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ABSTRACT

This volume of working papers in psycholinguistics, from the "MITA Psycholinguistics Circle", contains the following articles: "Some Problems in the Acquisition of Derived Nouns" (Mika Endo); "World Knowledge in Children's Sentence Comprehension" (Yuki Hirose); "Examining the Including and Excluding Roles of Positive Evidence: A Study of a Case Where L2/L1 Grammar Intersects" (Midori Inaba); "Parsing as a Process of Applying I-Language Modules: A Case Study Based on the Processing of Quantifier Float Constructions in Japanese" (Yasuo Kaneko); "Do Formulaic Utterances Cease to Be 'Chunks' When They Are Analyzed?" (Yasuko Kanno); "Are Subject Small Clauses Really Small Clauses?" (Miori Kubo); "The Performance of the Japanese Case Particles in Children's Speech: With Special References to "Ga" and "O" (Hiroko Miyata); and "On the Interpretation of the Past Tense and the Acquisition of English" (Keiko Sano). (VWL)

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PSYCHOLINGUISTICS**

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Preface

This is the third volume of our Working Papers series, and is the first since 1989. In the meantime, I have received a huge number of inquiries as to the fate of this series. The sole reason for the absence of publication is that I was out of country for two years, and that the Mita Psycholinguistics Workshop on whose activities the present series largely relies was not held during that period.

Papers by Mika Endo, Midori Inaba, Yasuo Kaneko, Hiroko Miyata, and Keiko Sano are based on their presentation at the special session of the Mita Psycholinguistics Workshop held at Keio University on November 13, 1992. I would like to thank Steven Pinker of MIT for being there and giving invaluable comments on each of the presented papers.

The size of this series has been changed in order to save postage as well as space on your bookshelf.

As I put in the Preface to the first volume in 1988, the major impetus for starting this working papers series was the recognition of the communication gap in linguistics between Japan and other countries. Unfortunately, the situation has not essentially changed. I sincerely hope that the publication of the present and subsequent volumes of this series will improve this unfortunate situation. We appreciate your continuing support for this project.

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MITA WORKING PAPERS IN PSYCHOLINGUISTICS

Volume 3

3

SOME PROBLEMS IN THE ACQUISITION OF DERIVED NOUNS*

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Tokyo Institute of Technology

1. Introduction

In the study of language acquisition, one of the central problems is how to bridge a qualitative gap between the primary linguistic data (PLD) which children are exposed to and the final state of a particular grammar that children acquire. Universal Grammar (UG) is assumed to play a crucial role in this problem. The aims of this paper are (1) to specify which subsystems of UG are involved in the course of acquiring derived nouns or what is given innately for the acquisition of derived nouns, if specified, (2) to make explicit what kind of information that children have to receive from the PLD in order to get the same knowledge that adults have for derived nouns, and (3) to propose a learning model which is compatible with conditions (1) and (2). Following a standard version of GB-theory, I will assume that UG consists of the following subsystems: X-bar theory, theta theory, Case theory, government theory, binding theory, bounding theory, control theory.

In the studies of derived nouns in generative grammar, it has been widely assumed that derived nouns and their base verbs share the same syntactic or semantic properties, based on X-bar theory and the lexicalist hypothesis (Chomsky 1970).

- (1)a. The enemy destroyed the city.
- b. The enemy's destruction of the city

The enemy in (1a), for example, is the subject or the agent of the verb *destroy*, and *the city* is the object or the patient of *destroy*. The same relation holds in the derived nominal (1b): *the enemy* is the subject or the agent of the derived noun *destruction*, and *the city* is the object or the patient of *destruction*. The basic problem which I will consider in this paper is how children come to get knowledge of this parallel relation. There are two potential ways to answer this problem. One is that children first learn syntactic or semantic properties of a verb and of its derived noun separately, and

correlate them later. The other is that children learn syntactic or semantic properties of a base verb first and deduce those of the derived noun from the verb's at a later stage. If we take the former, on the one hand, children have to get evidence for both a base verb and its derived noun from the PLD in order to learn them. On the other hand, if we choose the latter way, children do not have to learn the syntactic or semantic properties of a derived noun by getting evidence from the PLD. In this paper, I will pursue this latter direction.

In the next section, I will propose a learning model, which is a modified version of Randall's (1985). The learning model itself is not sufficient for children to avoid overgeneralization, but the model is necessary to explain a productive aspect of language acquisition. In section 3, I will first point out several kinds of data which would involve children following the proposed learning model in a problem of overgeneralization. I will then suggest that the overgeneralization of nominalization does not occur, based on the continuity hypothesis of UG. The basic assumption is that the learning model is in favor of a productive aspect of acquisition while principles of UG take a role in ruling out unwanted output from the beginning of acquisition. As for the necessity of the proposed model, section 4 will be devoted to the investigation of derived nouns which take a content *that*-clause.

2. Learning Models of Derived Nouns

I will first review a learning model which is based on the assumption that derived nouns basically share the same syntactic properties as the base verbs. Randall (1985) has proposed the following model:

- (2)a. a morphologically complex form is seen to be related to verbal base
- b. assume the maximal relation possible: Inherit the full subcategorization of the base verb as the subcategorization for the derived item, provided there is no evidence that both meaning and category differ
- c. elsewhere, (where there is evidence of differences in both category and meaning), inherit only the unmarked portion of the base verb's subcategorization, either transitive or intransitive (Randall 1985: 101)

This learning model assumes that whether deverbal nouns have the same subcategorization frame as their base verb depends upon the type of affixes which create the derived nouns. Her classification of the affixes is as follows:

		CATEGORY CHANGE		
	+			-
MEANING CHANGE	+	-[ing]A -[ion]N -[er]N -[ment]N -[able]A -[y]N -[al]N -[ed]A -[en]A	[re]- [un]- [counter]-	
	-	-[ing]N	inflectional affixes	

(Randall 1985: 61)

According to this classification, the suffixes *-ment*, *-y*, *-ion*, *-al*, and *-er* belong to the [+meaning change] class, while the suffix *-ing* belongs to the [-meaning change] class. This classification predicts a contrast as between (5) and (6):

- (4)a. We ran [into the tunnel] [without a flashlight].
 b. To collect garbage [without gloves] can be messy.
 c. We didn't think we could move the piano [out of the dining room].
- (5)a. *I saw a runner into the tunnel without a flashlight.
 b. *The collection of garbage without gloves can be messy.
 c. *We didn't think the piano was moveable out of the dining room.
- (6)a. The running into tunnels without a flashlight is prohibited.
 b. The collecting of garbage without gloves can be messy.
 c. The moving of the piano out of the dining room took 3 hours.

(Randall 1985: 199)

Her explanation is as follows. Since the suffixes of the

derived nouns in (5), *runner*, *collection*, and *moveable* all have the feature [+category change, +meaning change], these derived nouns cannot inherit the full subcategorization frames of the base forms. In contrast, derived nouns in (6) can inherit the full subcategorization frames since the suffix *-ing* has the feature [+category change, -meaning change].

Note here that the bracketed phrases in (4) are not in fact the phrases which the verbs are subcategorized for. The contrast between (5) and (6) is supposed to illustrate the possibility for derived nouns to take adjunct phrases in the same way as their base verbs.

As for suffixes which create derived nouns, Grimshaw (1990) correlates the type of suffixes with the presence or the absence of the argument structure of derived nouns: it is suggested that whether a derived noun has the same argument structure as its base verb (except for its external argument) is determined by the type of suffixes. If a suffix introduces *Ev* to a derived noun as an external argument, on the one hand, the derived noun has the same arguments as its base verb. On the other hand, if a suffix introduces *R_i*, the derived noun has no argument structure. Following Grimshaw's basic idea that the type of suffixes affects the possibility of the inheritance of argument structure, I assume that the suffixes *-ment*, *-y*, *-tion*, *-al* and *-ing* all have the same feature [-affect argument structure] while the suffix *-er* has [+affect argument structure], and that the classification of suffixes is as follows:

(7)

		CATEGORY CHANGE	
		+	-
ARGUMENT STRUCTURE AFFECTING	+	-[er]N -[able]A ...	[re]- [on]- [counter]- ...
	-	-[ing]N -[al]N -[ment]N -[y]N -[tion]N ...	inflectional affixes

Based on the affix classification (7), I will modify the learning model (2) in the following way:

- (8) (i) The argument structure of a base form is acquired.
- (ii) A morphologically complex form is seen to be related to the base form.
- (iii) Features of a relevant affix are recognized.
- (iv) a. Inherit the full argument structure of the base form as the argument structure of the derived form, provided that there is no evidence that the affix has [+category change, +argument structure affecting].
- b. Elsewhere, (where there is evidence of differences in both category and argument structure), inherit the argument structure of the base form as the argument structure of the derived form in a conservative way.

In addition to this model, children acquiring English have to learn an English particular part of the Case-marking system: genitive 's is for a noun appearing in the subject position of the noun phrase and the preposition *of* for one in the object position. Note that the basic idea of this model is that the derived form inherits the full argument structure from the base form unless the affix has the two features [+category change] and [+argument structure affecting] at the same time. Basically children do not have to learn the argument structure of a derived noun by getting evidence from the PLD, but can get knowledge of the argument structure of a derived noun from that of its base form.

3. Relationship between Learning Model and UG

In this section, I will point out several cases where the parallelism between the base form and the derived form cannot be maintained, regardless of the type of suffixes, and consider a problem of overgeneralization which the learning model proposed in the previous section could arise. In doing so, I will make explicit the relationship between the learning model above and UG.

There are some constructions that have no corresponding nominals. The contrast between a. and b. of examples (9) to (14) illustrates this point. Consider the examples in (9a) first. Both of them are so called subject-to-subject raising

constructions. As shown in (9b), the corresponding nominals are not allowed in English. The same is true for the exceptional Case-marking construction shown in (10), the *tough*-construction in (11), the small clause construction in (12), the double object construction in (13):

- (9)a. John appeared to have left.
 John was likely to win.
 b. *John's appearance to have left
 *John's likelihood to win (Abney 1987: 129)
- (10)a. I expected John to win.
 b. * my expectation of John to win (Ibid: 129)
- (11)a. John is tough to please.
 b. *John's toughness to please (Ibid: 135)
- (12)a. I believe John a fool.
 b. *my belief of John a fool (Ibid: 131)
- (13)a. I gave Bill a book.
 b. *the gift of Bill (of) a book (Ibid: 132)

Derived nominals cited above raise an overgeneralization problem with the learning model (8): children would incorrectly judge them as proper forms if they followed the learning model (8) only. Suppose that a child who knows the verb *expect* (stage (8i)) comes to know that the word *expectation* is morphologically related to the verb *expect* (stage (8ii)) and that s/he has known that the suffix *-tion* has the features [+category change, -argument structure affecting] (stage (8iii)). (8iv.b) could lead the child to incorrectly conclude that the derived nominal (10b), which corresponds to (10a), is a proper form. The same is true for the other derived nominals cited above.

It is difficult to imagine that every child acquiring English gets the negative evidence that derived nominals as in (9-13) are not allowed in English. It is much more plausible to assume that a part of UG rules out those derived nominals so that this kind of overgeneralization should not occur. The uniformity condition proposed by Chomsky (1986) is one feasible candidate for this purpose:

(14) Uniformity Condition

If α is an inherent Case-marker, then α Case-marks NP
 if and only if θ -marks the chain headed by NP

(Chomsky 1986: 194)

Given this condition, derived nominals in (9-13) are correctly ruled out. Suppose that derived nominal (9b) has the following structure:

- (15)a. *John's appearance [*t* to have left]
 b. *John's likelihood [*t* to win]

According to the condition (14), the trace of *John* (*t*) must be theta-marked by the derived noun *appearance* at D-structure to be Case-marked, but it is not, thus it is correctly ruled out. The same explanation holds true for derived nominals in (10b) and (11b), assuming the following structure:

- (16)a. *my expectation of John [*t* to win]
 b. *John's toughness ' to offend *t*]

As for derived nominal (12b), while the bracketed phrase is theta-marked by the derived noun, *John* itself is not:

- (17) *my belief [of John a fool]

In order to rule out a derived nominal like (13b), a stipulation is needed, in addition to the uniformity condition, that 'the rule of *of*-insertion is a "default case", applying only when there is no preposition available that inherently assigns the appropriate θ -role' (Chomsky 1986: 194). In the double object construction, the indirect object is Case-marked by a suitable preposition in the derived nominal: 'the gift to Bill of a book' is allowed. ¹

In any cases cited in (9-13), the learning model (8) could raise the problem of overgeneralization, while the uniformity condition, which is assumed to be a part of UG, prevents children from overgeneralizing. ² Thus the learning model of the derived noun and the uniformity condition play complementary roles: the former contributes to the productive acquisition of derived nouns and the latter limits the possible forms.

4. Evidence for Productive Learning of Derived nouns

In the previous section, I considered several constructions which children would overgenerate without a certain constraint of UG. This section now focuses on one of the cases in which the proposed model is supposed to play a crucial role in the course of acquisition of derived nouns.

To begin with, let us look at examples in (18):

- (18)a. Bill's explanation that he was temporarily insane
 a'. Bill explained that he was temporarily insane.
 b. his awareness that he is ignorant
 b'. He is aware that he is ignorant.
 c. the news that our team won the race

(18a) is a deverbal nominal which corresponds to the sentence (18a'). (18b) is a de-adjectival nominal which corresponds to the sentence (18b'). (18c) has no such corresponding sentence. The derived nouns *explanation* in (18a) and *awareness* in (18b), and the simple noun *news* in (18c) all occur with a content *that*-clause. In English, not all simple nouns which can be associated with some propositional content occur with a content *that*-clause of this kind, as shown in (19):

- (19)a. *the tale/talk/story that Bill went to the North Pole
 b. the fact/news/rumor that Bill went to the North Pole

It seems to be an idiosyncratic property of the noun whether a given simple noun can take a content *that*-clause or not. So children would have to learn one by one which noun can take a *that*-clause by receiving input from adults actually using that noun with a *that*-clause. As for the derived nouns, however, it is predictable which noun can take a *that*-clause, because if the base form can take a *that*-clause, the derived noun can also take a *that*-clause, as shown in (18a-b'). Therefore given the learning model proposed in (8), children do not need input from adults using noun phrases like those in (18a) and (18b) in order to learn that derived nouns like *explanation* and *awareness* can take a *that*-clause. As for the case of simple nouns like (19), since the learning model is not applicable, children have to learn one by one which noun can take a *that*-clause by actually receiving relevant inputs.

To sum up, I have claimed that nouns which take a content *that*-clause are divided into two classes, derived nouns and simple nouns, and that nouns of these two classes are acquired in different ways. One way is based on the rule-governed nature of the verb-noun relation. It is not necessary for derived nouns cooccurring with a content *that*-clause to appear in the PLD, because children can deduce that certain derived nouns can take a *that*-clause based on what they have learned about their base forms, given the learning model proposed in (8). The other way is item-by-item learning. This is for the simple nouns which can take a *that*-clause.

In the following subsections, I will discuss two kinds of evidence which support the claim just made above. One assumption for the discussion is that the process of acquisition affects the resultant state of acquisition. Section 4.1 will be devoted to supporting the claim that the derived noun with a content *that*-clause and the simple noun with that is acquired in different ways, and section 4.2 will provide supporting data for the way of learning derived nouns.

