she would arrive] *t*] (high)
  b. [CP1 when she claimed [CP2 *t* that she would arrive *t*]] (low)

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[1] In this paper, I focus on the three types of temporal heads: *when/toki*, *before/mae*, and *after/ato*.

(5) I saw Mary in New York [PP before [CP1 she claimed [CP2 that she would arrive]].
a. [PP before [CP1 Op (=when) she claimed [CP2 that she would arrive] *t*] (high)
b. [PP before [CP1 Op she claimed [CP2 *t* that she would arrive *t*]] (low)
(6) I saw Mary in New York after she claimed that she had arrived.
a. [PP after [CP1 Op she claimed [CP2 that she had arrived] *t*] (high)
b. [PP after [CP1 Op she claimed [CP2 *t* that she had arrived *t*]] (low)

Larson (1990) accounts for the Geis-ambiguity by claiming that the NP adverb *when* is a temporal operator, which undergoes A'-movement from its original position to Spec, CP. In *before*- and *after*-clauses, the temporal operator is phonetically null. In the high reading, on the one hand, the operator is base-generated in CP1 but above CP2, and then it moves to Spec, CP1 as in (4a), (5a), and (6a). In the low reading, on the other hand, the operator occurs within CP2, and it moves successive-cyclically to Spec, CP1 as in (4b), (5b), and (6b). This operator movement account of the ambiguity is supported by the observation that German, which permits only clause-bounded movement, shows no ambiguity in TACs. (The following examples are adopted from Larson (1990).)

(7) a. wer t hat gesagt [CP dass Georg ihn gesehen hat]
"Who said that Georg saw him?"
b. *wen hat Hans gesagt [CP dass Georg t gesehen hat]
"Who did Hans say that Georg saw?"
(8) ich sah ihn schon lange [bevor Paul sagte [dass ser ankommen sollte]]
*?
"I saw him long before Paul said that he was supposed to arrive."

(7) shows that a German *wh*-operator cannot cross a clause boundary. Given this clause-boundedness and proposal that the temporal operator moves like *wh*-phrases, the unavailability of low reading in (8) can be regarded as evidence to support the presence of operator movement in TACs. The temporal operator cannot move across a clause in German, hence no ambiguity arising. Larson's operator movement proposal can thus account for the cross-linguistic data on the Geis-ambiguity, and it is reasonable to conclude that the internal structure of TACs is CP.

1.2. Japanese TACs and Geis-Ambiguity

Japanese also has TACs which ostensively correspond to the English counterparts as in (9)-(11). *Toki* is a conjunction, and *mae* and *ato* are postpositions like English *when*, *before*, and *after*, respectively.

(9)	Taro-wa	Hanako-ga	saru	toki	kita.
	Taro-top	Hanako-nom	leave	when	came
	"Taro came when Hanako left."				
(10)	Taro-wa	Hanako-ga	saru	mae	kita.
	Taro-top	Hanako-nom	leave	before	came
	"Taro came before Hanako left."				
(11)	Taro-wa	Hanako-ga	satta	ato	kita.
	Taro-top	Hanako-nom	left	after	came
	"Taro came after Hanako left."				

As we have seen in the previous section, English TACs involve CP projection and operator movement. If these syntactic properties are universal in human languages as Haegeman (2009, 2010, 2011, 2012a,b) claims, it is predicted that Japanese TACs should also show the Geis-ambiguity. This is, however, not borne out: Japanese

TACs in (12)-(14) show no such ambiguity.

(12) Watasi-wa Mary-ni [[kanojo-ga tuku to] itta] toki New York-de atta.
I-top Mary-dat she-nom arrive C claimed when New York-loc saw
"I saw Mary in New York when she claimed that she would arrive." (high/*low)
(13) Watasi-wa Mary-ni [[kanojo-ga tuku to] iu] mae New York-de atta.
I-top Mary-dat she-nom arrive C claim before New York-loc saw
"I saw Mary in New York before she claimed that she would arrive." (high/*low)
(14) Watasi-wa Mary-ni [[kanojo-ga tuita to] itta] ato New York-de atta.
I-top Mary-dat she-nom arrived C claimed after New York-loc saw
"I saw Mary in New York after she claimed that she had arrived." (high/*low)

This contrast in the Geis-ambiguity between English and Japanese indicates that the structure of Japanese TACs is different from that of English ones. In what follows, I introduce a previous analysis concerning the structure of Japanese subordinate clauses including TACs, and further provide data that the analysis cannot explain.

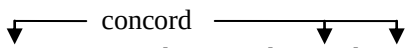
1.2.1 The Structure of Toki-*Clauses*

Endo (2012, 2014a,b) discusses why Japanese *toki*-clauses have no temporal ambiguity as in (12), by considering the structure of *toki*-clauses. Endo formulates a mechanism of constructing subordinate clauses in Japanese and posits the following hierarchy of functional heads in Japanese:

(15) Voice < Aspect < Polarity < Tense < Speaker's Mood < Interpersonal Mood
(16) …narabe- rare- tei- na- katta- soo -yo
arrange- pass asp neg past Speaker's Mood Interpersonal Mood
"(Things) do not seem to have been arranged, do they?"

(16) exemplifies the hierarchy in (15). In (15), higher functional heads select lower ones. The size of the clause is thus determined by the occurrence of higher functional heads. Endo further points out, following the traditional Japanese grammarians (Minami (1974), Noda (2001)), that the external syntax of Japanese subordinate clauses corresponds to the internal syntax of the subordinate clauses, which they call *concord*. Let us look at the following example.

(17) a. Neko-wa atama-o nade-rare-(*tei) nagara zitto si-tei-ta.
cat-top head-acc pat-voice(pass)-*asp while still stay-asp-past
"While its head was being patted, the cat stayed still."



b. TV-o mi nagara gohan-o tabe-tei/*hajime- ta.
TV-acc watch while/with rice-acc eat-prog/incept- past
"I was eating rice while watching TV." (Endo (2012) with a slight modification)

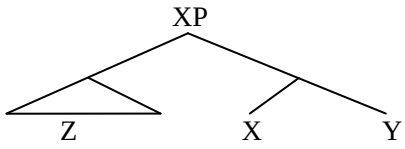
According to Endo (2012, 2014a,b), *nagara* selects a voice head (*rare*) but not an aspectual head (*tei*) as its complement (17a). In addition, the matrix clause hosting the *nagara*-clause allows only for the progressive aspect (17b). Endo expresses in (18) the correlation between the functional heads available in the matrix and embedded clauses and proposes the schema (19).

(18) a. The subordinator in an adverbial clause has a selectional feature, which specifies the type of the functional head that may appear as its complement.
b. The selectional feature for the complement of the associated auxiliary element in the matrix

clause is the same as the selectional feature for the complement of the subordinator in the adverbial clause.

(Endo (2012: 369))

(19) Equation Y = Z



(i) X = functional head of matrix clause
(ii) Y = complement of X
(iii) Z = functional head in adverbial clause licensed by X

(Endo (2012) with a slight modification)

In (18b), the head of the adverbial clause Z has a selectional feature [Voice], and the clause Z headed by *nagara* requires a related Aspect head X in the matrix clause which has a selectional feature [Voice]. Consequently, the passive voice head *rare* is permitted but the aspectual head *tei* is excluded in the *nagara* clause, and at the same time, the aspectual head in the matrix clause is limited to *tei* by the requirement of *nagara*. Crucially, the subordinate clause is "truncated" in that no higher projection than the subordinator specifies can appear. In this way, Endo (2012, 2014a,b) captures the nature of Japanese subordinate clauses by selectional properties of functional heads which host the clauses.

Turning to TACs, Endo claims that *toki* takes TP complement. This is exemplified by the concord relation between the embedded clause and the matrix clause. The tense of the matrix clause corresponds to that of the TAC (20).

concord

(20) Boku-wa [umare-ta toki] taizyuu-ga sukuna-katta/*i
I-top born-past when weight-nom low-past/pres
"When I was born, I weighed little."

(Endo (2012))

He notes that although the verb in the *toki*-clause can take either present or past form as in the English *when*-clause, the interpretation depends on the matrix clause, and therefore suggests that the *toki*-clause lacks the complete C-T sequence needed for the independent tense interpretation referring to the speech time. Endo thus concludes that *toki*-clauses have not CP but TP as their internal structure.[2]

This TP structure of *toki*-clauses can immediately account for the absence of the low reading in the clauses ((12) is repeated as (21)).

(21) Watasi-wa Mary-ni [[kanojo-ga tuku to] itta] toki New York-de atta.
I-top Mary-dat she-nom arrive C claimed when New York-loc saw
"I saw Mary in New York when she claimed that she would arrive." (high/*low)

(22) [toki [TP itta [CP Op [TP tuku t]]]]

(22) schematically represents the structure of the *toki*-clause in (23). Since *toki* takes TP complement, no landing site is available for the temporal operator in the upper clause.Thus, the *toki*-clause cannot have the ambiguity.

A reviewer points out that it is predictied from Endo's analysis that the high reading should also be excluded due to the absence of the lading site of the operator. If the temporal operator is unavailable, another operation should be responsible for the high reading. I then suggest that the high reading is derived via head-movement of T in a higher clause into a subordinator. In (21), for example, T (with a verb) undergoes head-movement to *toki* 'when' and the (V-)T-*toki* string establishes the temporal relation in question. On the other hand, the subordinator

[2] See also Arregui and Kusumoto (1998) and Kusumoto (1999). They reach the same conclusion from the viewpoint of formal semantics that Japanese TACs is composed of TP, not CP.

cannot establish a temporal relation with the T head in the lower clause since the subordinator is structurally "far" from the lower T. Hence the low reading does not arise even with the head-movement.

This explanation is also applicable to *mae-/ato*-clauses. *Mae* and *ato* select not CP but TP, so the Geis-abiguity does not arise. The incorporation of T into *mae/ato* establishes a temporal relation between T and *mae/ato*, resulting in the high reading, but the low reading is underivable. Thus it is plausible to conclude that all of the three Japanese TACs have a truncated structure relative to English TACs.

1.2.2. The Geis-Ambiguity in the Toki-*Clause with* -Ni

Even though the Geis-ambiguity does not arise in the *toki*-clause as in (12), there is a case where the ambiguity is observable. Miyagawa (2012) points out that the *toki*-clause can have the low reading if it is suffixed by a postposition or case particle *-ni*.

(23) John-wa [Sheila-ga [kare-ga dekakeru beki da to] itta] toki-ni, dekaketa.
John-top Sheila-nom he-nom leave should cop C said when-at left
"John left when Sheila said that he should leave." (Miyagawa (2012))

In (23), the low reading (the time he should leave) is available. In order to explain this, Endo (2012, 2014a,b) proposes that the case particle (or postposition) *-ni* is a Focus head, which provides a landing site of the null operator.

(24) [FocP OP Foc^0 (*ni*) [*toki* [TP1 [CP t [TP2 t]]]]] (word order irrelevant)

As in (24), although *toki* has TP as its complement, the case particle attached to *toki* projects FocusP, whose specifier is the landing site of the temporal operator originated in the most embedded clause. Since there is no intervener prohibiting the operator movement, the low reading is derived by the operator just like in English. When the case particle is absent, on the other hand, no upper landing site is available, so that the Geis-ambiguity does not arise.[3]

Endo cites supportive evidence for his proposal from Masuoka (1997). Masuoka argues that adjunct clauses are focalized when they are suffixed by a case particle. He also notes that extraction of *wh*-phrases from adjunct clauses is improved when a case particle co-occurs with the clauses.

(25) a. ?Nani-o siteiru toki kono hon-o yonda nodesu ka?
what-acc doing when this book-acc read polite Q
"What did you read a book when you were reading?"
b. Nani-o siteiru toki-ni kono hon-o yonda nodesu ka?

[3] One might wonder whether a case particle is actually a Focus head. It might be that a case particle is associated with Topic or Force. Intuitively, though, an element with a case particle can easily receive a focused interpretation.

(i) Taro(-ga) ki-mashita yo.
Taro-nom come-pol.past prt
"Taro came."

(ii) a. (Sono-uchi-no) dare-ga ki-mashita ka?
that-among-gen who-nom come-pol.past Q?
"Who came (among them)?
b. Taro?*(-ga) ki-mashita yo.
Taro-nom come-pol.past prt
"Taro came."

(i) shows that the case particle can be dropped without the proposition being changed. In (iib), however, the focused element must co-occur with the case particle. I therefore conclude that Endo's Focus hypothesis is correct. Of course, this issue should be investigated further in another occasion.

what-acc doing when-at this book-acc read polite Q
"What did you read a book when you were reading?" (Endo (2012))

Though the judgment is subtle, the case particle in (25b) improves the acceptability of the *wh*-question in adjunct clauses in comparison with (25a). This is, according to Endo, because the case particle projects FocusP. In (25b), the *wh*-phrase *nani(-o)* first moves to Spec, FocusP (covertly) and then moves to the landing site in the matrix clause. In (25a), on the other hand, the *wh*-phrase crosses a clause boundary without dropping in at an intermediate landing site, resulting in CED violation and a slight oddness. Thus the parallelism between the availability of the low reading with a case particle in TACs and the complete acceptance of *wh*-question with a case particle in adjunct clauses follows from the proposal that the case particle provides the landing site (Spec, FocP).