4.1. The Property of Content That-Clauses

First of all, for derived nouns, let us look at the examples in (20) and (21):

- (20)a. Paul explained that he was insane.
- b. Paul's explanation that he was insane
- c. Paul's explanation was that he was insane.
- (21)a. They knew that Dukakis was ahead.
- b. the knowledge that Dukakis was ahead
- c. *The knowledge was that Dukakis was ahead.

Both *explanation* and *knowledge* are derived noun, base forms of which take a *that*-clause. As shown in (20c) and (21c), however, while *explanation* allows its content *that*-clause to appear in the complement position of a copular sentence, *knowledge* does not. Derived nouns are thus divided into two types: *explanation*-type and *knowledge*-type. For example, nouns like *argument*, *conclusion*, *speculation*, and so on belong to *explanation*-type, and nouns like *determination*, *insistence*, and so on belong to *knowledge*-type.³

As for simple nouns, they all belong to one type, that is,

explanation-type. In other words, all content *that*-clauses which occur with simple nouns can be separated from the simple nouns by *be* in the copular sentence (cf. (20c)).

4.2. Evidence for Inheritance

There is another piece of supporting evidence for my claim. To begin with, look at the examples in (22-23):

- (22)a. the likelihood that John will get married
- b. John's anger that he was not chosen
- (23)a. It is likely that John will get married.
- b. John was angry that he was not chosen.

Both *likelihood* and *anger* are de-adjectival nouns. The noun *likelihood* is derived from the adjective *likely*, which takes formal *it* as a subject, and the noun *anger* is derived from the adjective *angry*, which takes an animate subject. As shown in examples in (24), *likelihood* belongs to *explanation-type*, and *anger* belongs to *knowledge-type*:

- (24)a. The likelihood is that John will get married.
- b. *John's anger was that he was not chosen.

Further examples of de-adjectival nouns of *explanation-type* are *possibility* and *probability*, and those of *knowledge-type* are *awareness*, *confidence*, *happiness*, and so on.

Now look at the examples in (25-27):

- (25)a. It's almost certain that the government will lose the next election.
- b. He is certain that she will recover.
- (26)a. the certainty that the government will lose the next election
- b. his certainty that she will recover
- (27)a. The certainty is that the government will lose the next election.
- b. *His certainty is that she will recover.

Certainty is a derived noun the base form of which is the adjective *certain*, which takes either formal *it* or an animate noun as a subject. When the base form *certain* takes formal *it*.

as a subject, its derived form, as shown in (27a), belongs to *explanation*-type. When the base form *certain* takes an animate subject, on the other hand, its derived form, as shown in (27b), belongs to *knowledge*-type.

To sum up our discussion of (22) to (27), nouns derived from adjectives which take formal *it* as a subject cannot appear as a subject of the copular sentence if they are separated from their content *that*-clause, while nouns derived from adjectives taking an animate subject can. This shows that the property of a derived noun correlates with that of its base form, which is consistent with the course of acquisition of derived nouns based on the learning model proposed in (8).

5. Conclusion

In this paper, I have shown that derived nouns are productively acquired in accordance with the learning model (8), and that the uniformity condition, which is assumed to be included in UG, regulates the occurrence of overgeneralization. The tasks for children acquiring derived nouns are (a) to acquire the argument structure of a base form, (b) to correlate a morphologically complex form with the base form, (c) to recognize the features of an affix attached to the base form, and (d) to acquire the Case-marking system of a particular language. The former three (a-c) are included in the learning model (8), and the last one (d) is necessary for getting the uniformity condition to start to work.

NOTES

* This is a revised version of a paper read at Keio Psycholinguistics Workshop held on November 13, 1992. I would like to express my gratitude to Professor Yukio Otsu for giving me the opportunity to develop my study. I wish to thank Professor Steven Pinker for his helpful comment on my paper at the workshop. I am also grateful to Professors Rei Akiyama and Reiko Shimamura for their pertinent suggestions. I am indebted to Professor Noriko T. Imanishi for her insightful comments on an earlier version of this paper. Thanks also go to Minoru Amanuma and Hugh Gosden, who provided valuable suggestions and

stylistic corrections for this paper. Any remaining inadequacies are of course my own.

¹ The derived nominal in (iib) remains unexplained in the discussion here:

- (i)a. I presented the award to John.
 - b. I presented John with award.
 - (ii)a. my presentation of the award to John
 - b. *my presentation (of) John with the award
- (Abney 1987: 133)

² Unlike the cases of (9-13), the following examples are supposed to be constrained by certain semantic conditions:

- (i)a. Mary frightened/amused/angered/bored/liked/hated John.
 - b. *Mary's fright/amusement/anger/boredom/like/hate of John
- (Abney 1987: 126)
- (ii)a. I can tell that the cake is tempting John.
 - The devil tempted Jesus.
 - b. *the cake's temptation of John
 - the devil's temptation of Jesus
- (Ibid: 127)
- (iii)a. John realized his mistake.
 - John realized his fondest dreams.
 - b. *John's realization of his mistake
 - John's realization of his dreams
- (Ibid: 127)
- (iv)a. John weighed 180 pounds.
 - That book costs \$20.00.
 - John resembles his father.
 - b. *John's weighing/weight of 180 pounds.
 - *That book's costing/cost of \$20.00.
 - *John's resembling/resemblance of his father
- (Ibid: 125)
- (v)a. I knew the facts.
 - I knew the time.
 - b. my knowledge of the facts
 - *my knowledge of the time
- (Ibid: 146)

In example (i), the base forms are psych verbs and derived nouns do not denote an action or an event but denote a mental state. The contrasts in (ii) and (iii) illustrate that the derived noun cannot take an object when it denotes a mental state while the derived noun can take an object when it denotes an action or an

event. In examples (iv) and (v), the object of the base verb is not a typical one: objects in (iv) are not something affected by the verb and objects in (v) denote the proposition, which is canonically realized by a clause.

I will leave these data with just a descriptive mention here. A principled way to explain this kind of discrepancy between a base form and a derived form must await further investigation.

³ See Endo (1992) for further examples and analysis.

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World Knowledge in
Children's Sentence Comprehension

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0. Introduction

Sentence comprehension is more than a syntactically autonomous issue and relies on the clues that are not part of the grammar. In this paper, we will consider "world knowledge" as one such clue. In section 1, "reversibility" of sentences will be discussed. We will establish that the idea of world knowledge can create nonreversibility. "Sentence ambiguity" will be discussed in section 2. Section 3 is the experimental section which examines how world knowledge influences the interpretation of ambiguous sentences and affects linguistic development.

1 Semantic plausibility affecting sentence comprehension

1.1 Reversibility in sentence comprehension

Semantic plausibility and syntactic complexity affect sentence comprehension. Sometimes semantic factors seem even more crucial than syntactic complexity in accounting for children's sentence comprehension. Slobin (1966) studied the degrees of difficulty in sentence comprehension in terms of two aspects : (1) syntactic complexity between active (kernel) and passive structures with a grammatical transformation, and (2) reversibility and nonreversibility of the sentence. The following are the examples of sentences used in Slobin (1966):

- 1a. The dog is chasing the cat.
- b. The cat is being chased by the dog.

- 2a. The girl is watering the flowers.
- b. The flower is being watered by the girl.

Measuring the subject's response time (RT), he found that RTs for passive sentences (1b and 2b) were generally longer than RTs for active sentences (1a and 2a). This was taken to mean that the former underwent more grammatical transformation than the latter. This is what derivational theory of complexity (DTC) predicts. On the other hand, if the sentences were nonreversible, the difficulty of passivity was eliminated. Nonreversible sentences (2) generally took less RT than alternative reversible sentences (1). Interestingly enough, RT for (2b) was roughly equal to that of (1a), or even a little shorter. This is due to the relative ease of decoding meaning; whereas in (1a) and (1b) either NP, "the cat" and "the dog" could possibly be the subject NP, (2b) and (2a) allow only one of the two, -"the girl"- to be the probable subject of the action, thus reducing the probability of confusion.

In the following section, sentence reversibility will be discussed in more detail.

1.2 Knowledge of the world as non-linguistic factors

In the previous section, semantic plausibility, which influences reversibility of a sentence, was discussed in terms of the lexicon. In this section, we will discuss how "world knowledge" can also influence reversibility of a sentence. Let us continue to discuss the reversibility of the following sentences in which characters of the classic stories Don Quixote and Snow White appear.

- 3a. Don Quixote spared the windmills.
- b.*The windmills spared Don Quixote.

- 4a. The witch gave Snow White an apple.
- b.?Snow White gave the witch an apple.

Sentence (3a) could easily be considered a nonreversible sentence because the reversed version (3b) is judged implausible. An inanimate NP "the

windmill" cannot serve as the AGENT in the subject position of the action "spare." Such lexical information may alone be enough to account for the implausibility and the nonreversibility of (3b), irrespective of the plot of Don Quixote.

On the other hand, the plausibility of (4b) is in question for a different reason. From the perspective of the lexical information, (4a) should be considered a reversible sentence because either of the NP's "Snow White" or "the witch" can logically serve as the AGENT in the subject position of the VP "give x an apple." However, (4b) may frequently be rejected or at least cause hesitation in accepting it as plausible, if we assume the knowledge of the plot of the story makes sentence (4b) sound implausible. Assuming that such a special character like "Snow White" as an argument of a sentence requires a special situation to be represented to be in accordance with the story, we could explain why (4b) is implausible and (4a) is nonreversible.

An experiment performed to test this assumption used the following sentences:

- 5a. ouji-sama-wa nige-ta sinderera-o oikake-ta
 the prince NOM escape PAS Cinderella ACC chase PAS
 "The prince chased Cinderella who had escaped."
- b. sinderera-wa nige-ta ouji-sama-o oikake-ta
 Cinderella NOM escape PAS the prince ACC chase PAS
 "Cinderella chased the prince who had escaped."

(5a) is plausible while (5b) is not in a sense even though they are identical in terms of syntactic structure, if we assume that the special character "Cinderella" accompanied by "the prince" requires a certain situation in which "she runs away from the prince." While most children could correctly reconstruct what (5a) says by acting it out with cutouts many of them failed to do so for (5b). We may say that it is the implausibility due to knowledge of the story of Cinderella that hindered the children in sentence interpretation.

Section 3 presents an experiment to study the

effect of knowledge of the story on comprehension of more complex sentence structure, namely, structurally ambiguous sentences. Before turning to this point, section 2 will discuss another way of looking at sentence comprehension which will be seen to play an important role in the experiment outlined in section 3.

2. Sentence ambiguity

Ambiguous sentences are often useful in examining children's linguistic ability. Given a sentence which has two meanings, it is predicted that some would interpret it only one way, and others both ways. Among those who would realize both meanings of the sentence, some would realize only one meaning at a time and stumble across the alternative interpretation by chance, whereas others would be fully aware from the beginning that the sentence can have two meanings. Linguistic maturity of children is reflected in their response to sentence ambiguity. Otsu (1987) proposes an analysis of the relationship between children's ability to detect sentence ambiguity and the development of grammatical competence. The sentence used to illustrate this point is as follows.

- (1). Taro-kun-wa jitensha-de nige-ta Hanako-san-o
 TOP bicycle INST escape PAS ACC

oikake-mashi-ta.
 chase POLITE PAS

TOP:Topic, INST:Instrumental, PAS:Past, ACC:Accusative

Its ambiguity can be captured by assigning the following two structures involving relative clauses, which are indicated by brackets.

- (2). Taro-kun-wa [jitensha-de nige-ta Hanako-san]-o
 oikake-mashi-ta.
 "Taro chased Hanako, who had escaped by bicycle."

- (3). Taro-kun-wa jitensha-de [nige-ta Hanako-san]-o
oikake-mashi-ta.
"Taro chased hanako, who had escaped, by bicycle."

Thus, the two readings are made available by the fact the instrumental phrase jitensha-de "by bicycle" can be either inside or outside the relative clause.

It is discussed in Otsu that there were a considerable number of subjects who correctly understood both (2) and (3) but failed to detect ambiguity of (1). We can recognize from this that the ability to detect the sentence ambiguity belongs to a higher level of cognitive skill, called metalinguistic awareness, which is not a part of one's grammar. In the following experiment, I will mainly discuss the influence of world knowledge on children's assignment of structures to ambiguous sentences. Metalinguistic awareness will be another concern in this experiment because analyzing ambiguous sentences involves the ability to detect the ambiguity of a sentence apart from structure assignment to it.

3 Experiment

The purpose of the experiment in this chapter is to observe the fluctuation of the subjects' interpretation of ambiguous sentences (discussed in section 2) and analyze how knowledge of the story (discussed in section 3) influences it.

3.1 Material

The following three sentences, (6), (7), and (8) are modeled after Otsu (1987). Each of the sentences involves sentence ambiguity of the type discussed in section 2. (7) and (8) also involve the characters of the popular fairy tales: "Cinderella" and "the prince" in Cinderella, and "Songoku" and "the monster" in a Chinese story Saiyuki, or "Journey to the West." The instruments "glass slippers" and "Kintoun" belong to

"Cinderella" and "Songoku" respectively. "Hanawa-kun" and "Maruo-kun" in (6) are also involved in a popular Japanese comic strip series Chibimaruko-chan but no semantic constraint referred to in (7) or (8) is expected.

6. Hanawa-kun-wa rorasuketo-de nige-ta
TOP rollerskate on escape PAS

Maruo-kun-o oikake-ta
ACC chase PAS

- 6a. Hanawa-kun-wa [rorasuketo-de nige-ta
TOP rollerskate on escape PAS

Maruo-kun]-o oikake-ta
ACC chase PAS

"Hanawa chased Maruo, who had escaped on rollerskates"

- 6b. Hanawa-kun-wa rorasuketo-de [nige-ta
TOP rollerskate on escape PAS

Maruo-kun]-o oikake-ta
ACC chase PAS

"Hanawa chased Maruo, who had escaped, on rollerskates"

7. ouji-sama-wa garasu-no-kutsu-de nige-ta
the prince TOP glass slippers on escape PAS

sinderera-o oikake-ta
Cinderella ACC chase PAS

- 7a. ouji-sama-wa [garasu-no-kutsu-de nige-ta
the prince TOP glass slippers on escape PAS

sinderera]-o oikake-ta
Cinderella ACC chase PAS

"The Prince chased Cinderella, who had escaped on glass slippers."

7b. ouji-sama-wa garasu-no-kutsu-de [nige-ta
 the prince TOP glass slippers on escape PAS

sinderera] -o oikake-ta
 Cinderella ACC chase PAS

"The prince chased Cinderella, who had escaped, on
 glass slippers."

8. Songoku-wa kintoun-de nige-ta
 TOP on escape PAS

yokai-o oikake-ta
 the monster ACC chase PAS

8a. Songoku-wa [kintoun-de nige-ta
 TOP on escape PAS

yokai]-o oikake-ta
 the monster ACC chase PAS

"Songoku chased the monster, who had escaped on
 Kintoun."

8b. Songoku-wa [kintoun-de nige-ta
 TOP on escape PAS

yokai]-o oikake-ta
 the monster ACC chase PAS

"Songoku chased the monster, who had escaped, on
 Kintoun."

TOP: Topic, PAS: Past, ACC: Accusative

The ambiguity of (6), for example, is due to the position of the PP rorasuketo-de "on rollerskates" which can be either inside or outside of the relative clause and thus allows the interpretations (6a) and (6b) in which the relative clauses are indicated by brackets. The other two sentences, (7) and (8) are identical to (6) in terms of syntactic structure where the PP may be interpreted as either part of the relative clause (interpreted as "a") or the main clause (interpreted as "b"). However, if the plot of the

stories are fully regarded, the interpretation of (7a) and (8b) would sound more natural because the situation represented by those sentences are just what the stories predict, and (7b) and (8a), the alternatives, would sound odd because they represent situations that could hardly be realized if the readers restrict the sentences to expectations based on their knowledge of the characters of the stories.

3.2 Procedures

The experiment was carried out in two stages. First, a strip of paper on which a sentence was written was presented to the subjects individually. Each word in the sentence was shown at the equal intervals and no punctuation was given so that no extra information about juncture would be provided. Then, the subjects were told to act out the situation represented in the sentence with paper cutouts. When the subjects finished acting, the researcher asked them "That's it?" and "Can you think of anything else?" in order to give them the chance to make their own comments about the sentence and refer to the ambiguity if they noticed it.

At each performance, the subjects were categorized into three groups according to their interpretations. Those who parsed the instrumental phrase "rorasuketo-de", "garasu-no-kutsu-de", or "kintoun-de" as part of the main clause were marked "MC", as part of the relative clause were marked "RC", and those who pointed out both possibilities were marked "Both."

3.3 Subjects

The subjects for this experiment were 65 children selected from 90 monolingual elementary school students in the Kyoto and Nara area in Japan: 30 lower graders (the 1st and 2nd grades), 30 middle graders (the 3rd and 4th grades), and 30 higher graders (the 5th and 6th grades). Ages varied from 6 to 12 years old. The 65 children for the subjects were chosen through a preliminary experiment. The purpose of the preliminary

experiment was to exclude the children who did not correctly understand the very essential part of the relative clause structure. The sentence used is below:

9. Hanawa-kun-wa nige-ta Maruo-kun-o oikake-ta
 TOP escape PAS ACC chase PAS

"Hanawa chased Maruo, who had escaped."

After telling them to act out the situation with the cutouts, only those who took "Hanawa-kun" as the chaser and "Maruo-kun" as the one being chased were chosen as the subjects of the experiment.

Among the 65 chosen subjects, 17 were from the lower grades (L), 22 were from the middle grades (M), and 26 were from the higher grades (H). It was determined before the experiment that they all knew the stories of Cinderella and Saiyuki.

3.4 Predictions

Two predictions can be made about how the knowledge of a story affects the interpretation of a sentence. Many seem to have their own idiosyncratic preference as to whether the PP is in the relative clause or the main clause. The experiment was designed to see what happens when their preference is inconsistent with their knowledge of the story, and whether the conflict will prevent them from realizing the possibility of alternate interpretations. If one understands the instrumental PP to be in the main clause in (6) and chooses the interpretation of (6a), he/she is also likely to decide on the interpretation (7a), which would cause inconsistency with the story Cinderella. On the other hand, if one understands the PP to be inside the relative clause in (6) and chooses the interpretation of (6b), one would expect him/her to have the interpretation (7b) then (8b), which would cause inconsistency with the story Saiyuki. Now one would predict that the subject would either: (1) retain his preferred interpretation in spite of the inconsistency, or (2) discover alternate

interpretations of the sentence. Table 1 below shows the expected distribution of judgments of sentences (6), (7), and (8) where the letters A through I stand for the expected percentage of population which belongs to each category. Figure 1 presents the two predictions of the population discussed above corresponding to each category shown in Table 1 .

Table 1.

	RC	MC	Both
6	A	D	G
7	B	E	H
8	C	F	I

RC: (in the) relative clause

MC: (in the) main clause

Figure 1

prediction (1)

$A=B=C$ $D=E=F$

prediction (2)

$C < A < B$ $E < D < F$

Careful attention should also be paid to the changes in G, H, and I in Table 1, the population of which could detect the ambiguity.

3.6 Results and Discussion

The detailed figure indicating the number of the subjects falling into each category is shown in Table 2 below.

Table 2

	RC	MC	Both
6	35.4	46.1	18.5
7	56.9	15.4	27.7
8	9.2	55.4	35.4

The figure is in accordance with my prediction (2). While 35.4% of the subjects interpreted the instrumental PP to be inside the relative clause in (6), the "neutral" sentence in terms of the relationship with the story, as many as 56.9% of the subjects did so in (7) but only 9.2% did so in (8). On the other hand, 46.1% interpreted the instrumental PP in the main clause in (6), and 55.4% did so in (a) while as little as 15.4% did so in (7). This means a good number of the subjects changed their way of processing sentences so that the representation of the sentence would agree with their expectations and rejected the situation which was inconsistent with it.

Now let us look at the percent responses of each age group, L, M, and H. Table 3, 4, and 5 show the percent response of each age group for sentence (6), (7), and (8), respectively.

Table 3. Percent responses for (6)

	L	M	H	Total
RC	47.1	31.8	30.8	35.4
MC	47.1	54.5	38.4	46.1
Both	5.8	13.7	30.8	18.5

Table 4. Percent responses for (7)

	L	M	H	Total
RC	88.2	45.4	46.2	56.9
MC	11.8	27.3	7.6	15.4
Both	0.0	27.3	46.2	27.7

Table 5. Percent Responses for (8)

	L	M	H	Total
RC	11.8	13.4	3.8	9.2
MC	82.4	54.5	38.5	55.4
Both	5.8	31.8	57.7	35.4

The influence of world knowledge was especially prominent in lower graders (L) as great increases in the percentage of subjects in RC in sentence (7) and MC in sentence (8) show, while increases are not remarkable if we look at only middle and higher graders (M and H.) To borrow the Gleitmans' phrase, "the tendency to reject implausible but 'correct' sentences diminishes with the older subjects."

The 15.4% of the population who parsed the PP as part of the main clause in (7) and the 9.2% who parsed the PP as part of the relative clause are the people who were not influenced by the knowledge of the story and rather stuck to their idiosyncratic preference as to whether to parse the PP as part of the relative clause or the main clause.

As the population of each category indicating those who interpreted the PP as being RC or MC fluctuates with the influence of the stories, we should notice that the category for the people who got both interpretations kept increasing. The percentage of the whole population categorized into "both" was 18.5% in (6), 27.7% in (7), and 35.4% in (8). As I have

mentioned in the last section, children who succeed in detecting sentence ambiguity are considered to be at a more sophisticated level of linguistic awareness than those who do not. After having seen sentences in which PP-location does not affect the sentence's meaning and sentences in which it does, some of the subjects appeared to realize that a certain structure of a sentence allows more than one interpretation.

We shall now look more carefully into the subjects of the category "Both" of each L, M, and H graders. It should be noted here that no increase in number of lower graders was seen -- 5.8% in (6), 0.0% in (7), and 5.8% in (8)--, while a considerable increase was seen in middle and higher graders. Only lower graders failed to detect the sentence ambiguity although many of them were exposed to sentences in which alternative interpretations were possible.

From what has been shown above, we can roughly conclude that world knowledge (here, knowledge of the stories) plays an important role in sentence comprehension: (1) World knowledge helps children in assigning an alternative structure they would not normally assign to the sentence. As a result of this, a child may become aware of the fact that a sentence can have more than one meaning. If the child becomes fully conscious of it, this increases his/her metalinguistic awareness. (2) The role of world knowledge seems to be related to maturation. Younger children (mostly lower graders, under 8 years old) are more readily influenced by world knowledge. As can be seen from the results, the interpretation as to whether the PP is in the main or the relative clause fluctuated strongly because of the bias provided by the knowledge of the stories. However, even though some children assigned two different structures to (7) and (8), they were not aware of the fact that they did so. Children over a certain age (mostly children in higher grades, i.e., over 10 years old) were less accepting of world knowledge. They were found to be better at detecting sentence ambiguity. This is presumably because when children are young, they have very little information

coming from their own grammar. Once they get older, children have enough information from their grammar so that they do not require much non-linguistic information.

In a normal situation, syntax, to a great extent, offers clues into the semantic representation of a sentence. If such syntactic guidance is not available, one can guess the meaning of the sentence by making use of world knowledge. This first attempt at decoding the meaning, i.e., the semantic interpretation arrived at by the child through his/her world knowledge, may be sensed as some sort of a temporary bridge between the real semantic representation of a given sentence and its syntactic structure. This temporary bridge is often discarded and the real semantic representation is arrived at; though, sometimes, it may become a part of the child's emerging grammar.

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Examining the Including and Excluding Roles of Positive Evidence: a Study of a Case Where L2/L1 Grammar Intersects*

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0. ABSTRACT

This study argues that positive L2 data do not necessarily rule out inappropriate L2 grammar. Rather, L2 learners appear to postulate L1 grammar as an interim theory about the L2, at least in the initial stages of L2 acquisition. The case where L2 grammar intersects L1 concerning time adverbial clauses was chosen as an object of study. A grammaticality judgement test including correct L2 sentences which are compatible with the L1 (CP), ones which are incompatible with the L1 (ICP), and incorrect L2 sentences (TR) which would occur if L2 learners transfer L1 grammar to L2 was devised, and given to native speakers of English who study Japanese as a Second Language. The results indicate that: 1) the L2 learners accept the TR although there is no positive evidence in L2; 2) they reject ICP in spite of positive evidence to allow it; and 3) this tendency is remarkable especially in the initial stages of L2 acquisition. These findings support White (1991a, b; 1992) and Trahey and White (1993), and contradict Schwartz and Gubala-Ryzak's (1992) argument that positive L2 data alone should lead to the preemption of inappropriate L1 values.

1. INTRODUCTION

Recent studies arguing that the Subset Principle does not operate in second language (L2) acquisition (Zobl, 1988; White, 1989; Inaba, 1992a, b; Tomita, 1992) have raised new questions about the use of positive and negative evidence in L2 acquisition. Trahey and White (1993) showed empirical evidence that supplying positive evidence in the L2 classroom does not necessarily trigger the appropriate L2 value of a parameter of Universal Grammar. She argued that positive evidence does not serve so effectively to exclude incorrect L2 values.

This paper also argues that positive evidence does not play a role that is sufficient to exclude ungrammatical sentences in the target language (TL). It deals with the acquisition of Japanese time adverbial clauses by native English

speakers studying Japanese as a Second Language (JSL) at a university in Japan.

The intersectional relationship formed by the Sequence of Tenses (SOT) Rule in time adverbial clauses in English, and the Cooccurrence Restriction (COR) in those of Japanese time adverbial clauses were chosen as an object of study. The paper examines the use of positive evidence for its possible contributions both 1) to attain or include appropriate L2 grammar (referred to here as its including role), and 2) to exclude inappropriate L2 grammar (excluding role). Then it presents a hypothesis about interlanguage (IL) development of L2 learners.

The SOT and the COR have not been considered as parameters of UG. This study approaches the theory of principles and parameters in UG on the basis of empirical data from L2 learners, unlike White's recent theoretical studies. It does not apply the method of choosing one parameter of UG and examining principles of language acquisition by experiment. It rather focuses on the correct and incorrect use actually found in L2 learners, and formulates research hypotheses and poses research questions about IL development on the basis of this empirical data. The aim of this study is to look at the implications and gain perspective for UG theory. This approach is based on the assumption that if UG theory is really valid, it should apply to all the peripheral parts of the principles of languages.

2. L2/L1 INTERSECTIONAL RELATIONS

2.1 The Sequence of Tenses and the Cooccurrence Restriction

This section attempts to introduce the grammatical differences in Japanese and English time adverbial clauses in light of the SOT and the COR. The SOT refers to the tense¹ agreement between main and subordinate clauses that occurs in English. Whatever the tense of the main clause, the tense in the subordinate clause should agree with it. English observes this rule, while Japanese does not. There are four possible combinations for both present and past forms in main and subordinate clauses as shown in Table 1. While only two types are grammatical in English as a result of the SOT rule (A and D), all four types of sentences² are grammatical in Japanese, although there are slight differences in meaning.³ The analysis is based on the works of Miura (1970) and Nakau (1976, 1980).

Table 1. Four types of sentences with combination of present and past in time adverbial clauses.

types	subordinate clause	main clause
A	present	present
B	present	past
C	past	present
D	past	past

However, some Japanese time adverbial clauses (conjunctions) observe the COR, meaning that the verb in the subordinate clause always occurs with the same form, present or past, regardless of the tense of the main clause. This paper will refer to subordinate clauses involving a conjunction requiring the present verb form (*-ru/-u*)⁴ as present cooccurrence clauses, and those requiring past verb forms (*-ta/-da*), as past cooccurrence clauses. In the former clauses, only sentence types A and B are grammatical, and in the latter ones, only types C and D are grammatical in Japanese.

The *-mae(ni)* ('before') clause is an example of a present cooccurrence clause. Japanese sentences (1a) and (2a) are grammatical, and (3a) and (4a) are ungrammatical, since they violate the COR. On the other hand, the English sentences (1b) and (4b) are grammatical, but (2b) and (3b) are ungrammatical since they violate the SOT. The semantic equivalent of (2a) is (4b) in English.

(* ungrammatical)

- (1) a. *Neru maeni ha o migaku.* (Type A)
 b. I brush my teeth before I go to bed. (Type A)
- (2) a. *Neru maeni ha o migaita.* (Type B)
 b. *I brushed my teeth before I go to bed. (Type B)
- (3) a. **Neta maeni ha o migaku.* (Type C)
 b. *I brush my teeth before I went to bed. (Type C)
- (4) a. **Neta maeni ha o migaita.* (Type D)
 b. I brushed my teeth before I went to bed. (Type D)

The *-ato(de)* ('after') clause is an example of a past cooccurrence clause. Similarly to the example above, Japanese sentences (7a) and (8a) are grammatical, but (5a) and (6a) are ungrammatical. English sentences (5b) and (8b) are grammatical, but (6b) and (7b) are ungrammatical. Note that the semantic equivalent of (7a) is (5b).

- (5) a. *Bangohan o *taberu atode* terebi o miru. (Type A)
- b. I watch TV after I have supper. (Type A)
- (6) a. *Bangohan o *taberu atode* terebi o mita. (Type B)
- b. *I watched TV after I have supper. (Type B)
- (7) a. Bangohan o *tabeta atode* terebi o miru. (Type C)
- b. *I watch TV after I had supper. (Type C)
- (8) a. Bangohan o *tabeta atode* terebi o mita. (Type D)
- b. I watched TV after I had supper. (Type D)

2.2 The Intersectional Relation between L1 and L2

The SOT and the COR form one instance of Japanese and English grammar appearing to overlap, or intersect, although the grammatical structure is actually different. As seen in the previous section, English and Japanese share similarities as well as differences, creating an intersectional relationship. In this study, Japanese sentences including the ungrammatical sentences shown above are classified into the following four categories:

- 1) CP (compatible): sentences grammatical in both L2 and L1.
e.g. sentences (1a)(1b)/(8a)(8b)
- 2) ICP (incompatible): sentences grammatical in L2 but not in L1
e.g. sentences (2a)(2b)/(7a)(7b)
- 3) TR (transfer): sentences ungrammatical in L2 but not in L1. representing incorrect Japanese sentences which would occur if L2 learners applied the SOT to L2 sentences.
e.g. sentences (4a)(4b)/(5a)(5b)
- 4) NP (no positive evidence): sentences ungrammatical both in L2 and L1.
e.g. sentences (3a)(3b)/(6a)(6b)

CP and ICP are available as positive evidence, while TR and NP do not have positive L2 data which support them. Note that NP sentences, which do not exist in either L1 or L2, will not be included in this study, since the purpose of this study is to identify the use of positive evidence. The terms CP and ICP will be used when referring to positive evidence of the same type. The domains of CP, ICP and TR are illustrated in Figure 1.