Thus, Endo's truncation and case particle proposal can account for the difference between the *toki*-clause and the *when*-clause. The impossibility of the low reading in Japanese TACs without a case particle or postpostion is due to the absence of the landing site of operator movement, resulting from the selection by subordinators. The low reading becomes available in the *toki*-clause when a case particle or postposition *-ni*, which is a Focus head, is present.

1.2.3. Mae- *and* Ato-*Clauses with* -Ni and Sono-*TACs: Issues and Goals of this Paper*

Endo is silent on *mae-/ato*-clauses, but the analysis of *-ni* proposed by Endo predicts that Japanese *mae-/ato*-clauses suffixed by *-ni* can have the Geis-ambiguity. This is, however, not borne out as in (26)-(27).

(26) Watasi-wa Mary-ni kanojo-ga tuku to iu mae-ni New York-de atta.
I-top Mary-dat she-nom arrive C claim before-at New York-loc saw
"I saw Mary in New York before she claimed that she would arrive." (high/*low)

(27) Watasi-wa Mary-ni kanojo-ga tuita to itta ato-ni New York-de atta.
I-top Mary-dat she-nom arrived C claimed after-at New York-loc saw
"I saw Mary in New York when she claimed that she had arrived." (high/*low)

Given that Endo's analysis of *toki* and *-ni* is correct, these data indicate that *mae-* and *ato*-clauses are different from *toki*-clauses in terms of their clausal architectures. It is thus necessary to modify Endo's analysis to explain why we cannot observe the Geis-ambiguity in (26)-(27).

Further complicated is that TACs bear the Geis-ambiguity when the subordinators follow *sono*, irrespective of the temporal subordinators as in (28)-(30).

(28) Watasi-wa Mary-ni [[kanojo-ga tuku to] itta]] sono-toki-ni New York-de atta.
I-top Mary-dat she-nom arrive C claimed that-when-at New York-loc saw
"I saw Mary in New York when she claimed that she would arrive." (high/low)

(29) Watasi-wa Mary-ni [[kanojo-ga tuku to] iu] sono-mae-ni New York-de atta.
I-top Mary-dat she-nom arrive C claim that-before-at New York-loc saw
"I saw Mary in New York before she claimed that she would arrive." (high/low)

(30) Watasi-wa Mary-ni [[kanojo-ga tuita to] itta] sono-ato-ni New York-de atta.
I-top Mary-dat she-nom arrived C claimed that-after-at New York-loc saw
"I saw Mary in New York after she claimed that she had arrived." (high/low)

Recall that the internal structure of bare Japanese TACs is not identical with that of English TACs. It is therefore required to seek an explanation of why *sono*-TACs behave uniformly with English TACs in terms of the Geis-ambiguity. Considering that just attaching *-ni* to *mae/ato* does not raise the Geis-ambiguity, it should be that *sono* plays an important role for the ambiguity.

Now we can describe the problems regarding TACs in the following way:

(31) a. The *toki*-clause behaves differently from the *mae-/ato*-clause when *-ni* is present in that the former allows the Geis-ambiguity wheras the latter does not.

b. *Sono*-TACs behave uniformly within Japanese and similarly to English TACs in terms of the Geis-ambiguity.

The observation is summarized in Table 1. To the best of my knowledge, these problems have not received a comprehensive explanation in the field of syntax. This paper will thus account for (31) by investigating the internal syntax of Japanese TACs in detail.

Important is that the complication of the Geis-ambiguity in Japanese cannot be explained by simply positing that Japanese TACs have the (P-)CP structure like English TACs. What is, then, a crucial factor in the difference regarding the Geis-ambiguity in English and Japanese? As for language variation, Chomsky (1995, 2000, 2001, et. seq) argues that parameters in natural languages are reduced to properties of functional heads (and PF). The minimalist program aims to eliminate theoretically unmotivated principles in the syntax and we cannot appeal to traditional syntactic parameters associated with those principles. Therefore, based on the argument that the computational system in syntax and LF is universal, Chomsky proposes that language variation rests on formal features with no interpretation at interfaces, which are stored in functional categories in the lexicon. Given this minimalist consideration, it is plausible that the difference of TACs should be attributed to certain properties of functional heads.

In this paper, I will argue that functional heads in Japanese TACs are relevant for the inter- and intra-language variation. Here it is worth noting that *mae* and *ato* are postpositions, which Baker (2003) argues are functional heads. It then follows that (31) can be accounted for by the properties of these postpositions. Regarding Japanese postpositions, Watanabe (2009) proposes a fine structure of PP, in which postpositional elements are distributed in distinct functional projections and a lower constituent is forced to raise to a higher Spec position. I will claim that his structure and derivation of PP contributes to explaining the absence of the Geis-ambiguity in *mae-/ato*-clauses with *-ni*. In addition, adopting Endo's proposal that a selectional property of a functional head determines the size of the clause, I will argue that the selectional property and the categorial status of *mae* and *ato*, as well as *toki*, differs from that of English *before*, *after* and *when*, which leads to the parametric variation of the way of constructing TACs between English and Japanese.

This paper will further discuss universality of the clausal architecture of TACs. One might suppose from Endo's (2012, 2014a,b) proposal that Japanese TACs lack CP projection altogether. This is, however, premature because *sono*-TACs are not taken into consideration. *Sono*-TACs have not been noticed and studied in the literature, to the best of my knowledge. As it turns out, *sono*-TACs provide a good ground to argue that they involve CP projection and temporal operator movement just like English and other languages' TACs. In the course of the discussion, I will propose that the demonstrative part *so-* in *sono-* plays an important role to construct CP structure of TACs: *so-* is a head of CP.

Before going to the discussion, I would like to note terminology of projection. Endo (2012, 2014a,b) posits based on the fine left periphery (Rizzi (1997)) that the landing site of the operator is Spec, FocusP, whereas the landing site of operator movement is taken to be traditional Spec, CP in Larson (1990). Given that the two projections are identical in that they serve as a landing site of the temporal operator, I adopt the former terminology in section 2 for the consistency of cartography and the latter in section 3 for expository purpose.

The organization of this paper is as follows. Section 2 addresses (31a). I first review the proposals by Watanabe (2009), and then offer a revised analysis of Endo's that accounts for a wider range of data. Section 3 discusses (31b) and claims that *sono*-TACs host CP projection with a demonstrative-like complementizer. Section 4 concludes the discussion.

Table 1: Availability of the Geis-ambiguity in English and Japanese TACs

	Bare	With *-ni*	With *sono-*
when	Yes	-	-
before	Yes	-	-
after	Yes	-	-
toki	No	Yes	Yes
mae	No	No	Yes
ato	No	No	Yes

2. The Structures of Japanese Bare/*-Ni* TACs

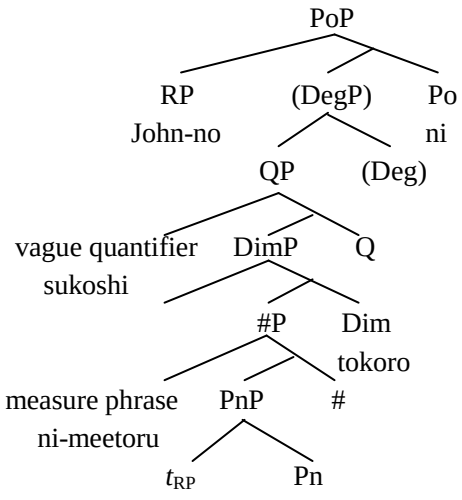
2.1. The Structure of Mae/Ato-*Clauses*

This subsection explores the internal structure of *mae*- and *ato*-clauses in detail. As I have pointed out in section 1.2, just positing that *mae* and *ato* are P as considered in English cannot explain the absence of the Geis-ambiguity, because English *before/after* should pattern with Japanese *mae/ato* if they were in the same category. This means that an alternative analysis is needed for *mae-/ato*-clauses. In what follows, I will introduce Watanabe's (2009) analysis of Japanese PP and then propose the structure and derivation of *mae/ato*-clauses.

2.1.1. The Fine Structure of PP: Watanabe (2009)

Watanabe (2009) proposes a fine-grained internal structure of PP in Japanese. Watanabe explains word order variation of Japanese PP by positing a layered structure and a movement mechanism.

(32)



(Watanabe (2009) with a slight modification)

Based on the vector-space semantics (Zwarts (1997)), each of the projection has semantic contribution to the interpretation of locative/temporal PP. PoP, DimP #P, PnP, and RP represent position of vector, dimension of the vector, length of vector, direction of vector, and reference object of the vector, respectively. On syntactic properties, RP moves from the complement position of Pn to Spec, PoP as in (32), in order to derive legitimate word order. Pn has a nominal property in that it can be used with a case particle (33).

(33) Taro-wa usiro-o mita
Taro-top behind-acc looked
"Taro looked behind him."

#P holds measure phrases in its specifier. QP and DegP are adopted from Corver (1997) for the parallelism of AP and PP. What is of importance here is that QP hosts vague quantifiers like *sukosi* 'a little'.

Now let us look at the derivation of the fine layered PP.

(34) a John-no ni-meetoru usiro(-no-tokoro)-ni Bill-ga iru.
John-gen two-meter behind-link-place-loc Bill-nom is
"Bill is found two meters behind John."
b. John-no usiro ni-meetoru*(-no-tokoro)-ni Bill-ga iru. (Watanabe (2009))

(35) a.[DimP [#P 2-meetoru [PnP ushiro] #] [Dim (tokoro)]]
b. [DimP usiro [#P 2-meetoru *t* #] [Dim tokoro]] (Watanabe (2009))

In (34a), the measure phrase *ni-meetoru* 'two-meter' precedes the Pn *usiro* 'behind', in which case the realization of the Dim head *tokoro* 'place' is optional. In contrast, when the Dim head *tokoro* is overtly realized, the measure phrase must follow the Pn *usiro* (34b). In order to explain the word order restriction, Watanabe argues that the overt Dim head optionally triggers movement of PnP, which includes *usiro*, over #P to the specifier of DimP as in (35b). RP (*John-no*) then moves to Spec, PoP. If there is a vague quantifier like *sukosi* 'a little', RP moves over #P, DimP, and QP to Spec, PoP in (32). (36) is a case where PnP moves to Spec, DimP and then RP moves to the Spec, PoP. The schema of the derivation is given in (37).

(36) a. John-no chotto/sukosi/kanari usiro(-no-tokoro)-ni Bill-ga iru.
John-gen a.little/a.little/a.lot behind-link-place-loc Bill-nom is
"Bill is found a little/far behind John."
b. *John-no ushiro chotto/sukosi/kanari(-no-tokoro)-ni Bill-ga iru. (Watanabe (2009))

(37) [PoP John-no [QP sukosi/kanari [DimP [PnP t_{RP} usiro] [#P t_{Pn} Dim]] Q] Po]
(Watanabe (2009))

Thus, the word order regarding Japanese PP is captured in the fine structure and movement proposed by Watanabe.

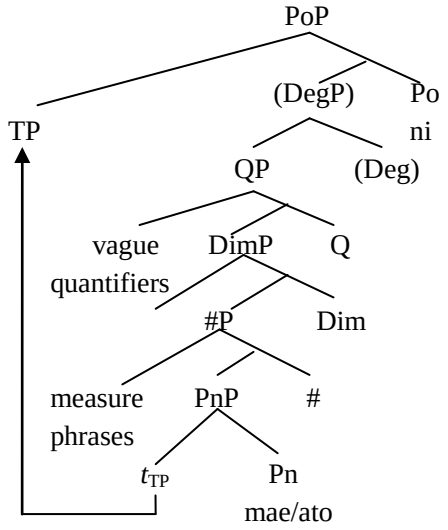
2.2.2. Movement of TP in Mae/Ato-*Clauses*

Watanabe locates *mae* and *ato* in Pn. These temporal Pns are compatible with measure phrases and vague quantifiers like locative Pns (cf. (34a) and (36a)).

(38) John-wa jiken-no ni-jikan/sukosi mae/ato-ni Mary-ni atta.
John-top incident-gen two-hour/a.little before/after-loc Mary-dat met
"John saw Mary two hours/a little before/after the incident."
(Watanabe (2009) with a slight modification)

How can we accommodate this to TACs? For simplicity, it is natural to posit the same structure for *mae/ato*-TACs as ordinary *mae/ato* PPs. I thus claim that *mae* and *ato* in TACs are also Pn. The structure is given in (39).

(39)



Just like *toki*, Pn takes TP complement. This TP moves to Spec, PoP as RP does in (32).[4,5] This movement derivation can account for the fact that TACs must precede measure phrases or vague quantifiers (40)-(41).

(40) a. John-wa dekakeru ichjikan mae-ni resutoran-o yoyakusita.
John-top go.out one.hour before-at restaurant-acc reserved
"John made a reservation at a restaurant one hour before he went out."

b. John-wa dekakeru sukosi mae-ni resutoran-o yoyakusita.
John-top go.out a.little before-at restaurant-acc reserved
"John made a reservation at a restaurant a little before he went out."

c. *John-wa ichjikan dekakeru mae-ni resutoran-o yoyakusita.
John-top one.hour go.out before-at restaurant-acc reserved
"Intended: John made a reservation at a restaurant one hour before he went out."

d. *John-wa sukosi dekakeru mae-ni resutoran-o yoyakusita.
John-top a.little go.out before-at restaurant-acc reserved
"Intended: John made a reservation at a restaurant a little before he went out."