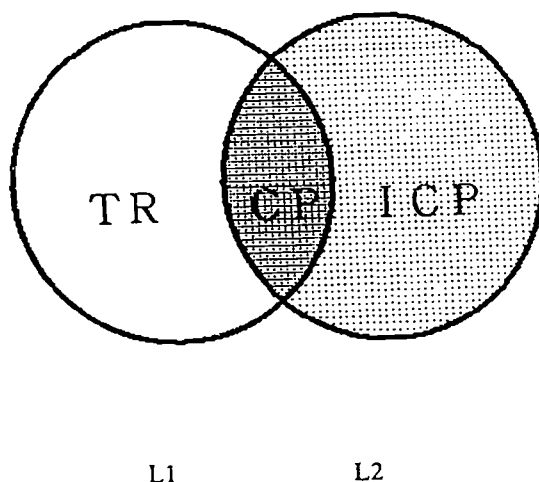


Figure 1. CP, ICP and TR

3. LEARNERS' ERRORS AND BACKGROUND OF THE STUDY

The learners' errors concerning Japanese tense adverbial clauses seem to be attributable to the over-application of the SOT to present and past cooccurrence subordinate clauses, resulting in COR violations. As for the present cooccurrence subordinate clauses, learners incorrectly generate sentences Type D (defined in 2.1) to convey the sense of Type B, whereas they have no problem generating Type A. Also in the case of past cooccurrence subordinate clauses, they generate Type A for the sense of Type C, while they can correctly generate Type D.

For example, they make sentences like (11a) below, which has an error in the *-mae(ni)* ('before') clause, intending to mean (11b), but the correct Japanese sentence would be (12a). (13a) is an example of the kind of correct sentence learners seem to have no trouble generating.

- (11) a. * *Nihon ni itta maeni*, Nihongo o benkyou shita. (Type D)
 b. Before I went to Japan, I studied Japanese. (Type D)
- (12) a. *Nihon ni iku maeni*, Nihongo o benkyou shita. (Type B)
 b. * Before I go to Japan, I studied Japanese. (Type B)
- (13) a. *Nihon ni iku maeni*, Nihongo o benkyou shiyo. (Type A)
 b. Before I go to Japan, I will study Japanese. (Type A)

Learners also make errors like (14a) below, in the *-ato(de)* ('after') clauses. They want the meaning of (14b), but the correct Japanese sentence to convey this meaning would be (15a). Again, (16a) is an example of correct sentence with which they do not have a problem.

- (14) a. * *Toshokan ni iku ato*, kaimono o suru. (Type A)
 b. After I go to the library, I will go shopping. (Type A)
- (15) a. *Toshokan ni itta ato*, kaimono o suru. (Type C)
 b. * After I went to the library, I will go shopping. (Type C)
- (16) a. *Toshokan ni itta ato*, kaimono o shita. (Type D)
 b. After I went to the library, I went shopping. (Type D)

These incorrect sentences that learners generate do not exist in positive L2 data. Errors of this kind, however, are often found in L2 learners' spoken and written work. Mizutani (1988) also points out L2 learners' errors like this. The fact that learners make errors like these leads us to the following questions:

1) Why do L2 learners generate sentences like TR, despite the fact that there is no positive L2 evidence supporting them?

2) Why don't they allow ICP sentences in their IL, instead using TR in the sense of ICP, although positive L2 data supporting ICP sentences exists? These are the practical background of this study.

4. EXPERIMENTAL DESIGN

4.1 Research Questions

The research consisted of two basic studies. Study I examines the including and excluding roles of positive evidence. The specific research questions addressed in Study I are: 1) whether the subjects can accept CP and ICP, which exist in positive L2 data, and 2) whether they can reject TR, which do not exist in positive L2 data. The operation of the including role predicts the acceptance of CP and ICP, and that of the excluding role predicts the rejection of TR.

Study II investigates IL development. The IL grammar that the learners entertain is considered in three aspects: 1) grammar assumed to be transferred from the L1; 2) appropriate L2 grammar; and 3) grammar which allows both L2 and L1 grammars. The operation of preemption predicts the acceptance of IC and ICP, and the rejection of TR.

4.2 The Test

The grammaticality judgement test used in this study had a correct/incorrect format. The test consisted of four types of Japanese sentences: CP, ICP, TR and NP.⁵ The Japanese conjunctions taken up were: *-mae(ni)* (before), *-made* (until), *-tochuu* (on the way to), *-ato(de)* (after). The test sentences can be found in appendix i.

Although Ellis (1991) has criticized some aspects of the grammaticality judgement test, in this case it has the advantage of presenting all four types of sentences to L2 learners.

4.3 Subjects

The subjects consisted of three groups of students with different language proficiency levels. Level I contained thirty-four elementary-level students, Level II, sixteen intermediate-level students, and Level III, ten advanced-level students. The levels were divided according to the placement test given by the university at the beginning of the semester. The language proficiency levels of the subjects correspond approximately to the levels of the Japanese Language Proficiency Test (given by the Association of International Education, Japan) shown in Table 2. Learners underwent a total of about 180 hours of study in this university.

Naturalistic exposure lasted about 15 weeks.

The results of the grammaticality judgement tests at three language proficiency levels (elementary, intermediate and advanced) will be compared and discussed in each study, on the assumption that the higher proficiency levels had undergone longer exposure to positive L2 data through generalized instruction including naturalistic exposure, and also had more general linguistic knowledge. The three levels are also assumed to be three stages of IL development.

Table 2. Subjects

Level	I	II	III	controls
proficiency	elementary	intermediate	advanced	---
number	34	16	10	110
instruction (hrs)	180	180	180	---
exposure (wks)	15	15	15	---
background (yrs)	0.5 to 1	1 to 2	2 to 3	---
JLPT level	3	2	1	---

*JLPT: Japanese Language Proficiency Test (Association of International Education, Japan)

5. RESULTS

5.1 Study I

5.1.1 Regarding the Including Role of CP Positive Evidence

Figure 3 shows the percentages of subjects who accepted and rejected CP. The difference between acceptance and rejection is indicated by the z value⁶ in Table 3.

All experimental groups attained significantly higher percentages of acceptance than those of rejection. Their performances were similar to the control group. Even Level I attained high percentages, statistically similar to the controls.

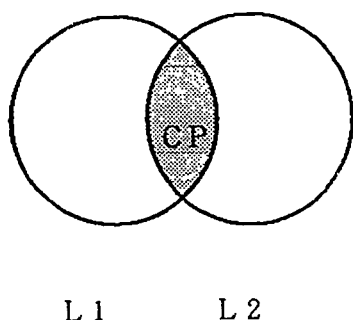


Figure 2. CP domain

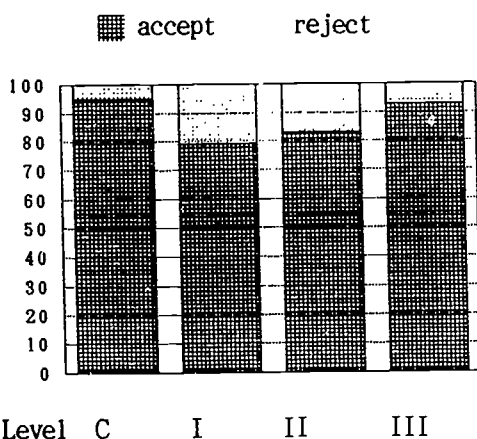


Figure 3. CP accept/reject

Table 3. Percentages of accept/reject for CP

	Controls n = 113	Level I n = 34	Level II n = 16	Level III n = 10
accept(%)	95	79	83	93
reject(%)	5	21	17	7
difference	91	58	66	86
z value	13.53**	4.78**	3.23**	3.85**

(** $p < 0.01$, * $p < 0.05$)

The results indicate that all groups of subjects accept the CP in their IL. Level I learners already entertain CP, presenting the possibilities that they have had it from the beginning as the initial state, or that they picked it up at a very early stage of acquisition..

The data suggest two possible interpretations for the operation of the including role of positive evidence. One is the endowment of positive L2 data, indicating the true operation of the including role of positive evidence. The other would be L1 positive transfer, since CP is consistent with the L1. However, the data shown above are insufficient to determine which of these interpretations is correct.

5.1.2 Regarding the Including Role of ICP Positive Evidence

Figure 5 shows the results for ICP. Level I results show no significant difference between acceptance and rejection, while Levels II and III showed significantly higher percentages of acceptance than rejection (Level II, $z = 2.04$; level III, $z = 1.79$; $p < 0.05$). These results indicate that at higher levels, the subjects increasingly accepted ICP.

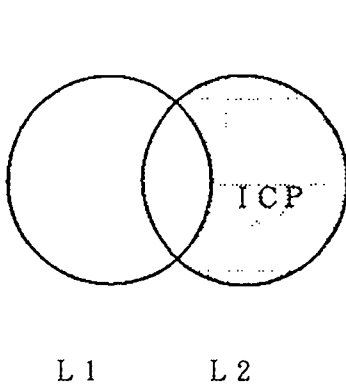


Figure 4. ICP domain

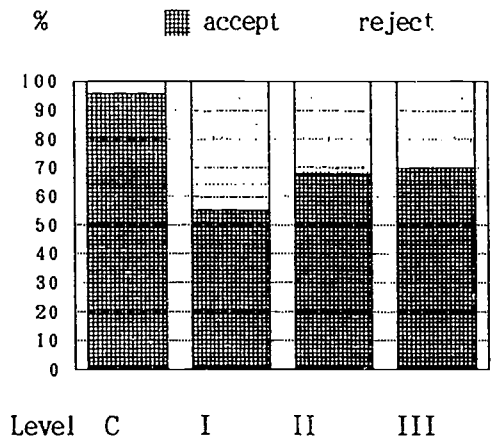


Figure 5. ICP accept/reject

Table 4. Percentages of accept/reject for ICP

	Controls n = 113	Level I n = 34	Level II n = 16	Level III n = 10
accept(%)	96	55	68	70
reject(%)	4	45	32	30
difference	92	10	36	40
z value	13.83**	0.82	2.04*	1.79*

(** $p < 0.01$, * $p < 0.05$)

Thus the including role of ICP appears to operate with higher proficiency levels. But, please note that the subjects in Level I rejected ICP at a rate similar to that of acceptance, despite the presence of positive L2 data supporting ICP. If the learners are conservative enough to follow the grammar obtained from positive L2 data alone, they should not reject ICP. A possible explanation for the rejection of ICP is that they applied the SOT to the L2 as they do in their L1, resulting in the undergeneralization of L2 grammar.

5.1.3 Regarding the Excluding Role of ICP

This section examines the excluding role of positive L2 data. The crucial point in this case is whether or not the subjects could reject TR. Figure 7 shows the results for TR. All of the experimental groups showed a significantly higher percentage of acceptance than the control group (level I, $z = 1.94$; Level II, $z = 3.99$; Level III, $z = 3.29$; $p < 0.05$). They did not significantly differ from each other. Level I and II attained significantly higher percentages of acceptance than rejection (Level I, $z = 2.47$; Level II, $z = 1.81$; $p < 0.05$).

The results from this indicate that subjects in Level I and II have a strong tendency to accept TR, despite the fact that there is no such positive L2 data. Note that the inappropriate TR grammar did not disappear even in Level III.

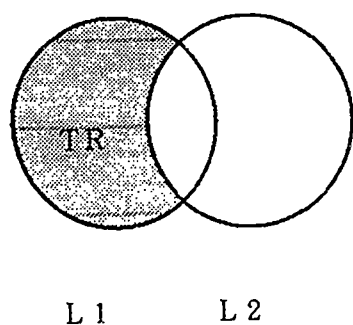


Figure 6. TR domain

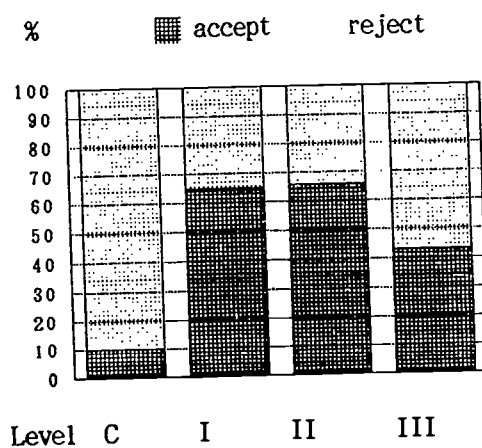


Figure 7. ICP accept/reject

Table 5. Percentages of accept/reject for TR

	Controls n = 113	Level I n = 34	Level II n = 16	Level III n = 10
accept(%)	10	65	66	43
reject(%)	90	35	34	57
difference	-80	30	32	-14
z value	-12.03**	2.47**	1.08*	0.63

(** p < 0.01, * p < 0.05)

On the basis of this data, the excluding role of the ICP positive evidence does not appear to have operated in this case. In other words, positive L2 data did not suffice for L2 learners to eliminate inappropriate L1 grammar. If positive evidence alone were enough to trigger L2 appropriate grammar, they should have excluded sentences which do not exist in L2 data.

To summarize the results of Study I, the including role of positive evidence was suggested, but the excluding role of positive evidence appeared not to operate so effectively.

5.2 Study II

5.2.1 IL Analyses

To explore II. development, the same data was analyzed in the following different ways:

1) Subjects who accepted both TR and CP but rejected ICP. The results were interpreted to mean that they based their grammaticality judgement on their L1 (referred to as the "transfer group").

2) Subjects who accepted both CP and ICP but rejected TR. They entertained correct L2 grammar ("success group").

3) Subjects who accepted all TR, CP and ICP. They allowed both L2 and L1 at the same time ("neutral group").

4) Subjects whose choices did not belong to either of these three groups ("others").

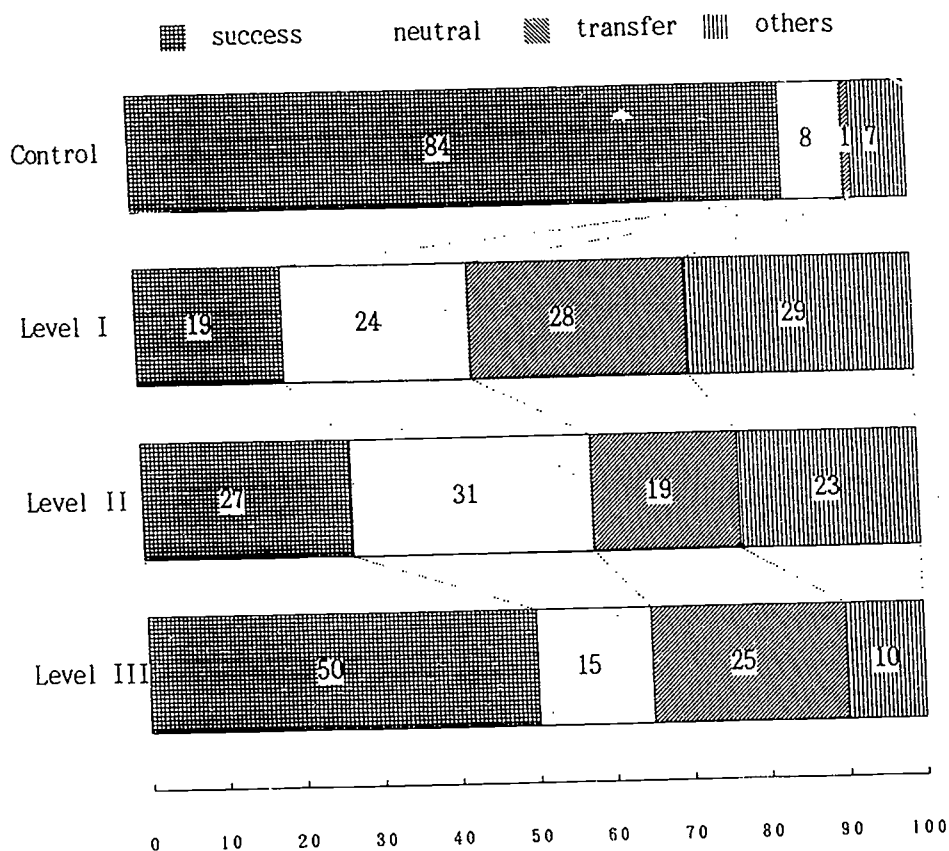


Figure 8. Percentages of success/neutral/transfer/others groups

5.2.2 Regarding TR Grammar

In Figure 8, the transfer group in Level I attained statistically similar percentages to the success and the neutral groups. Level III did not show a significant decrease in percentages.

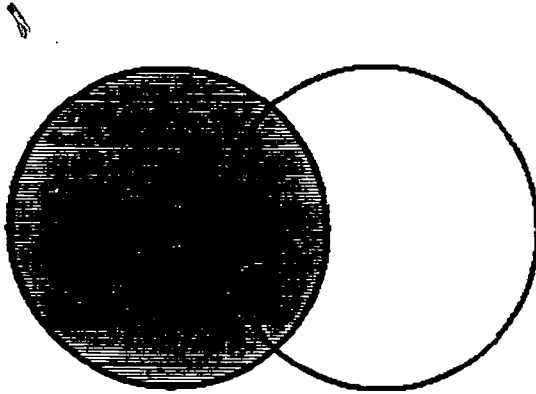


Figure 9. TR grammar

The results indicate that they incorrectly assumed TR grammar to be appropriate for L2. This tendency was found at all levels. It suggests that they hold TR grammar in the early stages of acquisition, and higher proficiency levels did not necessarily eliminate the TR grammar. This supports the argument that L2 learners do not always utilize positive evidence alone. Instead, they appear to postulate TR grammar before they have arrived at appropriate L2 grammar.

5.2.3 Regarding Preemption

The success group shown in Figure 8 attained quite low percentages in Level I, but a significant increase was found between Levels I and III ($z = 1.96$, $p < 0.05$). This indicates that the subjects who entertained appropriate L2 grammar have increased with higher proficiency levels.

However, preemption did not operate so effectively in this case, since the success groups in Level I and II attained lower percentages than the totals of the transfer and the neutral groups. Note that inappropriate L1 transferred grammar still exists even at the advanced level.

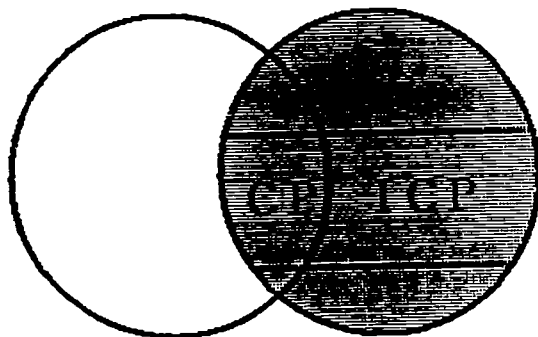


Figure 10. L2 grammar

5.2.4 Regarding the Coexistence of L2/L1 Incompatible Grammar

In figure 8, the neutral groups in Level I and II attained statistically similar percentages to the transfer and the success groups. The results indicated that L2 learners did hold two incompatible grammars at the same time.

However, the fact that the neutral group in Level III attained significantly lower percentages than the success group ($z = 1.71$, $p < 0.05$) indicates that they gradually trigger L2 correct grammar.

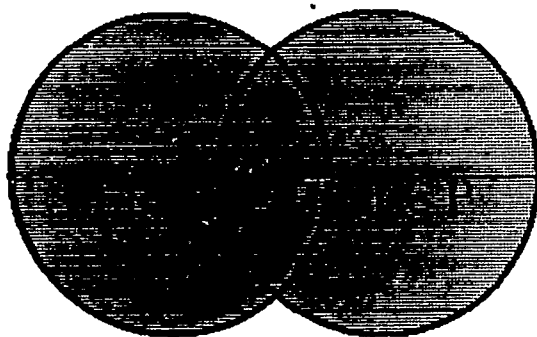


Figure 11. Neutral grammar

5.2.5 IL Development Hypothesis

The results from the study show that there are some subjects who entertain both L2 and L1 grammar at the same time, and this tendency decreases with higher proficiency levels. The results indicate the possible coexistence of both grammars at the same time. Thus, the following hypothesis is advanced: in L2 acquisition, at first learners assumed L1 grammar settings, then changed to the L2/L1 grammar coexistence as a transitional stage, finally triggering appropriate L2 grammar, eliminating inappropriate (L1 transfer) settings. This is illustrated in Figure 12.

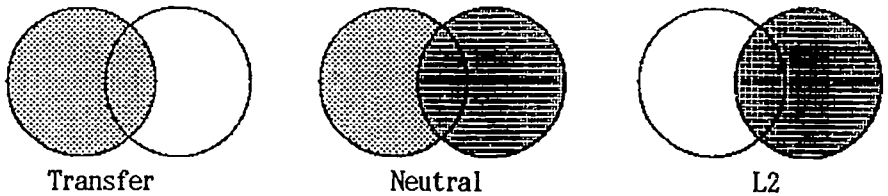


Figure 12. IL development hypothesis

6. DISCUSSION

The results from this study indicate that positive evidence is not available enough to exclude inappropriate L2 grammar, but it is available to include L2 grammar. These results are similar to those of Trahey and White (1993), in that supplying positive L2 data did not lead the L2 learner to discover

ungrammaticality in L2, although the methodology and approach to theory in the two studies is different. The subjects of this study were exposed to positive evidence through classroom and naturalistic environments for a longer period, while White's subjects underwent positive evidence in the classroom intensively. The TL is Japanese, rather than English. The target grammar, SOT and COR, is not a parameter of UG, while the verb movement parameter (Pollock, 1989) in White's study was one of the UG parameters.

On the other hand, the results of this study differ from Trahey and White (1993) in that preemption occurred to a small degree as the proficiency level increased, in the sense that the number of subjects who entertained appropriate L2 grammar increased, not that TR holders decreased. That is, the L2 learners did trigger correct L2 grammar with the increase of their proficiency levels, but it was not stronger than the TR grammar.

However, another possible explanation for the cause of preemption cannot be denied. In this study, neither the classroom instruction nor the textbooks explained that Japanese does not observe the SOT, and there was no special instruction about the SOT either. There were no examples to show incorrect Japanese sentences to the subjects. That does leave the possibility that there was some negative evidence from naturalistic exposure or other influences outside the classroom. If this were the case, this study cannot be used to support the operation of the excluding role of positive evidence.

The operation of the including and excluding roles of positive evidence would never predict TR grammar. The fact that the subjects in this research entertained TR grammar in their IL leads to the hypothesis that they based their grammaticality judgements on their L1.

However, the data obtained from this research did not suffice to ascertain that the TR grammar was due to L1 transfer. A crosslinguistic study of the SOT should determine whether or not TR grammar is, in fact, a transfer from the L1.

Inaba (1993)⁷ found that the including role of ICP positive evidence was not strong enough to trigger more inclusive L2 grammar. In contrast, the results of this study did support the operation of the including role of ICP. One possible reason for this might be the COR. The time adverbial clauses which observe COR seem to be a kind of chunk expression, thus the positive L2 data that L2

learners encounter always has the same form (i.e. present form for *-mae(ni)*, and past form for *-ato(de)*). It might, then, have helped the L2 learners to be aware of the COR.

The IL analyses lead to the possible conclusion that L2 learners initially approach L2 data from the perspective of the TR grammar setting. That is, the L2 learners' default L2 grammar might be the TR. If this were the case, it indicates that the grammar which L2 learners entertained previously dominates the grammar which exists in their L2 exposure.

Another finding was that L2 learners entertained both L2 and TR grammar at the same time. These results contradict the claim by Rutherford (1989) that input data incompatible with the initial parameter setting will force resetting the parameter to the appropriate L2 value. Schwartz and Gubala-Ryzak (1992) also argue that there should be no stage at which the L2 learners maintain two settings at a time, since the L2 parameter setting should be mutually exclusive in the grammar of a language learner. Although the SOT is not a parameter of UG, it contradicts their argument that L2 learners should not allow two grammars at the same time in their IL.

7. CONCLUSION

This study concludes that positive evidence would be available in helping L2 learners reset the grammar that they previously held to the TL. However, there is still a lot of investigation to be done in the field of tense and aspect, including SOT.⁵ Few studies have been done especially about SOT in time adverbial clauses. Markedness and unmarkedness concerning SOT are still an open question. Hopefully, the approach in this study will provide some perspective for further theoretical research.

Otsu (1990) pointed out that the theory of UG will not lead to the direct application to language education. Although this study's approach has a disadvantage in that it does not directly examine the principles of UG in L2 acquisition, it has the advantage in its possible application to L2 education. It can provide some perspective to Japanese Language Education for native speakers of English as well.

Notes

* I wish to thank the Director of the Center for Japanese Studies, the staff and students at Nanzan University, and the Director of Nagoya University for their cooperation when the investigation tests were given. I would also like to thank Yukio Otsu, Steven Pinker, Tsuneo Ono, Masanori Fujiwara, and Tadashi Sakamoto, and the audience at Keio Psycholinguistics Workshop on November 13, 1992, for their helpful comments on an earlier version of this paper (Inaba, 1992c). Needless to say, I take full responsibility for any errors in the article.

1 The term 'tense' is used to represent a syntactic category in this paper, following Nakau (1976, 1980), although there are some other possibilities for Japanese tense and aspect interpretation.

2 Inaba (1993) studied the case of *-toki* ('when') clause which allows these four types of sentences in Japanese.

3 This is attributed to the functional differences of the tense systems of both languages. Further information about the differences among these four types of sentence can be found in detail in Miura (1970) and Nakau (1976, 1980).

4 The Japanese *-ru -u* form represents present/future, but refers to the present tense here.

5 The test included other sentences dealing with other questions than the test sentences in this research.

6 The formula used in this study (Butler 1985)

$$P_r = (f_1 + f_2) / (N_1 + N_2)$$

$$z = (p_1 - p_2) / (\sqrt{p_p(1-p_p)}(1/N_1 + 1/N_2))$$

p is the proportion of items having the property.

N is the sample size.

f is the frequency.

z is a z score.

The significance is assessed at the five percent level or less with a one-tailed test. The five percent significance value of the normal distribution is 1.64, and one percent, 2.33.

* Part of the subjects in this study were in common with Inaba (1993).

8 Ellis (1987) dealt with the SOT, but he did not refer to it in time adverbial clauses.

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Appendix i

All the sentences were inscribed in Japanese. The English translations given here (for correct sentences in Japanese only) were not in the test.

- (17) a. Tomodachi ga kuru maeni kaeru.
(I will go home before my friend comes.)
b. Tomodachi ga kuru maeni kaetta.
(I went home before my friend came.)
c. Tomodachi ga kita maeni kaeru.
d. Tomodachi ga kita maeni kaetta.
- (18) a. Tomodachi ga kuru made, 30 pun matsu.
(I will wait until my friend comes.)
b. Tomodachi ga kuru made, 30 pun matta.
(I waited until my friend came.)
c. Tomodachi ga kita made, 30 pun matsu.
d. Tomodachi ga kita made, 30 pun matta.
- (19) a. Ie ni kaeru tochu, honya ni yoru tumorida.
(When I go back home, I will stop by a bookstore.)
(or I will stop by a bookstore on my way back home.)
b. Ie ni kaeru tochu, honya ni yotta.
(When I went back home, I stopped by a bookstore.)
(or I stopped by a bookstore on my way back home.)
c. Ie ni kaetta tochu, honya ni yoru tumorida.
d. Ie ni kaetta tochu, honya ni yotta.
- (20) a. Tomodachi ga kita atode, kaeru.
(I will go home after my friend comes.)
b. Tomodachi ga kita atode, kaetta.
(I went home after my friend came.)
c. Tomodachi ga kuru atode, kaeru.
d. Tomodachi ga kuru atode, kaetta.

Appendix ii

Data

Table 6. Percentages of accept/reject for the test sentences

Sentence no.	Controls n = 113	Level I n = 34	Level II n = 16	Level III n = 10
17a	97/3	91/9	88/12	100/0
17b	98/2	76/24	69/31	80/20
17c	14/86	50/50	62/38	20/80
17d	0/100	29/71	19/81	0/100
18a	94/6	76/24	56/44	80/20
18b	98/2	38/62	44/56	50/50
18c	4/96	82/18	88/12	70/30
18d	0/100	24/76	25/75	0/100
19a	98/2	76/24	100/0	100/0
19b	100/0	44/56	88/12	90/10
19c	9/91	71/29	69/31	30/70
19d	2/98	62/38	25/75	10/90
20a	92/8	74/26	88/12	90/10
20b	88/12	62/38	69/31	60/40
20c	12/88	56/44	44/56	50/50
20d	4/96	29/71	61/39	20/80

Table 7. Percentages of success/neutral/transfer/others for the test sentence

Sentence no.	groups	Controls	Level I	Level II	Level III
17	success	81	38	31	70
	transfer	0	15	25	10
	neutral	14	29	25	10
	others	5	18	19	10
18	success	90	6	0	20
	transfer	1	47	25	40
	neutral	2	18	25	20
	others	7	29	50	20
19	success	90	9	31	70
	transfer	0	21	12	10
	neutral	8	32	56	20
	others	12	38	1	0
20	success	74	24	44	40
	transfer	2	29	12	40
	neutral	8	15	19	10
	others	16	32	25	10

Parsing as a process of applying I-language modules: A case study based on the processing of quantifier float constructions in Japanese*

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1. Introduction.