(41) a. John-wa kaigi-ga owatta ichjikan ato-ni resutoran-o yoyakusita.
John-top meeting-nom ended one.hour after-at restaurant-acc reserved
"John made a reservation at a restaurant one hour after the meeting was over."

b. John-wa kaigi-ga owatta sukosi ato-ni resutoran-o yoyakusita.
John-top meeting-nom ended a.little after-at restaurant-acc reserved
"John made a reservation at a restaurant a little after the meeting was over."

c. *John-wa ichjikan kaigi-ga owatta ato-ni resutoran-o yoyakusita.
John-top one.hour meeting-nom ended after-at restaurant-acc reserved
"Intended: John made a reservation at a restaurant one hour after the meeting was over."

d. *John-wa sukosi kaigi-ga owatta ato-ni resutoran-o yoyakusita.
John-top a.little meeting-nom ended after-at restaurant-acc reserved
"Intended: John made a reservation at a restaurant a little after the meeting was over."

This word order restriction cannot be explained if we just assume that *mae* and *ato* are P and are modified by

[4] When *-ni* is absent, TP moves to Spec, DegP, resulting in the legitimate word order.
[5] I do not discuss the fine structure of English PP here, but I can say at least that English *before* and *after* are not Pn, because they cannot be used as nominals as freely as Japanese Pns. On the case where English P's are used in a nominal position, see Bresnan (1994) and Jaworska (1996).

left-adjunction of measure phrases or vague quantifiers. It is therefore safe to conclude that the movement of TP is necessary for the *mae/ato*-clause.

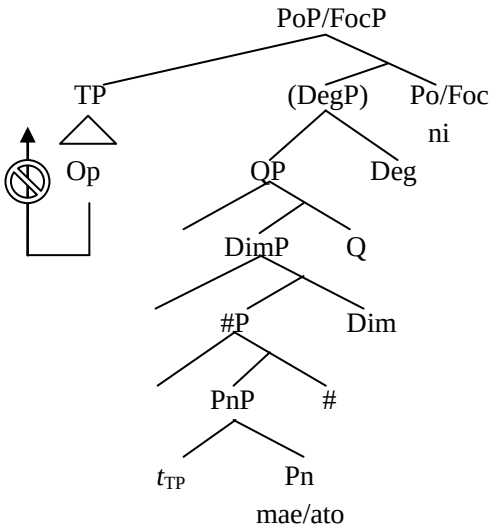
It follows from this movement analysis that *mae/ato*-clauses do not bear the Geis-ambiguity even when *-ni* is present. As we have observed in section 1.2, the low reading is unavailable in *mae/ato*-clauses with *-ni*. I repeat (26) and (27) in (42) and (43), respectively.

(42) Watasi-wa Mary-ni kanojo-ga tuku to iu mae-ni New York-de atta.
I-top Mary-dat she-nom arrive C claim before-at New York-loc saw
"I saw Mary in New York before she claimed that she would arrive." (high/*low)

(43) Watasi-wa Mary-ni kanojo-ga tuita to itta ato-ni New York-de atta.
I-top Mary-dat she-nom arrived C claimed after-at New York-loc saw
"I saw Mary in New York when she claimed that she had arrived." (high/*low)

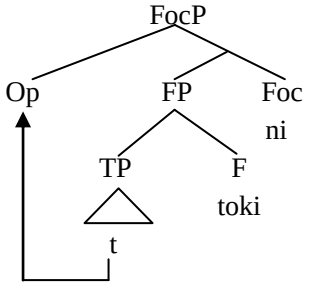
Notice that the specifier of the projection that *-ni* projects is the landing site of the TP movement in (39). Given that this postposition *-ni* is also the head of FocusP (cf. section 1.2), its specifier should be a target of the operator movement required for the low reading. That position is, however, filled up by TP, since TP obligatorily moves there for the licit word order. Otherwise, the word order could not be derived, resulting in unacceptability. Consequently, the operator cannot move to Spec, PoP, or FocP in Endo's (2012, 2014a,b) term and the low reading does not arise. The derivation is shown in (44).

(44)



This contrasts with the *toki*-clause with *-ni*, where the Geis-ambiguity is observable. In (45), TP cannot move since the movement is not motivated by word order or any other reasons. Nothing thus prevents the temporal operator from raising to Spec, FocP. (I will turn to the precise category of *toki* in 2.2.1. I tentatively label *toki* as F here).

(45)



In this way, the contrast of the availability of the low reading between *mae-ni-/ato-ni*-clauses and *toki-ni*-clauses

(that is, (31a)) can be captured by the presence of movement of TP in *mae/ato*-clauses, on the one hand, and the absence of the operation, on the other hand.

2.2. The Category of Japanese Temporal Subordinators

We have seen that Japanese TACs lack CP and that *mae/ato*-clauses involve the additional movement operation whereas *toki*-clauses do not. We have also argued that the category of *mae* and *ato* is Pn. However, the categorial status of *toki* has remained open. In fact, Endo (2012, 2014a,b) is silent on the precise status of *toki*. In this subsection, I will discuss the categorial status of *toki* and compare it with that of *mae* and *ato*. There is a significant difference between *toki* and *mae/ato*, which is relevant for verbal morphology and occurrence of modals in Japanese TACs.

2.2.1. The Category of Toki*: a Fin Head*

In contrast to *mae* and *ato*, *toki* is incompatible with measure phrases or vague quantifiers.

(46) a. *John-wa kyuukei-no ichjikan toki-ni resutoran-o yoyakusita.
John-top rest-gen one.hour when-at restaurant-acc reserved
"John made a reservation at a restaurant one hour when taking a rest."
b. *John-wa kyuukei-no sukosi toki-ni resutoran-o yoyakusita.
John-top going.out-gen a.little when-at restaurant-acc reserved
"John made a reservation at a restaurant a little when taking a rest."

This indicates that *toki* belongs to a category other than Pn.

On the categorial status of *toki*. Miyagawa (2011, 2013), following Whitman (1992), suggests that *toki* is a C head when it heads an adjunct clause and is an N head when it is used in an argument position.[6] Fujita (1988) and Miyagawa (1989) point out that the so-called Nominative/Genitive Conversion (NGC) is not allowed with an unergative verb in TACs (47a) while it is when the temporal clause occurs in an argument position (47b).

(47) a. [Kodomo-ga/*-no waratta toki], tonari-no heya-ni ita
child-nom/gen laughed when next-gen room-in was
"When the child laughed, I was in the next room."
b. [Kodomo-ga/-no waratta toki]-o omoidashita
child-nom/gen laughed when-acc recalled
"I recalled the time when the child laughed." (Miyagawa (2013))

Taking the position that the NGC is licensed by a nominal head, Miyagawa argues that *toki* is not a nominal element but a complementizer.

At this point, we face a problem with respect to the nature of *toki* as a C head. Recall Endo's (2012) argument that there is no complete C-T sequence in the *toki*-clause since the interpretation of tense in the clause is dependent on the matrix clause. This seems to contradict with Miyagawa's argument that *toki* is a complementizer. In addition, if *toki* is a complete C, the Geis-ambiguity should arise, contrary to the fact. How can we solve these problems?

A hint lies in Rizzi's (1997) fine left periphery, where the roles of traditional C are distributed in separate projections. In his structure, finiteness of the clause is determined by FinP, and the landing site of operator movement is the specifier of FocP, TopP or ForceP, depending on the type of movement. Since *toki* by itself cannot license the null operator for the Geis-ambiguity or involve independent tense interpretation, it is plausible to propose that *toki* is a Fin head in Rizzi's sense and lacks higher projections which host a landing site of operator movement (FocP) or illocutionary force relevant for the independent tense interpretation (ForceP). In fact,

[6] I am grateful to Shigeru Miyagawa for leading my attention to the relevant papers.

Miyagawa (2012) observes that topic *-wa* is not available in TACs.

(48) *Taro-ga [Hanako-wa kita toki], uti-ni i-nakat-ta.
Taro-nom Hanako-top came when home-at be-neg-past
"When Hanako came, Taro wasn't at home." (Miyagawa (2012))

(49) a. [ForceP [TopP* [FocP [TopP* [FinP [TP]]]]]] (Rizzi (1997))
b. ~~[ForceP [TopP Hanako-wa [FocP~~ [FinP toki [MP/TP]]]]]

The present proposal can easily account for the restriction. Since there are no higher projections than FinP as in (49b), it is natural that topic *-wa* cannot be licensed in the *toki*-clause in (48).

Likewise, it can be said that the absence of ForceP is responsible for the tense interpretation of the *toki*-clause, which is dependent on the matrix clause; if there is no independent illocutionary force, there is no independent tense interpretation either. FinP is responsible for finiteness of a clause, but is silent to the tense morphology by itself. It should then follow from the FinP analysis that a verb in the *toki*-clause can take either the present or the past form, irrespective the tense in the matrix clause. This is borne out as in (50).

(50) a. Taro-wa Hanako-ga saru/satta toki(-ni) kuru-daroo.
Taro-top Hanako-nom leave/left when-at come.will
"Taro will come when Hanako leaves/has left."
b. Taro-wa Hanako-ga saru/satta toki(-ni) kita.
Taro-top Hanako-nom leave/left when-at came
"Taro came when Hanako left/had left."

In (50a), regardless of the non-past tense in the matrix clause, the verbal morphology in the *toki*-clause is not restricted in terms of tense. Similarly, in (50b) the verb in the *toki*-clause can take either form in the context of the past interpretation. Since Force is absent and FinP just specifies that the *toki*-clause is finite, both of the two tense forms are available in the clause, irrespective of the tense of the matrix clause.[7]

This proposal is not only adequate to capture the observations above, but also conceptually consistent with Endo's analysis. As we have seen before, Endo (2012, 2014a,b) proposes that a case particle functions as a Focus head. Given Rizzi's (1997) structure and the optionality of TopP, it is plausible that a Focus head is directly attached to FinP as in (51).

(51) [FocP -ni [FinP toki [TP]]]] (word order irrelevant)

In the proposed analysis, no further assumption is needed to explain why a case particle is compatible with *toki*, since FocP can select FinP as its complement.[8] Thus, the availability of a case particle *-ni* with *toki* can be attributed to the selectional property of the Focus head.

2.2.2. Modals in Toki-*Clauses*

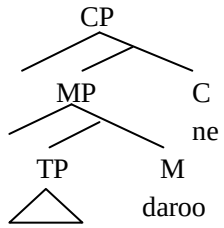
The FinP analysis of *toki* involves a natural consequence regarding occurrence of modals. Koizumi (1993) argues that Japanese modals are located above TP and below CP as in (52) (cf. Cinque (1999)).

(52) a. Kanchi-ga Rika-ni nekkuresu-o ageta daroo ne
Kanchi-nom Rika-dat necklace-acc gave probable prt

[7] See Arregui and Kusumoto (1998), Kusumoto (1999), Oshima (2011), among others for the interpretation of tense in the *toki*-clause.

[8] Hiraiwa and Ishihara (2002) also posit the structure where FocP directly selects FinP for Japanese cleft constructions. I am thankful to Mioko Miyama for reminding me of their argument.

"Probably, Kanchi gave a necklace to Rika."

b. 

Kanchi-ga … age-ta (Koizumi (1993) with a slight modification)

In Koizumi's structure, the modal *daroo* is selected by the end particle *ne* in C. Based on this structural analysis, let us consider whether modals can occur in the *toki*-clause.

(53) Taro-ga syuuron-o teisyutsu-suru hazu-no/-datta toki Hanako-wa
Taro-nom Master's Thesis-acc submit-pres should-gen/-cop.past when Hanako-top
kare-o Sibuya-de mikaketa
him-acc Sibuya-in saw
"When Taro was supposed to submit his Master's Thesis, Hanako saw him in Sibuya."

As (53) shows, the modal *hazu* is permitted in the *toki*-clause. Since *toki* is a Fin head, which belongs to the traditional CP area, *toki* can select modals in its complement and thus (53) is acceptable.

Here one might suppose that this is incompatible with Endo's (2012, 2014a,b) argument that the *toki*-clause does not allow mood particles. As we have seen in section1.2.1, Endo claims that Japanese subordinate clauses are truncated. He classifies mood particles as a functional head higher than T as in (15). Accordingly, it is expected that mood particles cannot co-occur with *toki*, which Endo argues selects T. However, it should be pointed out that the mood particle which Endo exemplifies is *soo(-da)* 'I hear.' *Soo(-da)* behaves differently from *hazu* in that the former is incompatible with the *koto* complement clause.[9]

(54) a. Watasi-wa Taro-ga kuru hazu-datta koto-o oboeteiru.
I-top Taro-nom come should-past C-acc remember
"I remember that Taro was supposed to come."
b. *Watasi-wa Taro-ga kuru soo-datta koto-o oboeteiru.