The goal of this study is to understand the ways in which humans apply relevant modules of knowledge of language to an input sentence in a parsing process. To this end, we will analyze quantifier float constructions in Japanese, as a case study, on the basis of the view that the output in parsing comprises discrete and multiple categories. Then we will provide a framework for analysis with two relevant modules of knowledge of language in which the output or judgements of a given sentence by native speakers could be classified into the categories. Finally, on the basis of an analysis of the main features of the output, we will consider the problem of the ways in which the process of applying the relevant modules of knowledge of language is organized.

Although the present paper will discuss a constraint on the phenomenon of quantifier float constructions in Japanese in relation to problems of parsing, this does not mean that a performance-based explanation replaces traditional, grammar-based explanations of the constraint. What substitutes for the notions which play an important role in the traditional explanations of the constraint are also grammar-based notions. The problems of parsing which we will address are only concerned both with the process in which knowledge represented by the grammar-based notions is applied and with outputs from the process.

1.1. Problems

Generally speaking, parsing can be defined as a process which receives a PF as an input and creates a corresponding LF (or more) as an output. We could define parsing in this way very easily (Figure 1).

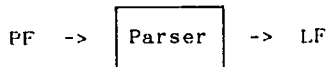


Figure 1. A definition of parsing

The ease of defining it, however, does not warrant any easy solution of problems which we face when we try to understand the detailed processes of parsing in humans. There seems to be no

agreement even as to the overall structure of a human parser. It seems to me that this situation requires us to go back to and to reconsider original issues of the so-called parsing problem.

I think that the parsing problem is both

- (I) an analogous problem to Plato's problem in language acquisition, and at the same time,
- (II) an inverse problem of Descartes' problem in language production.

By "an analogous problem to Plato's problem" I mean that a sentence does not contain enough information in itself to allow us to interpret it fully. Thus the poverty of stimulus in sentence interpretation, which is due to partial realization of information conveyed by an expression, parallels the poverty of stimulus in language acquisition. To put it another way, a parser cannot create an LF solely on the basis of a PF; (s)he must contain a rich set of knowledge of language to apply to an input sentence.

By "an inverse problem of Descartes' problem" I mean that the human sentence parsing process faces a problem of unpredictability of any aspects of an input sentence, which is caused by the creativity in language production.

Therefore, in order to understand the human sentence parsing process, we need to answer the following two questions.

(I') How do humans apply a rich set of knowledge of language to an input sentence and recover the information which is omitted at the time of encoding of an expression or lost during the transmission?

(II') How do humans cope with the unpredictability of any aspects of an input sentence, which is caused by the creativity in language production?

Correspondingly, a theory of the human sentence parsing process must consist of two aspects:

(I'') an aspect which concerns itself with the process of applying a rich set of knowledge of language to an input sentence, and

(II'') another aspect which concerns itself with those mechanisms and procedures which make it possible for humans to cope with the unpredictability of any aspects of an input sentence.

I think that we can realize the first aspect of the theory of the human sentence parsing process as an idea that parsing is a process of applying the knowledge contained in the modules of the I-language (Chomsky 1986) to an input sentence. The principle-based parsing (e.g., Berwick, 1991; Johnson, 1989; Wehrli, 1988) is an attempt to realize this idea. Although, in fact, this paradigm contains a variety of approaches (cf. Berwick, et al., 1991), straightforward and comprehensive attempts to realize the idea are made in Fong (1991), where, for now, they explore computational possibilities of control structures which apply relevant modules of knowledge of language

to an input sentence on the basis of logical dependencies among the modules. However, what matters in psycholinguistic studies is not just the computational possibilities but empirical facts about the process of applying the modules to an input sentence. We do not know anything about the latter.

On the other hand, the second aspect of the theory, that is, the aspect concerning the parser's flexibility when (s)he must cope with the unpredictability of an input sentence, clearly has to do with the following various kinds of mechanisms and procedures which give the parser the flexibility. These include a look-ahead buffer which holds unstructured items to delay syntactic decisions (Marcus, 1980), a method of underspecification which is intended to avoid unnecessary commitment to positing nodes which lack evidence for the existence at the time of expanding X bar rules (Marcus, Hindle, & Fleck, 1983; Barton & Berwick, 1985), a race model which computes possible structures in parallel and discards unnecessary structures immediately (Frazier & Fodor, 1978; McRoy & Hirst, 1990), error recovery procedures such as backtracking and more intelligent ones, to mention just a few. However, it is safe to say that the way in which this second aspect of the theory can be realized seems to be still globally unclear, witness the controversies such as delayed use (e.g., Frazier, 1990) vs. immediate use (e.g., Tanenhaus & Carlson, 1989) of argument structure information.

In the present paper I will focus on the first aspect of the parser. How can we provide a more constrained picture of parsing as a process of applying the I-language modules? I will address this problem in the next section.

1.2. The nature of output in the human sentence parsing process: A possible source of constraint

A possible constraint on the structure of the process of applying the I-language modules might come from the following observations:

"So-called "ungrammatical" or "deviant" sentences are often quite readily parsable and even perfectly intelligible." (Chomsky 1991, p.19)

"Sentences like what do you wonder who likes or John is proud Bill, though hard to understand, don't cause people to collapse like a rule-based system would." (Berwick, 1991, p.117)

In other words, any sentence can receive some interpretation. Therefore, the dichotomy between grammatical sentences and ungrammatical ones no longer holds. This simple statement implies a very profound change of view of the nature of parsing in general and of the nature of output in particular, because this negation of the dichotomy discards altogether both the traditional view of language as a set of sentences which are well-formed linear strings of words and the traditional view of a parser basically as an automaton which accepts the string as well-formed or rejects it as ill-formed (Chomsky 1990).

The goal of this study is to understand what kind of organization of the process of applying the I-language modules

could produce the output with the observed nature in parsing. To this end, my point here is to take up as serious subjects both the view of parsing as a process of applying the I-language modules and the view of the nature of the output in parsing and to examine what this change of view of the nature of the output implies on the basis of a concrete phenomenon of the so-called quantifier float constructions in Japanese. First, let me remind you here of the phenomenon.

2. Quantifier float constructions in Japanese.

In the following pairs of sentences, which roughly mean the same thing, the (b) forms of them are called quantifier float constructions.

- (1)a. San-nin-no gakusei-ga ik-i-mas-i-ta.
3 people GEN student NOM go POLITE PAST
("Three students went.")
b. Gakusei-ga san-nin ik-i-mas-i-ta.
- (2)a. San-nin-no gakusei-o ik-ase-mas-i-ta.
ACC CAUSATIVE
("Someone) made three students go.")
b. Gakusei-o san-nin ik-ase-mas-i-ta.
- (3)a. San-nin-no gakusei-ni shukudai-o das-i-mas-i-ta.
DAT homework give
("Someone) gave homework to three students.")
b. ?Gakusei-ni san-nin shukudai-o das-i-mas-i-ta.
("Someone) gave homework to three students." or
"Three people gave homework to students.")

Phrases like "san-nin" in the (b) forms are called floating numeral quantifiers (henceforth abbreviated as FNQ).

Some linguists describe the correspondence between these pairs of sentences in terms of movement. However, in this study, we shall limit our attention to an aspect of this phenomenon that there is a correspondence between the (a) forms and (b) forms in some cases but not in others. Then we shall consider what kind of constraints must be there in order for the (b) forms to make sense (cf. Miyagawa 1989).

As these examples show, there seems to be some constraints on this correspondence. Incidentally, in terms of movement, we can say that some constraints exist on the possibility of "launching" or "floating" a numeral quantifier from a noun phrase (henceforth, NP) which the quantifier originally modifies. Then what are the constraints like? The studies which have been done so far have tried to characterize or define the constraints in terms of some linguistic concepts such as the following. Let me give you a very brief review of the studies. First, a constraint was characterized or defined in terms of grammatical relations such as subject and object; that is, quantifiers can be floated from subject NPs and direct object NPs but not from other oblique NPs (Okutsu 1969; Kamio 1977).

After that, the constraint was redefined in terms of surface cases such as nominative and accusative, because some other examples show that NPs which are subject and at the same

time dative cannot launch quantifiers:

- (4)a. San-nin-no gakusei-ni shukudai-ga konas-e-mas-i-ta.
 SUBJECT NP DAT do POSSIBLE
 ("Three students managed to finish homework.")
 b.?Gakusei-ni san-nin shukudai-ga konas-e-mas-i-ta.

That is, quantifiers can be floated from nominative NPs and accusative NPs but not from other oblique NPs (Shibatani 1977).

Recently, definitions of the constraint became more complicated, accomodating concepts such as the obligatory nature of a modified NP as an argument with respect to a predicate, the distance between an FNQ and a modified NP, the kind of an intervening element between an FNQ and a modified NP, and word order (Haig 1980; Shimozaki 1989), although it is also pointed out in Miyagawa (1988; 1989) that the constituent which the FNQ can modify is basically an NP which receives "a thematic role from an external source such as the verb" (1989, p.27).

3. An alternative analysis.

3.1. Two kinds of top-level computations and multiple categories of output

However this line of studies might proceed, it seems to me that they have all overlooked the following point. That is, there is a serious problem in their way of looking at the data on which their arguments are based.

Above all, these studies are, even quite recently (for example, Miyagawa, 1988; 1989), based on data which presuppose a rather rigid dichotomy between grammatical sentences and ungrammatical ones. However, as has been well-known since the early days of generative grammar, there is much heterogeneity among the judgements made by native speakers on a given sentence (cf. for example, Shibatani 1982).

Moreover, there are some attempts to introduce such concepts as a degree of acceptability into the data (for an explicit introduction of the concept of degree, see Shimozaki, 1989). However, the mere introduction of the degree concept will not suffice. In this kind of study, it is implicitly assumed both that the number of categories of the output in parsing is only one and that the degree of acceptability is the difference within that one and the same category. However, this assumption would not hold a priori.

As a solution to these problems, there is an alternative way of looking at the data. As we will see later in more detail, we can make certain discrete distinctions in the data. The distinctions are different from both the dichotomy and the degree of acceptability. They are presumed to correspond to the output of parsing in humans. I would like to propose that we should base studies of quantifier float constructions on the data which reflect these distinctions.

More specifically, this alternative framework for analysis claims the following points. First of all, (i) the number of categories of output in parsing is plural. Second, (ii) each category of the output corresponds to a combination in which some

principles or factors involved in the processing of quantifier float constructions are violated and others are not. A maximally well-formed sentence is represented as a combination in which none of the principles involved are violated. Thus, this alternative analysis claims that there are as many cases in which quantifier floating is impossible as combinations in which the principles involved are violated. Finally, (iii) a difference in the degree of grammaticality or acceptability, if any, is within each of the categories of the output.

Then how can we realize this alternative framework for analysis? First of all, we can say that primacy of such factors as grammatical relations and surface cases in the process of interpreting the quantifier float constructions seems doubtful. Rather, I would like to propose that two factors, the possibility of theta-role assignment and the possibility of establishing modification relation from an FNQ to a modified NP, play primary roles in the process involved. Now let me explain involvement of these two factors in the process briefly.

3.1.1. Theta-role assignment

One of these factors is the possibility of assigning a theta-role to an FNQ in a sentence. For example, in sentence (1-b), the verb can assign the same agent-role to the FNQ and the nominative NP. In the more interesting case of sentence (3-b), the verb can assign, on the one hand, an agent-role to the FNQ; however, it assigns, on the other hand, a goal-role to the dative NP. Thus, in this case, the FNQ and the dative NP which the FNQ is originally intended to modify receive different theta-roles.

(5)a. 200 kg.-no rikishi-ga dohyo-ni aga-t-ta.

Sumo wrestler Sumo ring mount PAST

("A Sumo wrestler who weighs 200 kg. mounted the Sumo ring.")

b. *Rikishi-ga 200 kg. dohyo-ni aga-t-ta. (Otsu 1988)

In sentence (5-b), the FNQ, "200 kg.", cannot receive any theta-role from the verb, in marked contrast to examples (1-b) and (3-b). This situation, which makes sentence (5-b) "ungrammatical", constitutes another category of output from the processing of quantifier float constructions.

A note on the relation of this analysis to the theta-theory would be in order here. This analysis apparently seems to violate the theta-theory because the FNQ that is not an argument receives a theta-role. Even if the FNQ could have an argument status, the analysis violates the theta-criterion anyway because one and the same theta-role is then assigned to the two arguments.

However, we could avoid this violation by positing something like the theta-role transmission principle proposed by Jaeggli (1981) (the following explanation is cited from Dorr, 1991). The theta-role transmission principle is represented as follows;

(6) [CL + Case i + Theta j]...[NP + Case i] =>
[CL + Case i + Theta j]...[NP + Case i + Theta j].

where "CL" stands for a pronominal clitic.

- (7) Le regalé un libro a Juan.
 CL gave a book to John
 (" I gave a book to John.")

In sentence (7), "Le" is ["le" + accusative + patient] and "a Juan" is ["a Juan" + dative]. So, "a Juan" does not yet have a theta-role. Moreover, it cannot receive a theta-role directly from the verb without violating the theta-criterion, because the theta-role which it can receive is the same as the theta-role already assigned to the pronominal clitic, "Le". However, through this principle it can receive a theta-role without the theta-criterion violation.

By analogy, we could propose something like;

- (8) [NP + Case i + Theta j + feature k]...[FNQ + feature k] =>
 [NP + Case i + Theta j + feature k]...[FNQ + Theta j + feature k].

where "FNQ" stands for the floating numeral quantifier and "feature" stands for some semantic features discussed below.

3.1.2. Modification

Another factor is the possibility of establishing modification relation from an FNQ to a modified NP. Here the term "modification" is used "as a general term for relations such as qualification of and quantification over", following Sportiche (1988, p.429) and Ueda (1990, pp.86-87). For example, in sentence (1-b), the FNQ, "san-nin", can be easily interpreted or judged to be able to modify the preceding NP. In sentence (3-b), the FNQ, "san-nin", is not easily interpreted to be able to modify the preceding NP. This situation contributes to the "unacceptability" of this sentence. Note that it does not always follow that this combination of a dative NP and a FNQ contributes to "unacceptability";

- (9)a. San-nin-no gakusei-ni it-te-mora-t-ta.
 3 people GEN student DAT go want PAST
 ("(Someone) wanted three students to go."
 b. Gakusei-ni san-nin it-te-mora-t-ta.

When we interpret the FNQ in the context of this sentence, the same combination does not necessarily lead to "unacceptability" but to a partitive interpretation.

3.1.3. Output

Taking into account these two factors, we can propose the following structure of "what is being computed", in Marr's (1982) sense, and of what is output in the process of interpreting the quantifier float constructions. First, there are two kinds of computations on the top-level (Figure 2).

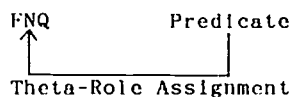
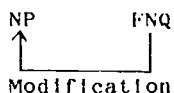


Figure 2. Two kinds of computations on the top-level: modification and theta-role assignment. These schemata represent only two constituents involved and order them according to the word order of the Japanese language.

These two kinds of computations on the top-level determine the overall pattern and major features of the output in parsing.

Second, modification and theta-role assignment have the same structure of alternatives (Figure 3); first, both divide into "possible" and "impossible", and in the case of "possible", both divide into "equal" and "not equal to". Incidentally, "not equal to" in the "possible" case of modification means a so-called partitive interpretation.

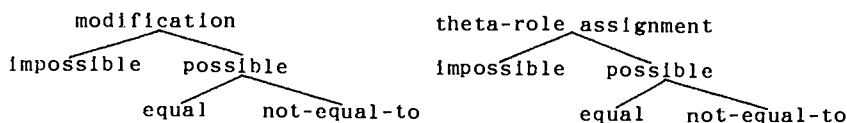


Figure 3. The structure of alternatives in modification and theta-role assignment.

These things are summarized in Table 1.

Table 1. Contents of computation and output.

modification		theta-role assignment		output
possibility	identity	possibility	identity	
possible	equal	possible	equal	(1) well-formed
possible	equal	possible	not-equal-to	(2) different theta-roles
possible	equal	impossible	irrelevant	(3) nonexistent
possible	not-equal-to	possible	equal	(4) partitive interpretation
possible	not-equal-to	possible	not-equal-to	(5) different theta-roles
possible	not-equal-to	impossible	irrelevant	(6) nonexistent
impossible	irrelevant	possible	equal	(7) nonmodifiable
impossible	irrelevant	possible	not-equal-to	(8) different theta-roles
impossible	irrelevant	impossible	irrelevant	(9) impossibility of theta-role assignment

Needless to say, more subtle distinctions in the output can be made, for example, on the basis of the fact that there is a case in which we find it impossible to assign any theta-role to an FNQ in the context of a sentence at a first-pass analysis, but we find it possible, in turn, at a second-pass analysis. However, possibilities like this are not pursued here, and thus distinctions based on the possibilities are not incorporated into the analysis proposed here.

An example of the output (9) in Table 1 is the sentence (5-b). The main feature of this sentence consists of the fact that it is impossible to assign any theta-role to the FNQ and that the FNQ remains without a theta-role.

- (10) Gyuuniku-ga 200 kg. ur-e-mas-i-ta. (Otsu 1988)
 beef sell passive
 ("A 200 kg. of beef was sold.")

In contrast to this, sentence (10), which contains the same FNQ as the sentence (5-b), is maximally well-formed and therefore falls under the type of output (1) in Table 1. In this case, first, the FNQ can modify the preceding NP because "gyuuniku" is a mass noun and "kg" is a suitable unit for a mass noun. Second, the predicate "sell" can assign a theme-role to the FNQ. We can explain a similar sentence (11) (Kamio, 1977) in the same way.

- (11) *Kuruma-o 2000 cc kau.
 car buy
 ("(Someone) buys a 2000 cc of car.")

In this case, the FNQ cannot modify the preceding NP because a suitable unit for counting cars is "dai", not "cc". However, the predicate "buy" can assign a theme-role to the FNQ under the interpretation that the theme has the function of a mass noun. This theme-role is the same as the theta-role which is assigned to the accusative NP "kuruma". Thus the sentence (11) falls under the type of output (7) in Table 1.

The sentence (3-b) is an example of output (8) in Table 1 if the modification is judged to be impossible as is usually the case, where "Gakusei-ni" has a goal-role and "san-nin" has an agent-role. If the modification is judged to be possible in this sentence, then the output of the same (3-b) falls into output (2) or (5) in Table 1, depending on the judgement of equality.

3.2. Subfactors affecting the top-level computations

It seems possible that these two factors of theta-role assignment and modification are also affected by some other minor factors, apart from structural positions, although it might become clear that these subfactors must be recast in structural terms (cf. references in (iv), for example). First, the factors which might affect judgement of the possibility of modification from an FNQ to a modified NP are as follows:

- (i) whether or not an auxiliary number or a numeral classifier

(for details, see e.g., Denny, 1979), which constitutes a quantifier with a numeral, is a suitable unit for counting objects which a set denoted by a modified NP includes or for measuring a property which a modified NP has. For example, "kg" in sentence (5-b) is not a suitable unit for humans.

(ii) whether or not [NP + postpositional particle + FNQ] is read as a single intonational constituent.

(iii) what kind of predicate constitutes a context for interpretation. For example, although the FNQ in sentence (4-b) is not usually judged to be able to modify the preceding NP, the one in sentence (9-b) can be judged to be able to modify the preceding NP. This might mean that the possibility of modification from an FNQ to a preceding NP depends on the context for interpretation, which is provided by the predicate.

(iv) kind of intervening constituents (Sportiche, 1988; Ueda, 1990).

(v) distance (Shimozaki, 1989).

(vi) whether or not the FNQ is a focus of new information (Katagiri, 1991; 1992).

(vii) whether or not a modified NP agrees in number with the FNQ (Okutsu, 1986).

Second, one of the factors which might affect judgement of the possibility and identity of theta-role assignment is:

(1) whether or not the semantic features which a theta-role requires are consistent with the semantic features of FNQ.

(12)a. San-nin das-u.

give PRESENT

("Three people give (something).")

b. San-dai das-u.

problem PRESENT

("(Someone) gives three problems (to someone).")

In sentence fragment (12-a), the FNQ, "San-nin", has a semantic feature, [+animate], which is consistent with one of the semantic features that an agent-role has. Thus this feature makes it possible to interpret the FNQ as playing an agent-role in this fragment. In contrast to this, the FNQ, "San-dai", in sentence fragment (12-b) has a semantic feature, [-animate], which makes it impossible to interpret the FNQ like the one in (12-a).

It might also be possible that these factors are in turn affected by certain subfactors. For example, the factor of whether or not the FNQ is a focus of new information, which affects the possibility of modification, is affected by the following subfactors (katagiri 1991; 1992).

(i) whether or not there is a contrasting form.

(13) Hanako-wa bounenkai-ni hutatsu shinnenkai-ni mittsu i-t-ta.
year-end party 2 New Year's party 3

("Hanako went to two year-end parties and three New Year's parties.")

(ii) whether or not there is an emphatic particle "mo".

(14) Hanako-wa kotoshi party-ni mittsu-mo i-t-ta.

- this year EMPHATIC
- ("Hanako went to three parties this year.")
- (11) whether a clause represent a result (15-a) or a state (15-b).
- (15)a. Kodomo-ga geragerato hutari wara-t-ta.
children loudly laugh
("Two children laughed loudly.")
- b. Kodomo-ga geragerato hutari wara-te-i-ta.
("Two children were laughing loudly.")

Another factor, whether or not the FNQ agrees in number with the modified NP, which affects the possibility of the modification, is further affected by the following subfactors.

(1) whether or not there is a discrepancy between implicit singularity of a common noun in Japanese and the plurality of FNQ (Okutsu, 1986).

(16) Gakusei-ga tegami-o suu-nin ka-i-ta.
letter several write

("Several students wrote a letter.")

(17) Gakusei-ga koogi-gi suu-nin sabo-t-ta.
class cut

("Several students cut the class.")

The relative awkwardness of sentence (16), compared with that of sentence (17), may be attributed to subfactor (1).

(11) Whether or not there is a discrepancy between the singularity of a proper noun and the plurality of FNQ.

(18) Taro-ga tegami-o suu-nin kaita.

(19) "Sato"-ga 8-nin "Suzuki"-ga 5-nin kono gakko-ni-wa
this school LOC TOPIC

i-mas-u.

there are

("There are eight "Sato" and five "Suzuki" in this school.")

The awkwardness of sentence (18), compared with the naturalness of sentence (19), may be attributed to subfactor (11).

Returning to the structure of what is computed in processing quantifier float constructions, how can we give concrete computational substance to the proposed structure of the two computations on the top-level? In the next section, we will address this problem.

3.3. Subcomputations of modification and theta-role assignment.

In this section, we will first consider the computation of modification relation from an FNQ to a modified NP and then the computation of theta-role assignment from the predicate to the FNQ.

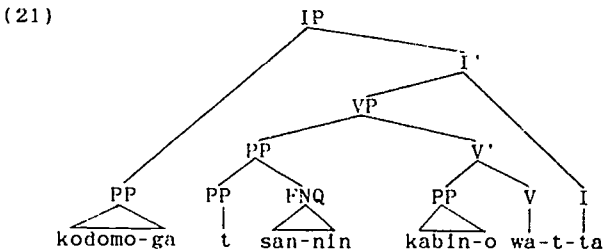
3.3.1. Modification

Here, we will define the computation of the possibility of modification relation from the FNQ to the modified NP in terms of the notion of c-command:

(1) to judge whether the FNQ can modify the PP if the FNQ c-commands a PP or the trace of a PP.

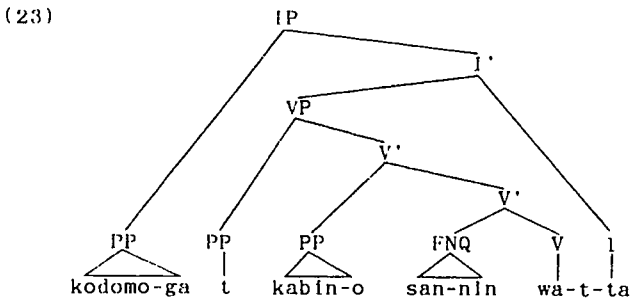
Here, let me demonstrate this by considering very simple sentences. In computing the c-command relation, we will assume the Japanese phrase structure according to Ueda (1990) with some minor modifications. For example, in sentence (20), we assume a structure like (21), where the FNQ c-commands the trace of PP; therefore, we are led to judge that the FNQ can modify the NP.

- (20) Kodomo-ga san-nin kabin-o wa-t-ta.
 children NOM 3 people vase ACC break PAST
 ("Three children broke a vase.")



On the other hand, in sentence (22), we assume a structure like (23), where the FNQ does not c-command the trace of PP "kodomo-ga", therefore, we are led to judge that the FNQ cannot modify the NP.

- (22)*Kodomo-ga kabin-o san-nin watta.



Ueda(1990) explains the ungrammaticality of sentence (22) in the following way. First, "kodomo-ga" and "san-nin" form a single constituent and have the structure (24) at the D-structure.

- (24) [np [np kodomo-ga] san-nin]

Second, "kodomo-ga" moves obligatorily from the VP-internal subject position to the specifier position of IP. Third, although "kabin-o" must move by scrambling, "adjunction to VP by scrambling is prohibited" (p.97). Therefore, sentence (22) is

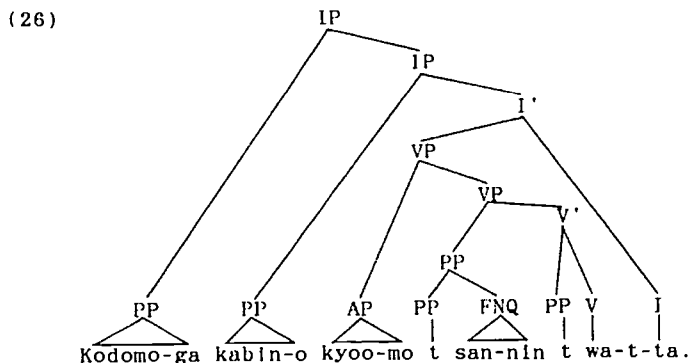
ungrammatical.

Although the analysis of Ueda (1990) can explain the ungrammaticality of (22), the impossibility of the modification from the FNQ to the NP in the sentence (22) remains to be explained. Because the structure (24) always exists at the D-structure, the modification relation should also hold in spite of the ungrammaticality. However, the modification relation does not hold. Therefore, there must be something which makes the modification impossible other than the violation due to the prohibited adjunction to VP.

The revision which is proposed here assumes (i) that a structure like (24) does not always exist at the D-structure and (ii) that a structure like (24) is posited only if there is evidence for movement by scrambling. For example, consider the sentence (25).

- (25) Kodomo-ga kabin-o kyoo-mo san-nin wa-t-ta.
 today also
 ("Three children broke the vase also today.")

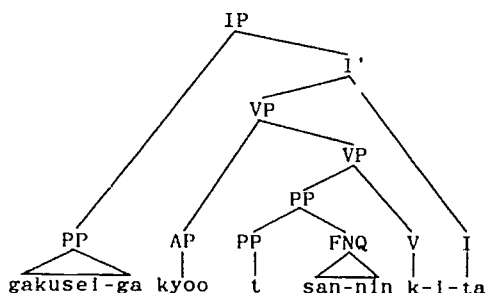
In this case, "san-nin" is more often judged to modify "kodomo-ga" in contrast to (22). The revised analysis assumes that there is evidence for the movement by scrambling in this sentence because "kodomo-ga" and "kabin-o" appears in higher positions than "kyoo-mo" which is originally in a higher position than the other constituents at the D-structure.



The same kind of analysis holds for sentence (27), the structure of which is shown in (28).

- (27) Gakusei-ga kyoo san-nin k-i-ta.
 student NOM today 3 people come PAST
 ("Today three students came.")

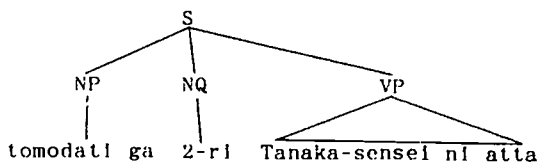
(28)



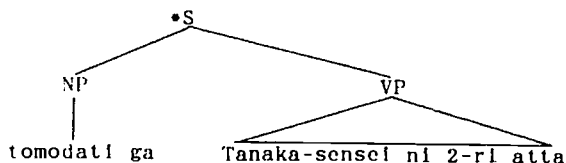
This definition of the computation of the possibility of modification relation in terms of c-command relation is not entirely new. Miyagawa (1988; 1989) introduced the mutual c-command requirement for establishing the modification relation, which Miyagawa (1988; 1989) regarded as "predication", between an FNQ and a modified NP. Miyagawa's (1988; 1989) argument is as follows. First, the necessity for introducing the c-command condition is shown in the following pairs of sentences and structures (Miyagawa, 1989, pp.28-29).

- (29)a. Tomodat_i ga 2-ri Tanaka-sensei ni atta.
 friends NOM 2-CL Prof. Tanaka DAT met
 ("Two friends met Prof. Tanaka.")
 b. *Tomodat_i ga Tanaka-sensei ni 2-ri atta.

(30)a.



b.



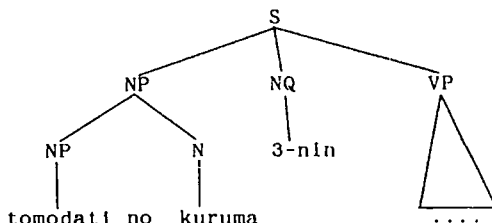
In (29a), the modification is possible and this fact is captured in (30a) by the structural condition that the FNQ c-commands the modified NP because the first branching node, S, dominating the FNQ also dominates the modified NP. On the other hand, the modification is impossible in (29b) and this fact is captured in (30b) by the structural condition that the FNQ does not c-command the modified NP because the first branching node, VP, dominating the FNQ does not dominate the modified NP.

However, Miyagawa (1988; 1989) argues that this c-command condition is not a sufficient condition and introduces the mutual

c-command requirement. According to Miyagawa (1989, pp.29-39), the necessity for introducing the mutual c-command requirement is shown in the following example.