[9] Sawada and Larson (2004) observe that *daroo* 'probable' is incompatible even with the *toki*-clause.
(i) *Taro-wa raisyuu kuru-daroo-toki, soba-o motte kite morau
Taro-top next week come-probable -when, noodles-acc bring come BENE
'When Taro may come next week, (I) will ask him to bring soba noodles.'
Daroo is also incompatible with the *koto* complement clause.
(ii) ?*Watasi-wa Taro-ga kuru daroo koto-o oboeteiru.
I-top Taro-nom come probable C-acc remember
"I remember that it is probable that Taro will come."
Daroo has an alternative form: *dearoo*. Interestingly, the latter form is marginally compatible with the *toki*-clause and the *koto* complement clause.
(iii) ?(?)Taro-wa raisyuu kuru-dearoo-toki, soba-o motte kite morau
Taro-top next week come-probable-when, noodles-acc bringcome BENE
'When Taro may come next week, (I) will ask him to bring soba noodles.'
(iv) ?(?)Watasi-wa Taro-ga kuru dearoo koto-o oboeteiru.
I-top Taro-nom come probable C-acc remember
"I remember that it is probable that Taro will come."
It is entirely unclear at this point why such contrast exists between *daroo* and *dearoo*. For the present purpose, it is sufficient to say that *daroo* may not be a counterexample to the argument that *toki* takes MP complement. Thanks to Mioko Miyama for informing me of the article.

I-top Taro-nom come I.hear-past C-acc remember
"I remember that it was said that Taro would come."

The contrast in (54) implies that *soo(-da)* should not be classified in the same class as *hazu*. Thus, I conclude that *toki* can take MP complement and hence is a Fin head with a selectional property of the traditional C.

2.2.3. Properties of Mae/Ato *as Pn*

Turning to *mae/ato*, I have argued that they are the head of PnP. Here I would like to claim that Pn does not have complementizer properties like *toki*. Pn selects TP, but does not allow its complement to take both of the present and past forms. In other words, Pn specifies the verbal morphology in TP. If *mae* and *ato* belonged to FinP or other projections of the traditional C, they would show free variation of verbal morphology. This is not the case as in (55)-(56) (cf. Kuno (1973)).

(55) a. Taro-wa Hanako-ga saru/*satta mae(-ni) kuru-daroo.
Taro-top Hanako-nom leave/left before-at come.will
"Taro will come before Hanako leaves."
b. Taro-wa Hanako-ga saru/*satta mae(-ni) kita.
Taro-top Hanako-nom leave/left before-at came
"Taro came before Hanako left."

(56) a. Taro-wa Hanako-ga *saru/satta ato(-ni) kuru-daroo.
Taro-top Hanako-nom leave/left after-at come.will
"Taro will come after Hanako leaves."
b. Taro-wa Hanako-ga *saru/satta ato-ni kita.
Taro-top Hanako-nom leave/left after-at came
"Taro came after Hanako left."

In contrast to verbs in the *toki*-clause, verbs in the *mae*-clause must take the present form (55), and ones in the *ato*-clause the past form (56), irrespective of the tense of the matrix clause. This is because the tense morphology is determined, or selected, by the Pns.

Furthermore, it is predicted from the categorial status of Pn that modals cannot occur in Pn-TACs, since modals can be selected only by complementizer projections. This is borne out as in (57)-(58).

(57) *Taro-ga syuuron-o teisyutu-suru hazu-no/-dearu mae
Taro-nom Master's Thesis-acc submit-pres should-gen/-cop.pres before
Hanako-wa kare-o Shibuya-de mikaketa
Hanako-top him-acc Shibuya-in saw
"Before Taro was supposed to submit his Master's Thesis, Hanako saw him in Shibuya."

(58) *Taro-ga syuuron-o teisyutu-suru hazu-no/-datta ato Hanako-wa
Taro-nom Master's Paper-acc submit-pres should-gen/-cop.past after Hanako-top
kare-ga ochikonde-iru no-o mikaketa
him-nom depressed-pre C-acc saw
"After Taro was supposed to submit his Master's Thesis, Hanako saw him depressed."

While *hazu* 'should' is acceptable in the *toki*-clause (cf. (53)), it is not in the *mae*- and *ato*-clause. This confirms that *mae* and *ato* have no selectional property of complementizers and hence cannot take MP.[10]

[10] Noda (2001) notices the difference in compatibility of modals with *toki* and *mae/ato*, though he gives no detailed discussion.

2.3. Interim Summary

This section has examined the structure of Japanese TACs and the properties of subordinators of the TACs, and argued that the difference in the Geis-ambiguity within Japanese are reduced to that of the selectional properties and the categorial status of the functional heads in Japanese TACs. I have proposed that in the *mae/ato*-clause the TP-complement of Pn competes with the temporal operator for Spec, FocP because of the obligatory movement of the TP, resulting in the lack of the Geis-ambiguity. On the other hand, *toki* is a Fin head, which does not require its complement to move, giving rise to the Geis-ambiguity.

The conditions on the verbal morphology inside the clause and the occurrence of modals can be taken as a consequence of the selectional properties of temporal subordinators. Since *toki* is a Fin head, which selects TP or MP, the verb can take the present or past form and modals are allowed to occur. *Mae* and *ato*, in contrast, specify the tense morphology of the complement and cannot take MP complement because they are Pn, which selects only TP and have no complementizer-like properties to allow both present and past forms. The data are summarized in Table 2.

Table 2: The Internal Structure of TACs and Syntactic Phenomena

	Category of the subordinator	Category of the complement of the subordinator	Modals	Tense morphology	Geis-ambiguity	Geis-ambiguity with a case particle
when	NP	(CP)	-	Present or Past	Yes	-
before	P	CP	-	Present or Past	Yes	-
after	P	CP	-	Present or Past	Yes	-
toki	Fin	TP	Yes	Present or Past	No	Yes
mae	Pn	TP	No	Present	No	No
ato	Pn	TP	No	Past	No	No

3. CP Structure of Japanese TACs

In the spirit of Endo (2012, 2014a,b), I have examined Japanese TACs in detail and proposed that the syntactic differences of TACs appeal to the properties of each functional head. *Toki*, *mae*, and *ato* select not CP but TP. In addition, *mae* and *ato* require their complement to raise, whereas *toki* does not. This additional movement prevents the temporal operator from moving to its licensing position. In this analysis, Japanese TACs do not include a full CP, in contrast to English TACs.

However, when we take "universality" of the subordinating clausal architecture seriously, there arises a question as to whether Japanese TACs also have a CP structure analogous to one in English. Haegeman (2009 2010, 2011, 2012a,b) suggests in line with Larson (1987, 1990) that TACs (and more generally, subordinate clauses) are universally derived by operator movement and hence that they contain CP projection. If Haegeman's argument is on the right track, it is desirable to find TACs including CP projection in Japanese as well.

I will therefore discuss this point in this section and show that we find Japanese TACs with CP projection. This accounts for (31b): *sono*-TACs behave uniformly within Japanese and similarly to English TACs in terms of the Geis-ambiguity. Moreover, it will be argued that the CP structure also appears by a selectional property and/or a categorial status of functional heads.

3.1. Yori-*TACs*

Miyamoto (1996) shows that certain Japanese TACs include operator movement and CP projection. He observes that the *mae*-clause obtains the Geis-ambiguity in the following;

(59) Boku-wa [John-ga [Mary-ga tukudaroo to] kiiteita yori-mo] mae-ni
I-top John-nom Mary-nom arrive.will C heard than-even before-at
kanojyo-o Asenzu-de mikaketa

her-acc Athens-in saw
"I saw Mary in Athens before John heard that Mary would arrive." (Miyamoto (1996: 186))

Since the case particle does not sanction the low reading in the *mae*-clause as seen above, (59) should not bear the low reading. (59) therefore seems problematic for the present proposal. In this case, however, as Kusumoto (1999) points out, *yori* 'than' is included in the *mae*-clause and the verb of the higher embedded clause takes the past form, contrary to the requirement that the tense morphology of the complement of *mae* must be the present form as observed in (55) (repeated in (60)).

(60) a. Taro-wa Hanako-ga saru/*satta mae(-ni) kuru-daroo.
Taro-top Hanako-nom leave/left before-at come.will
"Taro will come before Hanako leaves."
b. Taro-wa Hanako-ga saru/*satta mae(-ni) kita.
Taro-top Hanako-nom leave/left before-at came
"Taro came before Hanako left."

This fact indicates that the syntax of the *mae*-clause in (59) should be different from that presented in (53).

In order to solve this problem, I propose that *yori* plays a crucial role in deriving the low reading, as Kusumoto (1999) speculates. Significantly, *yori* is used in comparatives (61).[11]

(61) Taro-wa Hanako yori se-ga takai.
Taro-top Hanako than height-nom tall
"Taro is taller than Hanako."

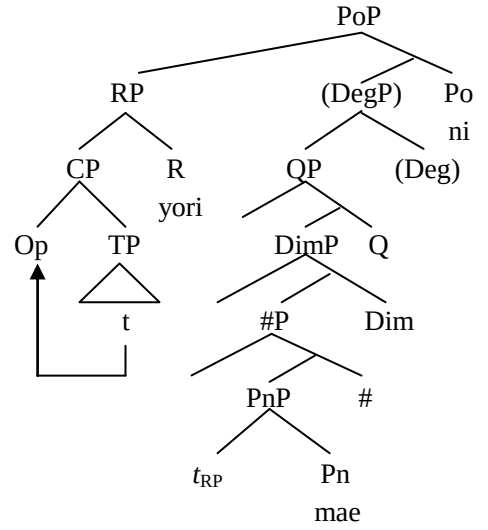
It is well known that English comparatives can be analyzed to involve operator movement (Bresnan (1973), Chomsky (1977), *inter alia*). Although there has been a controversy as to whether operator movement is available in Japanese comparatives, Shimoyama (2012) argues that Japanese also has clausal comparatives with operator movement as in (62).

(62) a. Taro is taller than [Op Hanako *t*].
b. Taro-wa [Op Hanako *t*] yori se-ga takai.

What is crucial for the present discussion is that the operator movement is made available by *yori*. By analogy, it is plausible to say that *yori* in (59) also makes the operator movement possible. It then follows that *yori* selects CP in its complement since Spec, CP is necessary for operator movement. Now the derivation is given in (63).

[11] On the analysis of Japanese adjectives in comparatives, see Watanabe (2013).

(63)



I label *yori* as R, following Watanabe (2009). Though Spec, PoP, which is the landing site of the operator, is filled with the entire RP projected by *yori*, the temporal operator can raise to Spec, CP of the embedded clause, so that the low reading is derivable. In this structure, it is not surprising that the complement clause of *yori* allows for the past verb form in spite of the requirement of *mae* that the complement verb take the present form, since the verbal morphology is not restricted in CP as mentioned in section 2.

It is worth noting here that in the case of the *yori*-TAC, *-ni* is obligatory (64).

(64) Taro-wa Hanako-ga saru yori-mo mae*(-ni) kita.
Taro-top Hanako-nom leave than-foc before(-at) came
"Taro came before Hanako left."

This indicates that a landing site of RP movement is required when *yori* appears. This can be immediately explained by the present proposal: *-ni* projects FocP, to whose specifier RP raises.[12]

If there is CP projection in *yori*-TACs, it is predicted that modals can appear in the embedded clause. This is borne out as in (65).

(65) Taro-wa Hanako-ga saru hazu-datta yori-mo mae-ni kita.
Taro-top Hanako-nom leave should-cop.past than-even before-at came
"Taro came before Hanako was supposed to leave."

Thus I conclude that Japanese has CP-TACs like other languages; the CP structure is selected by *yori*.

This consequence is desirable because it seems to support Haegeman's (2009 2010, 2011, 2012a,b) claim that TACs universally involve CP projection and can attribute the occurrence of the projection to the selectional property of the functional head. However, the CP structure is realized via the functional head R, which intervenes between the internal clause and Pn, so that we cannot say that the *yori*-clause is completely parallel to English

[12] When *-mo* does not occur with *yori*, *saki* sounds more natural than *mae* as in (i).
(i) Taro-wa Hanako-ga kuru yori saki/?mae-ni kita.
Taro-top Hanako-nom come than before-at came
"Taro came before Hanako came."
Similarly, *ato* seems a little degraded without *-mo*.
(ii) Taro-wa Hanako-ga kuru yori?(-mo) ato-ni kita.
Taro-top Hanako-nom come than(-even) after-at came
"Taro came after Hanako came."
I leave open why there is such a difference.

TACs, which are constructed without an additional element like *yori* or *than*. Thus I would like to explore in the next section the possibility that there are TACs in Japanese which have (P-)CP structure analogously to English TACs.

3.2. Sono-*TACs*

3.2.1. Core Data and CP structure

As we observed in section 1.2, *sono*-TACs allow the Geis-ambiguity, irrespective of the type of the temporal subordinator. (28)-(30) are repeated as (66)-(68).

(66) Watasi-wa Mary-ni [[kanojo-ga tuku to] itta]] sono-toki-ni New York-de atta.
I-top Mary-dat she-nom arrive C claimed that-when-at New York-loc saw
"I saw Mary in New York when she claimed that she would arrive." (high/low)

(67) Watasi-wa Mary-ni [[kanojo-ga tuku to] iu] sono-mae-ni New York-de atta.
I-top Mary-dat she-nom arrive C claim that-before-at New York-loc saw
"I saw Mary in New York before she claimed that she would arrive." (high/low)

(68) Watasi-wa Mary-ni [[kanojo-ga tuita to] itta] sono-ato-ni New York-de atta.
I-top Mary-dat she-nom arrived C claimed that-after-at New York-loc saw
"I saw Mary in New York after she claimed that she had arrived." (high/low)

Considering the discussion in the previous section, it is natural that *sono*-TACs also have CP projection. The derivation of the low reading is described in (69).

(69) [CP Op [CP *t* [TP kanojo-ga *t* tuku] to] iu] sono-mae-ni

This CP structure immediately explains the observation in (70)-(71) that both present and past forms are available in *sono*-TACs even when the temporal subordinator is *mae* or *ato*.

(70) Taro-wa Hanako-ga saru/satta sono-mae-ni kita.
Taro-top Hanako-nom leave/left that-before-at came
"Taro came before Hanako left."

(71) Taro-wa Hanako-ga saru/satta sono-ato-ni kuru-daroo.
Taro-top Hanako-nom leave/left that-after-at come-will
"Taro will come after Hanako leave."

A complementizer in *sono*-TACs intervenes between Pns (*mae/ato*) and TP and allows the presence of both present and past tense morphemes, unlike the cases where Pns (*mae/ato*) directly select TP.

If *sono*-TACs include CP, it is predicted that modals are compatible with *sono-mae/ato*-TACs since MP can be selected by C. This is borne out as in (72)-(73).

(72) Taro-ga syuuron-o teisyutu-suru hazu-datta sono-mae-ni
Taro-nom Master's Thesis-acc submit-pres should-cop.past that-before-at
Hanako-wa kare-o Shibuya-de mikaketa
Hanako-top him-acc Shibuya-in saw
"Before Taro was supposed to submit his Master's Thesis, Hanako saw him in Shibuya."

(73) Taro-ga syuuron-o teisyutu-suru hazu-datta sono-ato-ni Hanako-wa
Taro-nom Master's Paper-acc submit-pres should-cop.past that-after-at Hanako-top
kare-ga ochikonde-iru no-o mikaketa
him-nom depressed-pre C-acc saw

"After Taro was supposed to submit his Master's Thesis, Hanako saw him depressed."

Thus, these data are sufficient to conclude that *sono*-TACs involve CP projection since *sono*-TACs pattern with *yori*-TACs and *toki-ni* clauses in terms of the Geis-ambiguity, verbal morphology, and occurrence of modals.

So far we have seen that *sono*-TACs involve CP structure. The observations are summarized in Table 3, which is a modified version of Table 2. Though the argument that *sono*-TACs host the CP structure seems to be firm, now we face with an important question: how is the CP projection introduced in *sono*-TACs? To answer the question, we should investigate the categorial status of the demonstrative because the presence of *sono* obviously changes the behavior of TACs. In the next subsections, I will argue that in spite of the superficial morphological behavior of *sono* as a demonstrative, it does not syntactically function as a true demonstrative. To prove this, I will first consider two possible analyses to treat *sono* as a demonstrative: a relative clause analysis and a sentential modifier analysis. Second, I will introduce an insightful analysis by Inada (2009, 2011), which suggests that *sono* be an element other than a demonstrative. After problems of the three analyses are pointed out, a new hypothesis will finally be proposed; *sono* is used as a complementizer.

Table 3: The Internal Structure of TACs and the Geis-Ambiguity: Revised Version

	Category of the subordinator	Category of the complement of the subordinator	Modals	Tense morphology	Geis-ambiguity	Geis-ambiguity with a case particle
toki	Fin	TP	Yes	Present or Past	No	Yes
mae	Pn	TP	No	Present	No	No
ato	Pn	TP	No	Past	No	No
yori-mae	Pn	RP (including CP)	Yes	Present or Past	Yes	-
yori-ato	Pn	RP (including CP)	Yes	Present or Past	Yes	-
sono-toki	Fin	CP	Yes	Present or Past	Yes	-
sono-mae	Pn	CP	Yes	Present or Past	Yes	-
sono-ato	Pn	CP	Yes	Present or Past	Yes	-

3.2.2. A Relative Clause Analysis

One possible approach is to analyze *sono*-TACs as relative clauses. Since *sono-* contains a demonstrative part *so-*, one may argue that the temporal subordinator is nominalized by the demonstrative and hence the TACs are "relativized". For the time being, I assume that the relative clause is CP and is adjoined to DP. The schema is given in (74).

(74) [DP [CP] [DP sono [NP toki/mae/ato]]]

I will show that even though the approach appears to be correct at first sight, it is confronted with serious empirical problems.

3.2.2.1. Similarity between Relative Clauses and Sono-*TACs*

A piece of seeming evidence for the relative clause analysis is that relative clauses are compatible with both present and past verb forms (75).

(75) Taro-ga yomu/yonda hon
Taro-nom read.pres/read.past book
"the book Taro reads/read"

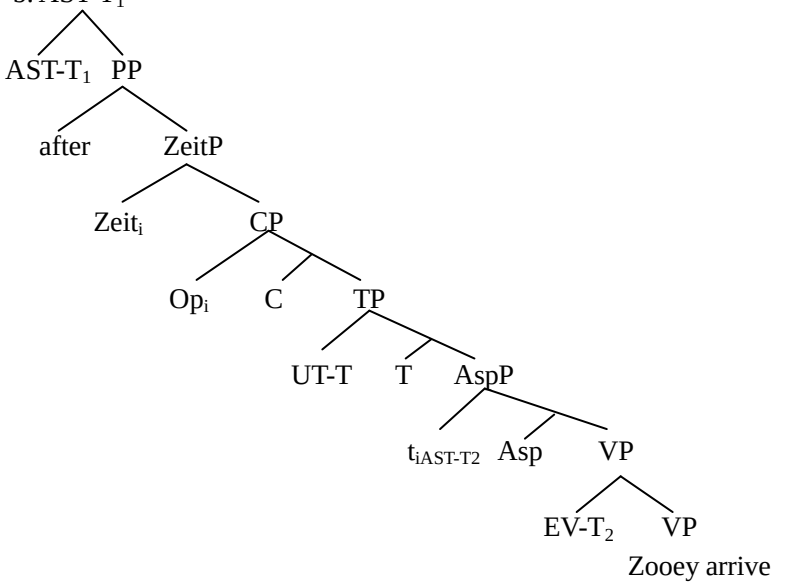
As mentioned above, CP projection is relevant for the variation of verbal morphology. Given that relative clauses

contain CP as in (74), it appears plausible to argue that *sono*-TACs are relative clauses.

This analysis partially agrees with the hypothesis made by Larson (1987), Johnson (1988), Declerck (1997), Demirdache and Uribe-Etxebarria (2004), Haegeman (2012b) among others, that temporal clauses are (hidden) free relative clauses. For example, Demirdache and Uribe-Etxebarria (2004) suggest the following structure for the *after*-clause:

(76) a. after Zooey arrived

b. AST-T_1



(Demirdache and Uribe-Etxebarria (2004))

UT-T stands for the time of utterance, AST-T for the reference time, and EV-T for the time of the occurrence of the event or state denoted by the VP. According to Demirdache and Uribe-Etxebarria (2004), the null operator raises to the Spec, CP and establishes a predication relation with the null temporal noun Zeit, which requires co-indexation between the operator and the Zeit head. This predication enables *after* to settle the temporal relation between AST-T_1 and AST-T_2 (see Demirdache and Uribe-Etxebarria (2004) for detail). What is of importance here is that the temporal clause includes a temporal noun (Zeit). Since *after* lacks nominal properties, it cannot be co-indexed with an operator. Thus the presence of a temporal noun to be co-indexed is forced in order that the predication relation may be established. In Japanese, the predication relation can be established by the Pn itself without the support of the covert temporal noun, because the Pn has nominal property which is strengthened by the demonstrative *sono* and hence the overt temporal "noun" can play the same role as Zeit. In this sense, Japanese *sono*-TACs are not "hidden" free relatives. The function of the Pn in *sono*-TACs is two-fold: as a noun that establishes co-indexation with the temporal operator, and as a postposition that determines the interpretation of the temporal relation between the matrix and the embedded clauses.

3.2.2.2. Differences between Relative Clauses and Sono-*TACs*

Although the relative clause analysis seems to be attractive, we find problems with the analysis. First, it is dubious whether it is appropriate to call *sono*-TACs "relative clause" in the first place. On the standard assumption, a relative clause contains a gap of the head.[13] As is shown in (77)-(78), the relation between the head and the clause in the case of relative clauses does not change compared to that in ordinary clauses. However, (79) and (80)

[13] Japanese has so-called gapless relatives as in (i).

(i) sakana-ga yakeru nioi
fish-nom is.grilled smell
"the smell of a fish being grilled"

I do not count such constructions as relative clauses here for expository purpose.

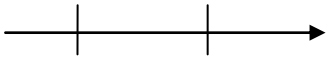
suggest that *sono*-TACs do not involve a gap of their head in the clause, because the interpretations of the reference time are different.

(77) Taro-ga hon-o yomu/yonda
Taro-nom book-acc read.pres/read.past
"Taro read the book."

(78) Taro-ga yomu/yonda hon
Taro-nom read.pres/read.past book
"the book Taro reads/read"

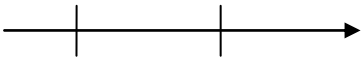
(79) a. Sono-mae Taro-ga kita.
That-before Taro-nom came
"Before that, Taro came."

b. come X



(80) a. Taro-ga kuru sono-mae
Taro-nom come that-before
"before Taro comes"

b. X come



X is time of an event associated with the event that Taro came. In (79a), Taro came before the time X, as schematized in (79b), whereas in (80a), the time X precedes the time when Taro comes as in (80b). That is, the temporal relation between X and the time of Taro's coming is not identical. This indicates that Pn in *sono*-TACs is not extracted from within the internal CP, which contradicts the relative clause analysis.

Second, *sono*-TACs behave differently from relative clauses in terms of resumptive elements. Murasugi (1991) observes that Japanese relative clauses headed by temporal nouns may have the low reading (81).

(81) [[e_i mensetsu-o uke-ta] gakusei-ga minna ukar-u] hi_i
job.interview-acc receive-past student-nom all pass-pres day
"the day$_i$ that all of the students that received the job interview t_i passes" (Murasugi (1991))

Murasugi argues that the low reading is raised not by operator movement but by null resumptive *pro*-PPs. Her argument rests on the observation the temporal relative clause permits an overt resumptive PP (82).

(82) ?[[sono hi_i-ni mensetsu-o uke-ta] gakusei-ga minna ukar-u] hi_i
that day job.interview-acc receive-past student-nom all pass-pres day
"the day$_i$ that all of the students that received the job interview then$_i$ passes" (Murasugi (1991))

If *sono*-TACs are relative clauses like (81), the overt resumptive PP should be also available in *sono*-TACs. This prediction, however, is not borne out as in (83)-(85).

(83) *Watasi-wa Mary-ni [[sono-mae$_i$-ni kanojo-ga tuku to] iu]] sono-mae$_i$
I-top Mary-dat that-before-at she-nom arrive C claim that-before
New York-de atta.
New York-loc saw
"I saw Mary in New York before$_i$ she claimed that she would arrive before that$_i$."

(84) *Watasi-wa Mary-ni [[sono-ato$_i$-ni kanojo-ga tuita to] itta]] sono-ato$_i$
I-top Mary-dat that-after-at she-nom arrived C claimed that-after

New York-de atta.
New York-loc saw
"I saw Mary in New York after$_i$ she claimed that she had arrived after that$_i$."

(85) *Watasi-wa Mary-ni [[sono-toki$_i$-ni kanojo-ga tuku to] itta]] sono-toki$_i$
I-top Mary-dat that-time-at she-nom arrive C claimed that-when
New York-de atta.
New York-loc saw
"I saw Mary in New York when$_i$ she claimed that she would arrive at that time$_i$."

The contrast between relative clauses and *sono*-TACs shows that *sono*-TACs cannot use the resumptive *pro*-PP. If *sono*-TACs were relative clauses, the contrast would be completely mysterious.

Third, *sono-mae/ato*-clauses show a different property from ordinary relative clauses in terms of numerals and vague quantifiers. When numerals and vague quantifiers occur between *sono* and *mae/ato* in *sono-mae/ato*-clauses, they must not be suffixed by *-no* as in (86), whereas between *sono* and a relative head in ordinary relative clauses, they must as in (87).

(86) Hanako-ga kuru sono 2-hun/sukosi(*-no) mae
Hanako-nom come that 2-CL/a.little(-gen) before
"two minutes/a little before Hanako came"

(87) Hanako-ga katta sono 2-kiro/sukosi*(-no) kome
Hanako-nom bought that 2-CL/a.little(-gen) rice
"two kilograms of/a little rice that Hanako bought"

This contrast strongly indicates that *sono*-TACs and relative clauses do not share the same structure.

Fourth, there exist substantial counterexamples to the RC analysis related to demonstratives. In order to show this, I would like to introduce Ishizuka's (2006) analysis of RCs. Ishizuka (2006) demonstrates, following Kamio (1977), that demonstratives in Japanese can either precede or follow relative clauses, depending on the interpretation. If demonstratives precede relative clauses, the interpretation is only restrictive (89)-(90). However, if demonstratives follow relative clauses, both restrictive and non-restrictive interpretations are available (91)-(92). (The examples are from Ishizuka (2006).)

(88) a. Dem [RC] NP (Restrictive/*Non-restrictive)
b. [RC] Dem NP (Restrictive/Non-restrictive)

(89) [Dem RC NP] (Restrictive)
ok Ito-san-ni-wa san-nin musuko-ga iru. Sakunen hitori-wa isya-ni, huta-ri-wa
Ito-Ms.-dat-top 3-CL son-nom exist last.year 1-CL-top doctor-dat 2-CL-top
bengoshi-ni natta. [Sono [sakunen isya-ni natta] musuko]-ga kekkon-sita.
lawyer-dat became that last.yeardoctor-dat became son-nom marriage-did
"Ms. Ito has three sons. Last year one became a doctor, and two became lawyers. That son who became a doctor last year got married."

(90) [Dem RC NP] (Non-restrictive)
*? Ito-san-ni-wa musuko-ga hito-ri iru. [Sono sakunen isya-ni natta]
Ito-Ms.-dat-top son-nom 1-CL exist that last.year doctor-dat became
musuko]-ga kekkon-sita.
son-nom marriage-did
"Ms. Ito has a son. That son who became a doctor last year got married."

(91) [RC Dem NP] (Restrictive)
ok Ito-san-ni-wa san-nin musuko-ga iru. Sakunen hito-ri-wa isya-ni, huta-ri-wa
Ito-Ms.-dat-top 3-CL son-nom exist last.year 1-CL-top doctor-dat 2-CL-top

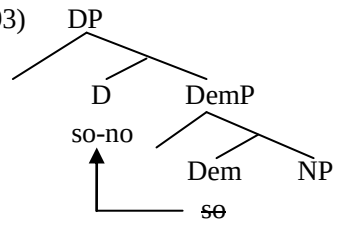
bengoshi-ni natta. [[Sakunen isya-ni natta] Sono musuko]-ga kekkon-sita.
lawyer-dat became last.year doctor-dat became that son-nom marriage-did
"Ms. Ito has three sons. Last year one became a doctor, and two became lawyers. That son who became a doctor last year got married."

(92) [RC Dem NP] (Non-restrictive)

ok Ito-san-ni-wa musuko-ga hito-ri iru. [sakunen isya-ni natta] sono
Ito-Ms.-dat-top son-nom 1-CL exist last.year doctor-dat became that
musuko]-ga kekkon-sita.
son-nom marriage-did
"Ms. Ito has a son. That son who became a doctor last year got married."

The presence and position of *sono* obviously differentiates the possible interpretations of relative clauses between restrictive and non-restrictive. To explain the paradigm, Ishizuka (2006) suggests the following structures (93)-(95), based on Kayne's (1994) antisymmetric approach.

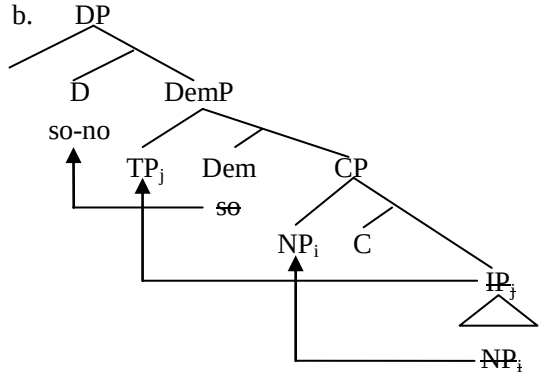
(93)



The Dem head *so* undergoes incorporation to the D head, yielding the surface form *so-no*. What is significant is that the structure has two D-like positions as a landing site of TP movement. When *sono* precedes the relative clause, the derivation is as follows:

(94) a. $[_{DP}$ sono $[_{DemP}$ TP_i $[_{CP}$ NP [C t_i]]] (restrictive/*non-restrictive)

b.

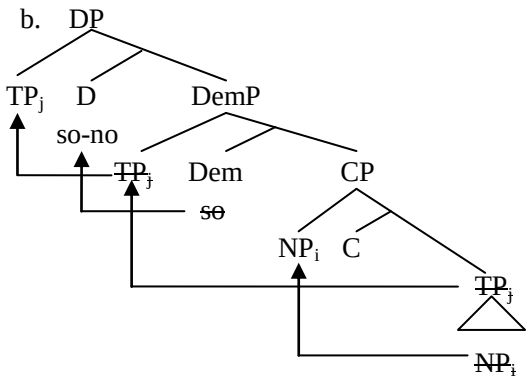


The head NP of the relative clause moves to Spec CP and the remnant TP movement takes place to Spec, DemP. In this case, TP remains within the scope of DP, thus only the restrictive reading is available.[14]

On the other hand, the RC-*sono*-NP order is derived in the following fashion.

(95) a. $[_{DP}$ TP_i $[_{D}$ sono $[_{CP}$ NP [C t_i]]] (restrictive/non-restrictive)

[14] A reviewer wonders why *so* cannot be reconstructed unlike TP. Ishizuka gives no explanation on this, but it is worth noting that the movement of *so* to D^0 is head-movement. I speculate that the status of head movement is relevant for reconstructability. Let us assume that D is associated with definiteness and/or referentiality and that Dim by itself has no such property. *So* must incorporate into D^0 in order to be activated as a demonstrative bearing referentiality. If *so* is reconstructed in situ, the constituency is broken and the definiteness or referentiality of *so* cannot be maintained. Hence *so* cannot be reconstructed in its original position.



The relative clause TP first moves to Spec, DemP, and further raises to Spec, DP. The non-restrictive interpretation arises since TP is located out of the domain of D. The restrictive interpretation is accounted for by reconstruction; TP is reconstructed in the domain of D, that is, Spec, DemP. Thus Ishizuka's analysis can explain why the two interpretations are available in the RC-*sono*-NP order but not in the *sono*-RC-NP order.

If *sono*-TACs are relative clauses, it should be observed that the temporal clauses behave uniformly irrespective of the word order in that the Geis-ambiguity and the morphological variation are maintained, since the internal structure of the moved clause does not change. However, the *sono*-RC-Pn order represents a different property from *sono*-TACs.

(96) a. Taro-wa Hanako-ga saru/satta sono-mae-ni kita.
Taro-top Hanako-nom leave/left that-before-at came
"Taro came before Hanako left."

b. Taro-wa sono Hanako-ga saru/*satta mae-ni kita.
Taro-top that Hanako-nom leave/left before-at came
"Taro came before Hanako left."

(97) a. Taro-wa Hanako-ga saru/satta sono-ato-ni kuru daroo.
Taro-top Hanako-nom leave/left that-after-at come will
"Taro will come after Hanako leaves."

b. Taro-wa sono Hanako-ga *saru/satta ato-ni kuru daroo.
Taro-top that Hanako-nom leave/left after-at come will
"Taro came after Hanako left."

As we have seen in section 3.2.1, *sono*-TACs do not restrict the tense morphology in the clauses. However, when *sono* is separated from Pn, the free variation disappears as in (96b) and (97b). If the underlying structure of *sono*-TACs and *sono*-RC-Pn were equivalent, the morphological restriction would be mysterious. It then follows that they have a distinct structure.[15]

In addition, given Ishizuka's derivation and Larson's operator movement, the order of the demonstrative relative to CP should give rise to no difference in terms of the interpretation of the internal clause, other than restrictive/non-restrictive. However the prediction is not borne out. When the demonstrative precedes the temporal clause, the Geis-ambiguity does not arise.

(98) Watasi-wa Mary-ni [[kanojo-ga tuku to] iu] sono-mae-ni New York-de atta.
I-top Mary-dat she-nom arrive C claim that-before-at New York-loc saw
"I saw Mary in New York before she claimed that she would arrive." (high/low)

[15] Though in Kayne (1994) and Ishizuka (2006) what is raised to the higher specifiers is IP (or TP), Frellesvig and Whitman (2011) suggest a possibility that the whole CP can move to the higher positions when it is a gapless relative clause. I assume this in order to maintain the operator movement analysis within CP.

(99) %Watasi-wa Mary-ni [sono [kanojo-ga tuku to] iu] mae-ni New York-de atta.
I-top Mary-dat that she-nom arrive C claim before-at New York-loc saw
"I saw Mary in New York before she claimed that she would arrive." (high/*low)

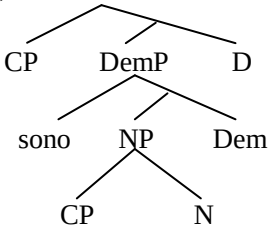
(100) Watasi-wa Mary-ni [[kanojo-ga tuita to] itta] sono-ato-ni New York-de atta.
I-top Mary-dat she-nom arrived C claimed that-after-at New York-loc saw
"I saw Mary in New York after she claimed that she had arrived." (high/low)

(101) %Watasi-wa Mary-ni [sono [kanojo-ga tuita to] itta] ato-ni New York-de atta.
I-top Mary-dat that she-nom arrived C claimed after-ni New York-loc saw
"I saw Mary in New York after she claimed that she had arrived." (high/*low)

(99) and (101) show that just adding the demonstrative to TACs does not guarantee the ambiguity. Furthermore, a reviewer and some informants find (99) and (101) less acceptable than (98) and (100) in the first place. This also indicates that the structure of (99) and (101) is different from that of (98) and (100).Thus the observation here strongly suggests that *sono*-TACs should not be taken to be syntactically equivalent to relative clauses.

The same argument holds even when we adopt the traditional head-final structure instead of the antisymmetric one. In order to capture the word order variation of ordinary relative clauses, I continue to adopt Ishizuka's DP-DemP-NP structure as in (102).

(102)



Assuming *sono* is in the specifier of DemP, there are two possible positions of CP. One is Spec, DP, where the CP is out of the scope of D, hence deriving the non-restrictive reading. The other is Spec, NP, inside the scope of D.[16] Thus the two interpretations can be captured regarding ordinary RCs. Concerning *sono*-TACs, however, it remains to be explained why CP must be located in Spec, CP and not allowed in a lower position.

I therefore conclude that the relative clause analysis of *sono*-TACs is deficient. Now that *sono*-TACs cannot be analyzed as relative clauses like other ordinary RCs, we should consider another approach to treat *sono*-TACs as nominal clauses. Through the discussion, it will turn out that the possibility that *sono*-TACs have a DP-structure is entirely excluded.

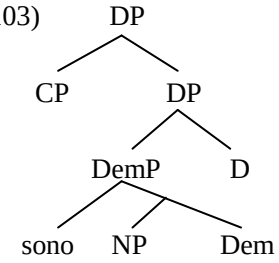
3.2.3. A Sentential Modifier Analysis

3.2.3.1. Word Order and Head Movement

Continuing to treat *sono*-TACs as underlyingly nominal clauses, I next consider a hypothesis that the temporal clause is a sentential modifier directly left-adjoined to DP involving the temporal subordinator as in (103).

[16] It is possible that CP is adjoined to DP or NP. In this case, too, the paradigm of ordinary RCs is accounted for. I do not take this position just for expository purpose.

(103)



Assuming that it is left-adjunction, the CP is structurally higher than DP and hence always precedes the DP. As a result, the word order problem posed in the relative clause analysis does not arise. In addition, the CP structure ensures that the verbal tense morphology is not restricted and that the Geis-ambiguity is derived by operator movement.

One might argue that the sentential modifier should be not CP but TP. It is well known that English sentential modifiers require an overt complementizer (104).

(104) the fact [$_{CP}$ *(that) John fell asleep]

Kayne (1981) and Stowell (1981) attribute this fact to the Empty Category Principle (ECP). According to them, if the complementizer is covert, there would be no governer to license the empty category in C, yielding the ungrammaticality. Based on this reasoning, Murasugi (1991, 2000a,b) suggests that Japanese sentential modifiers should be TP since the modifiers seem to permit no overt complementizer as in (105).

(105) Taro-ga inemuri-o sita (*no) jijitu
Taro-nom falling.asleep-acc did C fact
"the fact that Taro fell asleep"

If the Japanese sentential modifier has CP structure with a covert complementizer, the derivation would violate ECP. On the other hand, if the clause is TP, the unavailability of the overt complementizer can be immediately accounted for. Thus Murasugi concludes that the structure of sentential modifiers in Japanese is TP (see Murasugi (1991, 2000a,b) for more).

Kaplan and Whitman (1995) argue against Murasugi that the Japanese sentential modifier is in fact CP, citing Ueyama (1992), who hypothesizes that the Japanese copula *da* blocks raising to C. Ueyama points out that *da* cannot occur in the contexts where Subject/Aux Inversion cannot take place in English and vise versa.[17] (106) is the case where *da* shows complementary distribution in matrix and embedded clauses.

(106) a. [Taro-wa kita no (da) ka] wakar-anai.
Taro-top came C cop Q know-not.pres
"(I) don't know whether Taro came."
b. Taro-wa kita no (*da) ka?
Taro-top came C cop Q
"Did Taro come?"

In order to capture this, Kaplan and Whitman (1995) compare Japanese with Korean. Korean has a series of affixal elements which are attached to the verb in relative clauses (107), in contrast to Japanese (108).

(107) a. [ecey *pro* manna-ass-te-n] salam

[17] Ueyama (1992) adopts Rizzi's (1991) account of Subject/Aux Inversion to explain the observation. See Miyagawa (2012a), who argues this on an independent ground.

yesterday meet-past-ret-comp person
"the person *pro* met yesterday"

b. Ecey *pro* ku salam-ul manna-ass-ta
yesterday that person-acc meet-past-ind
"Yesterday *pro* met that person." (Kaplan and Whitman (1995))

(108) a. [kinoo *pro* atta] hito
yesterday met person
"the person *pro* met yesterday"

b. Kinoo *pro* ano hito-ni atta
yesterday that person-dat met
"Yesterday *pro* met that person." (Kaplan and Whitman (1995))

Yoon (1990), among others, analyzes the affix *-n* (and more generally affixal elements that occur in the same position) as an affixal complementizer. The Korean data then imply that a complementizer-like element occupies C in Japanese as well. Thus, combining Ueyama's analysis and the Korean data, Kaplan and Whitman (1995) propose that the copula *da* incorporates into C, yielding a V-T-C complex (109)-(110).

(109) $[_{CP}\ [_{IP}$ ecey *pro* $t_v\ t_i]\ [_C\ [_T\ [_V$ manna]+ass-te]+n] salam
yesterday meet-past-ret-comp person
"the person *pro* met yesterday" (Kaplan and Whitman (1995) with a slight modification)

(110) $[_{CP}\ [_{IP}$ kinoo *pro* $t_v\ t_i]\ [_C\ [_I\ [_V$ at]+ta]+ *e*]] hito
yesterday meet-past person
"the person *pro* met yesterday" (Kaplan and Whitman (1995) with a slight modification)

Adopting this analysis of *sono*-TACs, the temporal clause can avoid violating ECP by incorporation of the verb into C as in (111).

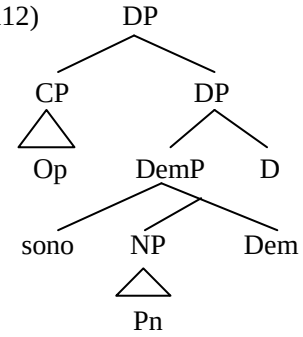
(111) $[_{CP}\ [_{IP}$ Hanako-ga $t_v\ t_i\ ]\ [_C\ [_I\ [_V$ sa]+ru]+ *e*]] sono-mae.
Hanako-nom leave that-before
"before Hanako leaves"

Thus the problem pointed out by Murasugi (1991, 2000a, b) can be resolved and the CP projection can be maintained in the nominal structure.

3.2.3.2. Absence of C-Command and Demonstrativity

For all the attractiveness, however, there are three reasons that the sentential modifier analysis is also difficult to maintain. The first problem with which the analysis is confronted is that the operator cannot establish the temporal relation with Pn. Recall the argument in the previous subsection that the null operator is c-commanded by Pn, creating the temporal relation with Pn. Given that this c-command relation is obligatory, the sentential modifier structure in (112) cannot satisfy the requirement since the clause containing the operator is located above Pn.

(112)



Although the operator itself has a landing site to evade vacuous quantification (i.e., Spec CP), no temporal relation between the embedded and the matrix clause would be established due to the lack of c-command relation between the operator and Pn.

The second problem is similar to that in the relative clause analysis. In contrast to *sono-mae/ato* clauses, sentential modifiers require *-no* of numerals as in (113a). More serious is that vague quantifiers are not compatible with sentential modifiers at all as in (113b).

(113) a. yougisya-ga satujin-o okasita 1-tu*(-no) syouko
suspect-nom murder-acc committed 1-CL(-gen) evidence
"one piece of evidence that the suspect committed murder"

b. *yougisya-ga satujin-o okasita sukosi(-no) syouko
suspect-nom murder-acc committed a.little(-gen) evidence
"lit. a little evidence that the suspect committed murder"

This data is a strong indication that sono-TACs are not sentential modifiers.

Even though the sentential modifier structure is rejected, one might nevertheless attribute the temporal relation to the demonstrativity of *sono*. *Sono* can take CP as well as NP as its referential antecedent.

(114) a. A: Taro-ga kinoo kuruma-o katta rasii.
Taro-nom yesterday car-acc bought I.hear
"I hear that Taro bought a car yesterday."
B: Sono-kuruma takai no ka-na?
that-car expensive cop C-prt
"Is that car expensive?"

b. A: Dare-ga sekinin-o toru no?
who-nom responsibility-acc take C
"Who will take the responsibility (for it)?"
B: Sono-koto-de minna nayande-ru.
that-thing-at all annoyed-pres
"All are annoyed at that."

(114a) is an example in which *sono* refers to the nominal phrase that already appears in the discourse; "that car" means the car Taro bought yesterday. In (114b), the thing that all are annoyed at is not the event or action "to take the responsibility," but the question "who will take the responsibility." Hence it is safe to propose that *sono* can take as its referent the proposition including the illocutionary force of the preceding CP, not TP.[18] Based on this

[18] Koizumi (1993) shows that *soo* takes IP (or TP) as its antecedent.
(i) a. Kiyomi-wa [IP/TP eego-ga deki-ru] daroo.
Kiyomi-nom English-nom able-pres probable

feature of *sono*, let us reconsider *sono*-TACs.

(115) Taro-wa [$_{CP}$ Hanako-ga saru]$_i$ sono$_i$-mae-ni kita.
Taro-top Hanako-nom leave that-before-at came
"Taro came before Hanako left."

In (115), *sono* takes the proposition of the preceding CP as its referent, since it already appears contextually before *sono*. Likewise, in the case of the Geis-ambiguity, *sono* refers to the lower CP, giving rise to the low interpretation.

(116) Watasi-wa Mary-ni [[$_{CP}$ kanojo-ga tuku to]$_i$ iu] sono$_i$-mae-ni New York-de saw
I-top Mary-dat she-nom arrive C claim that-before-at New York-loc atta.
"I saw Mary in New York before she claimed that she would arrive."(low reading)

In this way, it appears that we can derive the intended temporal interpretation by the demonstrativity of *sono*.[19]

Even the demonstrativity approach to the temporal interpretation, though, turns out to be problematic. Japanese has two other demonstratives: *kono* and *ano*. These two forms can also take CP referent like *sono*.

(117) A: Dare-ga sekinin-o toru no?
who-nom responsibility take C
"Who will take the responsibility (for it)?"
B: Kono/??Ano-koto-de minna nayande-ru.
this/that-thing-at all annoyed-pres
"All are annoyed at this/that."

(117) shows that though *ano* sounds awkward in this situation (see Kuno (1973) for a detailed discussion of their semantic/pragmatic properties), both *kono* and *sono* can basically refer to the antecedent CP. In addition, they can be attached to the head of temporal clauses as in (118).

(118) Taro-wa Hanako-ga satta kono/ano-mae-ni kita.
Taro-top Hanako-nom left this/that-before-at came
"Taro came after Hanako left."

Crucially, however, when there is no discourse antecedent to refer to, *sono* behaves differently from the other two demonstratives in TACs.

(119) Taro: Kinou ekimae-de dareka-to hanasiteita rasii kedo,

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"As for Kiyomi, probably, s/he can speak English."
b. Masami-mo soo daroo
Masami-also so probable
"As for Masami, I think so, too. (S/he can speak English.)" (Koizumi (1993))
Though *soo* and *sono* seem to share the demonstrative morpheme *so-* and to be both originated from it, they actually behave differently. (ii) indicates that *soo* cannot take a CP antecedent, unlike *sono*.
(ii) A: Dare-ga sekinin-o toru no?
who-nom responsibility take C
"Who will take the responsibility (for it)?"
B: #Soo minna nayande-ru.
so-at all annoyed-pres
"(intended): All are annoyed at that."
If *soo* took a CP antecedent, *soo* could be co-referential with the preceding question and (ii-B) should be acceptable. I therefore claim that *soo* and *sono* function differently in terms of the elements to which they can refer.

[19] In this analysis, the null operator is not introduced into the syntax, because it plays no role for interpretation.

yesterday in.front.of.station someone-with was.talking I.hear but
dare-to hanasiteita no?
who-with was.talking C
"I hear that you were talking with someone in front of the station, but who were you talking with?

Hanako:

a. Mary-to da yo.
Mary-with cop prt
"With Mary."

b. #Sono/Kono/Ano hito-to da yo.
that/this/that person-with cop prt
"With that/this person."

c. Michi-o kiitekita hito-to da yo.
way-acc asked.me person-with cop prt
"With a person who asked me a way."

d. #Michi-o kiitekita sono hito-to da yo.
way-acc asked.me that person-with cop prt
"With that person who asked me a way."

e. #Michi-o kiitekita kono/ano hito-to da yo.
way-acc asked.me this/that person-with cop prt
"With this/that person who asked me a way."

(120) Taro: kusuri-wa itu nome-ba ii desu ka?
medicine-top when drink-if good cop.pol Q
"When should I take the medicine?"

Doctor:

a. Ku-zi-goro desu.
9-CL-about cop.pol
"About 9 o'clock."

b. #Yuusyoku-no sono/kono/ano ato desu.
dinner-gen that/this/that after cop.pol
"After that/this dinner."

c. Yuusyoku-o tabeta ato desu.
dinner-acc ate after cop.pol
"After you have dinner."

d. Yuusyoku-o tabeta sono-ato desu.
dinner-acc ate that-after cop.pol
"After you have dinner."

e. #Yuusyoku-o tabeta kono/ano-ato desu.
dinner-acc ate this/that-after cop.pol
"After you have dinner."

In (119), Taro does not know the person with whom Hanako was talking in front of the station. Therefore, the answers which Hanako gives are necessarily indefinite. Now note that nominal phrases that demonstratives modify are in principle definite. In ordinary nominal phrases and relative clauses, the three demonstratives equally require a definite discourse antecedent, but the requirement that answers in (119) are indefinite results in the oddness of (119b,d,e).[20] Likewise, in (120), there is no consensus between Taro and the doctor regarding when Taro will have or usually has dinner. Since (120a) and (120c) require no discourse antecedent, the two replies are indefinite and hence completely acceptable. On the other hand, the demonstratives in (120b) and (120e) require some referent, so

[20] Some speakers find (119d) acceptable. On this point, see note 28 below.

the definite responses are unacceptable. Surprisingly, however, (120d) is completely legitimate even though the demonstrative *sono* is adopted. This contrast between *sono* and *kono/ano* cannot be explained if they are treated equally as demonstratives, which necessarily refer to what is already present in the discourse. Thus, it is plausible to conclude that *sono* should not be analyzed as a demonstrative in *sono*-TACs.

If *sono* is not a demonstrative in TACs, it is predicted that there should exist another difference between *sono*-TACs and *kono/ano*-TACs. In fact, we find an important contrast regarding the verbal morphology. In the *sono-ato*-TAC, on the one hand, the tense morphology is not restricted by that of the matrix clause whether the matrix is present or past, as in (121a). In the *kono/ano-ato*-TAC, however, the morphology of tense in the TACs is dependent on the matrix tense, as in (121b).

(121) a. Taro-ga kuru sono ato-ni Hanako-mo kita.
Taro-nom come that after-at Hanako-also came
"Hanako also came after Taro came."
b. *Taro-ga kuru kono/ano ato-ni Hanako-mo kita.
Taro-nom come this/that after-at Hanako-also came
"Hanako also came after Taro comes."

(122) Taro-ga kuru toki-ni Hanako-mo kita.
Taro-nom come when-at Hanako-also came
"Hanako also came when Taro came."

As (122) shows, it is allowed in Japanese that the embedded tense morphology differs from the matrix tense morphology. This is also the case with (121a), whereas it is not with (121b). The contrast in (121) indicates that the structure of *sono*-TACs is not the same as that of *kono/ano*-TACs. In other words, *sono*- functions differently from *kono/ano*- in TACs.

Now that the function of *sono* as a demonstrative in *sono*-TACs is denied, the sentential modifier analysis is invalid. The operator movement is unavailable due to the absence of c-command relation between the operator and the temporal subordinator. Moreover, *sono* cannot function as a demonstrative to refer to an antecedent clause to seek temporal reference. Since neither the relative clause analysis nor the sentential modifier analysis is sufficient to cover the observations, it is necessary to construct another hypothesis.

3.2.4. An Overt Relative Head Analysis

In the previous subsections, the approaches to consider *sono*-TACs as nominal clauses have been proven to be implausible. This suggests that it should be wrong to pursue the properties of *sono*-TACs in nominal structures. Before going to my proposal, I would like to refer to one interesting analysis proposed by Inada (2009, 2011) as a preliminary.

Inada (2009, 2011) claims based on Watanabe's (2009) PP structure that *so*- is a head of a relative clause. Inada points out that *sono*- can be a reference point of *mae*.

(123) a. (Sono) 5hun mae-ni shokuji-o sumaseta.
(that) 5.CL before-at meal-acc finised
"(I) finished the meal 5 minutes before that time." (Inada (2009))

In (123), the reference time which *mae* takes is optionally expressed by *sono*-. Inada thus posits the following structure for the *mae*-PP;

(124) [PoP [PnP [RP so(TIME)] -no mae] -ni]
that -gen before at
"before that time" (Inada (2009) with a slight modification)

What is important in (124) is that *so-* does not modify the Pn *mae*, but is taken as a complement by *mae*. This is a departure from the line of the analyses above, where *sono-* is considered to be a demonstrative that modifies a nominal phrase.

Inada further gives examples to support his analysis.

(125) a. [[[Kyuuryou-o t_i uketoru] (sono) $toki_i$/so_i-no] mae-ni]
salary-acc receive that time/that-gen before-at

b. [[[Kyuuryou-o t_i uketoru] $getsumatsu_i$-no] mae-ni]
salary-acc receive end.of.the.month-gen before-at

c. [[Kyuuryou-o sono-toki uketoru] e]mae-ni]
salary-acc that-time receive before-at

d. [[Kyuuryou-o getsumatsu uketoru] e]mae-ni]
salary-acc end.of.the.month receive before-at

"before that time/the end of the month he receives his salary"

(Inada (2009) with a slight modification)

Adopting the copy theory of movement, Inada argues that the head of the relative clause can be pronounced either in the moved position (125a,b) or in situ (125c,d). Whether the relative head which expresses the reference point is pronounced in either position, the whole proposition is identical. Thus, *so* can be analyzed as a relative head that is equivalent to a referent of time.

Though Inada's analysis is appealing in that it does not rest on the syntactic function of *so-* as a demonstrative, it cannot explain the Geis-ambiguity in *sono*-TACs. In his analysis, *so-* is an overt version of a relative head. In other words, there should be no semantic difference whether the relative head is pronounced or not. However, as we have seen above, the presence of *sono-* raises the Geis-ambiguity, which cannot be observed when *sono-* is absent. This cannot be predicted by Inada's proposal that *so-* is an optionally pronounced relative head. Consequently, his approach cannot be maintained at least in the case of *sono*-TACs.

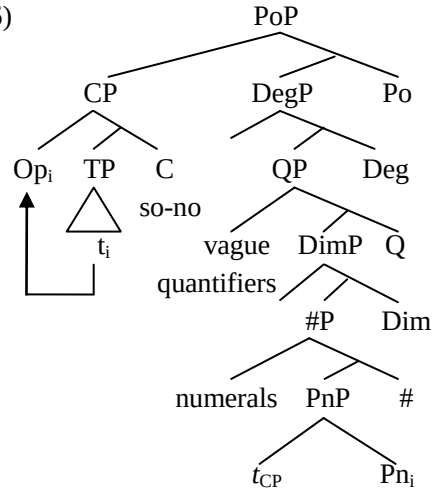
3.3. A So-*Complementizer Analysis*

We have seen that even Inada's *so-* relative head analysis does not suffice to explain *sono*-TACs. Nevertheless, his argument is attractive because *so-* does not function as a demonstrative in the sense that *so-* is in the complement of Pn and does not modify the Pn. In this section, following this spirit, I offer a new proposal to capture the data by the CP structure itself.

Recall that the acceptability of (120d), in which *sono* contrasts with *kono/ano* in that the former does not need a discourse antecedent. This fact implies that the function of *sono* is semantically not substantial but rather abstract. Given this and the observation that the temporal clause behaves like CP, I propose that *so-* is a complementizer in the TACs in question.[21] The structure is as follows:

[21] *-No* may be either a genitive case marker or a linker, which is inserted for morphological purpose. See Watanabe (2009, 2010) for the discussion of the necessity of positing a linker in Japanese nominal/postpositional structure. Here I leave open the precise nature of *-no* in *sono*-TACs.

(126)



Before the CP clause raises, the null operator moves to Spec, CP and at this position it is c-commanded by and co-indexed with Pn, which consequently makes the Geis-ambiguity arise. The whole CP then raises to Spec, PoP, resulting in the surface word order. The movement mechanism is supported by the observation in (127) that *sono*-TACs require the Po head *-ni*.

(127) Taro-ga kita sono-ato*(-ni) Hanako-ga kita.
Taro-nom came that-after-at Hanako-nom came
"Taro came after Hanako came."

When the Po head *-ni* is absent, the TAC is not acceptable.[22] Given the discussion of *yori*-TACs in section 3.1, it follows that *-ni* hosts a landing site of the CP projected by *so-(no-)*.

The CP movement accounts for not only the obligatoriness of the CP-*sono*-Pn order, but also the word order concerning numerals (128) and vague quantifiers (129).

(128) a. Taro-wa [Hanako-ga kuru sono] 2-hun mae-ni kita.
Taro-top Hanako-nom come that 2-CL before-at came
"Taro came two minutes before Hanako came."
b. *Taro-wa [Hanako-ga kuru] 2-hun sono-mae-ni kita.
Taro-top Hanako-nom come 2-CL that-before-at came
"Taro came two minutes before Hanako came."
c. *Taro-wa 2-hun [Hanako-ga kuru sono]-mae-ni kita.
Taro-top 2-CL Hanako-nom come that-before-at came
"Taro came two minutes before Hanako came."

(129) a. Taro-wa [Hanako-ga kuru sono] sukosi mae-ni kita.
Taro-top Hanako-nom come that a.little before-at came
"Taro came a little before Hanako came."
b. *Taro-wa [Hanako-ga kuru] sukosi sono-mae-ni kita.
Taro-top Hanako-nom come a.little that-before-at came
"Taro came a little before Hanako came."
c. *Taro-wa sukosi [Hanako-ga kuru sono]-mae-ni kita.
Taro-top a.little Hanako-nom come that-before-at came

[22] The (un)acceptability of (127) without *-ni* varies from * to ?? among speakers whom I consulted. The asterisk in (127) represents the worst case of the acceptability. Important here is the contrast between the presence and absence of *-ni*.

"Taro came a little before Hanako came."

If *sono-* belonged to the nominal/postpositional phrase projected by Pn, the internal clause could be separated from *sono-* (cf. (128b) and (129b)). Similarly, if the CP-*sono* constituent did not need to move, they could stay in situ (cf. (128c) and (129c)). Thus, the data in (128) and (129) show that the CP must move to Spec, PoP.[23]

Moreover, the demonstrativity problem does not arise since *sono* is C but *kono* and *ano* are still demonstratives, which bring about the oddness of (120e). In this way, the current proposal captures the various phenomena observed so far and further resolves the problems of the three previous analyses.[24]

The present proposal does not amount to saying that *so-* is always a complementizer. Rather, *so-* has a two-fold characteristic in the sense that it functions either as a complementizer or as a demonstrative.In the cases such as (99)-(101), *so-* is a demonstrative and modifies Pn by adjunction or another way.[25] Since no complementizer is available in the structure of the *sono*-clause-Pn order, operator movement is impossible and the low reading is not observable, as expected.

This proposal contains implication for the complementizer system stored in UG. It is well known that English *that* (and its counterparts in some other Germanic languages) can function as a complementizer whereas *this* cannot. If the claim here is correct, the two-fold nature of *so-* parallels the property of *that*; they have both complementizer and demonstrative functions. This parallelism is not surprising, taking into consideration the origin of the complementizer-*that* and similarities between Old English and Modern Japanese. The complementizer-*that* is originated in the demonstrative-*that* and the complementizer usage is found already in Old English. What is of interest is that Old English shares some syntactic and morphological properties with Modern Japanese such as scrambling, SOV word order, relatively rich case morphology, and *pro*-drop. Given that English, which used to have these linguistic properties, has eventually developed the complementizer-*that*, it is not implausible to suggest by analogy that Modern Japanese is in the middle of grammaticalizing the demonstrative *so-* into a genuine complementizer.[26] Since the two languages which belong to entirely different language families develop a complementizer in the same (or very similar) way, it follows that there should some core factor(s) in human languages to generate a complementizer.

Now one question arises: why does Japanese have both TP and CP structures for TACs? In other words, why does English not allow truncated TACs in addition to CP-TACs? This is explained by the nature of the head of TACs in Japanese and English. As we have seen in section 3.2, Demirdache and Uribe-Etxebarria (2004) argue that the temporal relation between the matrix and the embedded clauses is established via a (covert) temporal noun which mediates the two clauses. In Japanese, temporal heads have nominal properties (cf. section 2.2). Therefore, the temporal relation can be established only with the temporal head noun Pn. In English, on the other hand,

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[23] A reviewer points out that TP and *sono* can be intervened by *masani* 'exactly' as in (i).

(i) Taro-ga kita masani sono-toki-ni Hanako-ga kita.
Taro-nom came exactly that-when-at Hanako-nom came
"Taro came exactly when Hanako came."

Interestingly, when *sono* is absent, *masani* cannot occur as (ii) shows.

(ii) *Taro-ga kita masani toki-ni Hanako-ga kita.
Taro-nom came exactly when-at Hanako-nom came
"Taro came exactly when Hanako came."

This indicates that *masani* is structurally dependent on *so-*. I therefore would like to suggest that *masani* is a head of some functional head FP (perhaps DegP) selected by *so-*. TP is in the complement position of *masani* and the entire CP moves to Spec, FocP.

[24] I put aside the question of how the word order is derived in the antisymmetry theory. See Saito (2012, 2014) for an attempt to derive the Japanese word order based on Kayne's (1994) antisymmetry.

[25] The reason for the less acceptance of (99) and (101) by some speakers might be that *so-* in the clause-initial position is still a complementizer, resulting in an illicit structure.

[26] Kayne (2010) suggests that the complementizer-*that* is a relative pronoun like *who* or *which*. Though I do not take this position here, it might be worth investigating whether the analysis can be extended to Japanese, which has been considered to have no relative pronoun in the literature. Recall that Inada (2009, 2011) suggests that *so-* is a relative head noun. Combining his insight with my proposal, it could be hypothesized that *so-* is a relative pronoun like English *that*. This should be examined in future research.

prepositions that head TACs basically do not behave as nominals as freely as in Japanese.[27] Since the English prepositions lack nominal properties to license the temporal relation, they must adopt (hidden) relative clause structures, which have CP structure. Consequently English TACs cannot be truncated like Japanese ones.

4. Concluding Remarks

In this paper, I have provided the problems in (31) with answers which rest on the selectional properties and the categorial status of functional heads. The summary is given in (130).

(130) a. The postposition or case particle *-ni* offers a landing site of the temporal operator. Though this position is available for the operator in the *toki-ni* clause since *toki* is a Fin head and the position is not filled by an element other than the operator, the TP compelemt of Pn in the *mae/ato*-clause is forced to raise to that position and fills up the landing site of the operator. As a result the contrast between the *toki*-clause and the *mae/ato*-clause emerges.

b. *Sono*-TACs bear CP projection like English TACs, which leads to the uniform behavior in terms of the Geis-ambiguity and the verbal morphology within Japanese and between English and Japanese. In this case, *so-* functions as a complementizer.

This is a desirable consequence from the viewpoint of the minimalist program (Chomsky 1995, 2000, 2001 et seq.), in which language variation is reduced to the properties of functional heads, because the present proposal in this paper needs no further theoretical assumptions to explain the language variation.

The properties of functional projections have also accounted for the reason why Japanese have both TP- and CP-TACs, whereas English has only the latter. A temporal operator must be co-indexed with a temporal noun in order to establish temporal relation between a TAC and a matrix clause. In contrast to Japanese Pn, English P does not have a nominal property by itself. It follows that English TACs is forced to involve a hidden relative clause structure with a CP projection.

I have offered a proposal that the Japanese demonstrative *so-* has a categorial status of a complementizer in TACs. This is not surprising because the English complementizer *that* has also originated from the demonstrative *that*. In the literature, demonstrative-like complementizers have been investigated mainly in the field of Germanic languages since they show typical examples. If my proposal is on the right track, it will be possible to command a wider range of cross-linguistic consideration of the complementizer system in natural languages.

Although the *so*-complementizer analysis is appealing, there remain at least two questions. The first is the asymmetry between *so-* vs. *ko-*(*/a-*) series of demonstratives. Why is only the former adopted as a complementizer? This must also be asked in other languages where certain demonstratives acquire the complementizer-usage and the question regarding how the intuition is incorporated into the theoretical terms is problematic for whatever theory attempts to explain the functional change. A hint should obviously lie in the semantic/pragmatic difference between them. Intuitively, the *ko-/this* type demonstratives involve stronger referentiality to the discourse or the actual world than the *so-/that* series. This strong referentiality may block grammaticalization of the *ko-/this* type demonstratives into complementizers. Synchronic and diachronic data and semantic/pragmatic analysis of these demonstratives will be useful to confirm whether such reasoning is correct. The second is the extent to which *so-* is converted into a complementizer. Why is the complementizer-*so-* observed in the limited environment?[28] At present I tentatively suggest that other syntactic operations concerning CP structure disturb the grammaticalization of *so-*. The complementizer system in Japanese is still changing and not fixed, and if the TP-sentential modifier analysis by Murasugi (1991, 2000a, b) and/or the head-movement analysis by Kaplan and Whitman (1995) are on the right track, there seem to exist few grounds on which *so-* is used as a

[27] See Bresnan (1994) for prepositional subjects. She suggests that the preposition used in the subject position is headed by a covert noun and that the preposition itself is not nominalized.

[28] As I mentioned in note 20, some speakers find (119d) acceptable to some extent. For such speaker, *sono-* functions as a complementizer in relative clauses, too.

complementizer since other syntactic operations to substitute for or generate CP, such as truncation and/or incorporation, are already available. Consequently the frequency of adopting the *sono*-CP structure would be rather low. Therefore the *so*-demonstrative is prevented from immediately transforming into a complementizer. This explanation will be supported if we find languages which have a similar complementizer system and CP-related constructions. I believe that inquiries in these courses will also answer the remaining questions.

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