(31) * [NP Tomodati no kuruma] ga 3-nin kosyoosita.
 friends GEN car NOM 3-CL broke down

(32)



In sentence (31), the modification is impossible even if the FNQ c-commands the modified NP. Thus only the condition that the FNQ c-commands the modified NP is not a sufficient condition to exclude constructions like sentence (31). In constructions like sentence (29a) where the modification is possible, the FNQ c-commands the modified NP as was seen above, and at the same time the modified NP c-commands the FNQ because the first branching node, S, dominating the NP also dominates the FNQ. On the other hand, in constructions like sentences (29b) and (31) where the modification is impossible, the FNQ does not c-command the NP as in sentence (29b), or the FNQ c-commands the NP but the NP does not c-command the FNQ as in sentence (31).

However, if we could assume that "3-nin" appears under the VP in the structure (32), the mutual c-command requirement is not necessary, because "3-nin" does not then c-command "tomodati" anyway. Moreover, although "3-nin" and "kuruma" c-command mutually under the structure (32), "3-nin" cannot modify "kuruma". Therefore, even the structural requirement alone is not sufficient. Like our framework for analysis, we need to take into account such a factor as whether or not a numeral classifier which constitutes an FNQ with a numeral is a suitable unit for counting or measuring objects denoted by a modified NP.

According to our proposed framework for analysis, there is another factor which we need to take into account. What makes sentence (31) anomalous lies in the fact that it is difficult to have "kosyoosita" assign a theme-role to "3-nin" and "3-nin" remains without a theta-role, at least at a first-pass analysis, because "kosyoo" is usually associated with [-animate] thing.

3.3.2. Theta-role assignment

Next, we will propose a hypothesis of computation of theta-role assignment from the predicate to an FNQ, which consists of the following four steps:

- (i) to retrieve the argument structure of the predicate.
- (ii) to check whether or not the semantic features of FNQ can satisfy a theta-role provided by the argument structure. If

possible.

(iii) to check whether or not postposition or case markers do not govern the FNQ and whether or not the predicate governs the FNQ.

(iv) to judge whether the predicate can assign a theta-role to the FNQ if postposition or case markers do not govern the FNQ and the predicate governs the FNQ.

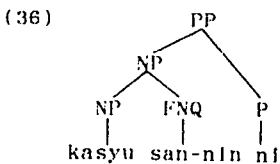
It is assumed here that this procedure functions as a default mechanism in the case where there is no argument to which a theta-role of the argument structure of the predicate can be assigned. When there is an argument to which a theta-role can be assigned, something like the theta-role transmission principle replaces the procedure.

3.3.3. Quantifier shift constructions: Evidence

A partial support of the computational processes of the modification and the theta-role assignment comes from a fact that there is no problem for the modification and the theta-role assignment in the output from an interpretation process of the so-called "quantifier shift constructions" (Shibatani 1977), in which FNQ appears in between a modified NP and postposition. Compare the quantifier float constructions ((b) sentences) and the "quantifier shift constructions" ((c) sentences) in the following set of sentences (Otsu 1988).

- (33)a. San-nin-no kasyu-ni puropoozu s-i-mas-i-ta.
 3 people GEN singer DAT propose do PAST
 ("(Someone) proposed to three singers.")
 b. *Kasyu-ni san-nin puropoozu s-i-mas-i-ta.
 c. Kasyu-san-nin-ni puropoozu s-i-mas-i-ta.
- (34)a San-nin-no kasyu-kara sain-wo mora-i-mas-i-ta.
 ABLATIVE autograph get
 ("(Someone) got autograph from three singers.")
 b. *Kasyu-kara san-nin sain-wo mora-i-mas-i-ta.
 c. Kasyu-san-nin-kara sain-wo mora-i-mas-i-ta.
- (35)a. San-nin-no kasyu-no-mae-ni tat-i-mas-i-ta.
 in front of stand
 ("(Someone) stood in front of three singers.")
 b. *Kasyu-no-mae-ni san-nin tat-i-mas-i-ta.
 c. Kasyu-san-nin-no-mae-ni tat-i-mas-i-ta.

In the quantifier shift constructions, it is always possible to establish the modification relation from the FNQ to the NP because the structure is like the following:



Moreover, it is also always possible to assign the same theta-role both to the FNQ and to the modified NP because the theta-

role which is assigned to the NP is transferred to the FNQ by something like the theta-role transmission principle in structures like (36).

4. Conclusion.

To summarize, the structure of what is computed in processing quantifier float constructions is rather straightforward. Two factors of possibilities of theta-role assignment to FNQ and of establishing modification relation from FNQ and modified NP play primary roles in the processing. Interaction of these two factors determines nine, not two, categories in output which are shown in Table 1.

Now, by way of conclusion, we would like to discuss some of implications which the analysis proposed here might have for one of the original issues, that is, the question of how the process of applying I-language modules to an input sentence is organized. First, the analysis makes use of natural notions of operations such as modification and theta-role assignment, which are involved anyway in the ordinary processes of sentence comprehension. Moreover, these two operations are generators, as contrasted with filters like Case Filter, Empty Category Principle, and so on, if we could divide the principles into these two categories as Fong (1991) does. Therefore, if our analysis which attempts to characterize or define the constraint on quantifier float constructions in terms of these notions is correct, the analysis might show that what determines major features of output in parsing are generators, not filters.

Second, intuitive contents of major features of output in parsing, which are shown in Table 1, show that the factor of theta-role assignment contributes more to the major features of the output than another factor of modification. Therefore, if this is correct, this difference in the contribution to the major features of the output might also mean something about the organization with respect to these two modules.

As a related question, we would like to consider the nature of the human parser. The task of parsing has been traditionally conceived to be restricted to phrase structure parsing or X bar parsing. However, a reconsideration of one of the original issues might show that the task of parsing is not necessarily restricted to X bar parsing. It includes all the processes which apply other I-language modules of syntactic component of grammar as well as X bar rules. In this conception of parsing, such modules as theta-role assignment play primary roles as seen above. However, this might not necessarily mean that the parser is communication-oriented because what is involved in syntax (e.g., Grimshaw, 1990) and in parsing (Pritchett, 1992) may not be the contents of theta-roles. The exact nature of parsing must be determined in relation to other modules of sentence comprehension and to the nature of the interface between the parser and these other modules.

Finally, we would like to discuss some implications of the analysis for psycholinguistic studies in general. First, this analysis might give a more natural explanation for the problem of acquisition of the constraint on quantifier floating. If we

characterized the constraint in terms of grammatical relations or surface cases and we stated that "subject NPs and direct object NPs can launch quantifiers but other oblique NPs cannot" or "nominative NPs and accusative NPs can launch quantifiers but other oblique NPs cannot", then it seems rather ad hoc to think that the constraint stated in these terms is acquired, represented, and used directly. In contrast to this, the problem of acquisition might disappear if we could adopt the kind of explanation of the constraint which is proposed here, because we then do not use the constraint at all when we process quantifier float constructions. Rather, there might exist only a general process of applying I-language modules, and judgements about quantifier float constructions which reflect the constraint might follow derivatively or "deductively" from the process.

Second, whatever individual differences might appear in interpretation of quantifier float constructions could each be attributed to one category of the output or another on the basis of the structure of what is computed shown in Table 1.

Of course, many problems remain to be solved. First of all, the existence of pattern or of types of output in parsing must be verified. Moreover, the psychological reality of judgements of possibilities of modification and of theta-role assignment must also be verified. However, it seems safe to say at least that this line of studies which has been shown in this paper might also shed some light on the nature of the human sentence parsing process.

* I am grateful to Sandiway Fong, Yoshiyuki Igarashi, Kooichi Miyashita, Yukio Otsu, and Steven Pinker for their criticism, questions, and comments on this study. Still remaining errors and inadequacies are, of course, my own.

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Do formulaic utterances cease to be "chunks" when they are analyzed?

Yasuko Kanno

Many second language learners in their early stages of development are known to make an extensive use of prefabricated formulae. These formulae are extracted holistically from the input and memorized by rote. Learners can learn to use such expressions as What's that?, Don't do that, and I'm finished, which are far beyond their current knowledge of syntax and vocabulary, by guessing their meaning from the contextual cues. The formulae that learners use therefore usually sound far more fluent and linguistically advanced than their creative speech (i.e. utterances that they generate using syntactic rules).

Researchers have called such formulas by various names: 'formulaic utterances' (Wong Fillmore 1976), 'prefabricated routines and patterns' (Hakuta 1974, Krashen and Scarcella 1978), 'speech formulas' (Peters 1977, 1983), 'prefabricated chunks' (Widdowson 1989) and 'lexicalized sentence stems' (Pawley and Syder 1983). However, they all refer to the same thing. What is more significant here is the definition of such formulaic utterances. Essentially, the definition, which is implicit in various researchers' work, is two-fold: 1) that formulae are extracted from the input and stored in the lexicon *as units*; and 2) that the learner does not know their internal structure.

A major dispute over the role of formulaic utterances in 1970's was whether they lead to creative language or they are a dead-end. More precisely, Wong Fillmore (1976, 1979), Clark (1974) and Peters (1983), on the one hand, argued that formulae that the learner has acquired constitute the data source from which syntactic rules are developed. On the other hand, Krashen and Scarcella (1978) maintained that formulae and rule-formation are developed separately. The controversy has not been settled and in fact it seems to have been dropped over the past decade. Although this topic is theoretically quite interesting and is relevant to my argument, it is not my main concern here. My central argument concerns one issue that both parties seem to agree on: that when the learner becomes aware of the internal structure of formulaic utterances, whether by comparing a few similar

formulae or by applying independently developed syntactic rules, they lose their status as unitary items in the learner's lexicon. This argument is basically based on the principle of parsimony rather than a psychologically plausible model. And this is a point where I depart from both parties.

I will argue that formulaic utterances remain as units, or "chunks", in the learner's lexicon, even after their syntactic structure becomes apparent to him/her, as long as they serve some purpose in economizing processing energy in sentence production. That is, lack of syntactic analysis is not a defining character of such formulae. I will draw on various researchers' data on SLA, including my own¹, which support my argument and demonstrate how it can explain some SLA phenomena better than the extant theories that have been widely used to explain them. I will then go on to explore some theoretical implications.

A starting point of creative language or a dead-end?

There has been much dispute over the role of formulaic expressions in SLA. Clark (1974), Wong Fillmore (1976, 1979) and Peters (1977, 1983) argue that these expressions do get analyzed, first partially and then fully, and will eventually lead to syntactic rules. Peters (1983) assertion is representative of this position: "socially relevant formulaic speech [is] *not* a dead end, but, [leads], through a documentable process of formulaic breakdown, first to formulaic frames with slots and eventually towards analysis into the conventional lexical items and syntactic patterns of the language" (p. 13, original emphasis). On the other hand, Krashen and Scarcella (1978) are of a very different opinion. They claim that the formulae and the syntactic rule formation are developed in different parts of the brain and that therefore there is no interface between them: "prefabricated routines may evolve into patterns², but at the same time, independently, the creative construction process develops" (p. 284).

¹ My data come from the participant observation that I conducted from October 1991 to February 1992 in an ESL class of a public elementary school in Toronto. Six children I observed ranged from 7 to 11 in age, and came from various countries: Bulgaria, China, Korea, Sri Lanka, Iran and Rumania. Some of them had immigrated to Canada in September 1991 and others a few months later, but all came to this class immediately after their arrival. These children take regular classes with Canadian students but have one hour of ESL everyday. I went to the ESL class once every one or two weeks and recorded their spontaneous utterances among other things. All the names of the children are pseudonyms.

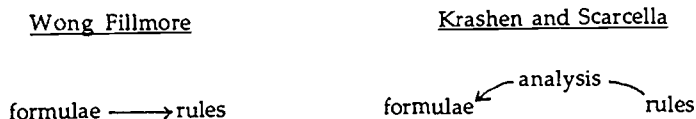
² Krashen and Scarcella (1978) distinguish 'prefabricated routines' and 'prefabricated patterns'. The former are memorized wholes while the latter are partly fixed expressions with open slots in which appropriate words or expressions can be inserted.

It is important to clarify exactly where the two positions differ, since much confusion seems to have arisen from simple misinterpretation of each claim. The only difference between the two positions concerns the question whether formulaic utterances become the data source from which syntactic rules are derived or not. Wong Fillmore, Clark, and Peters maintain that they do while Krashen and Scarcella argue that they do not. A quotation from Wong Fillmore's doctoral dissertation (1976) is illustrative of her position concerning this point:

The analyses the learner perform are on those things which are most available to them--the well-practiced and familiar expressions they find in their own speech repertoires. How much more reasonable this seems than to assume that the language learner can somehow apprehend the fast-fading message produced by someone else, figure out what it means and how it is put together, and then relate it to similar utterances he has heard (quoted in Peters 1983, p. 14).

In contrast, as it is clear from the quotation above, Krashen and Scarcella believe that syntactic rules are developed elsewhere. Note that they never said that prefabricated routines and patterns are permanently immune to analysis, as some of their opponents seem to interpret their position. In fact, they make their position on this point clear: "in some situations propositional language may 'catch up' with automatic speech; that is, the language acquisition process may 'reanalyze' patterns and routines as creative construction" (1978, p. 284). In other words, they believe that syntactic rules are developed without any reference to the formulaic expressions but once they are acquired, they may be applied to analysed the formulae (Figure 1):

Figure 1. The development of syntactic rules.



There is empirical data to support each of the two positions. First of all, Wong Fillmore (1976) has an abundant supply of data that document how hypotheses

about syntactic rules are developed by comparing similar formulae. For example, Nora, the most advanced learner in her study, had the following two prefabricated sentences, among others, at her disposal:

- (1) I wann play 'wi dese.
- (2) I don' wanna do dese. (quoted in Krashen and Scarcella 1978, p.293)

By comparing (1) and (2), she realised that the constituents after wanna can be exchanged, thus yielding:

- (3) I wanna do dese.
- (4) I don' wanna play dese. (Ibid.)

In other words, having compared these two formulaic utterances, Nora learned that I wanna and I don' wanna can be followed by a VP. This data clearly show that a syntactic rule was derived from formulaic utterances.

On the other hand, Krashen and Scarcella (1978) take Brown and Hanlon's first language acquisition data (1970) as an example of the rule formation that is developed independently and is later applied to formulaic expressions for analysis. Their subjects, Adam, Eve, and Sarah, acquired such wh-questions as What's that? and What doing? as formulae, an influence from their parents, who used certain wh-questions frequently. What happened after this is the crucial point:

When, much later, the children began to produce all manner of *wh* questions in the preposed form (such as *What he wants*), it was interesting to note that *What's that?* and *What are you doing?* were not at first reconstrued in terms of the new analysis. If the children had generated the sentences in terms of their new rules, they ought to have said *What that is?* and *What you are doing?* but instead, they, at first, persisted with the old forms We suggest that any form that is produced with very high frequency by parents will be somehow represented in the child's performance even if its structure is far beyond him Extensive use of such an unanalyzed or mistakenly analyzed fragments probably protects it, for a time, from reanalysis when the structure relevant to it is finally learned. (p. 51)

If the rule of pre-posing had been formulated on the basis of such formulae as

What's that? and What doing?, then these two expressions would have been the *first* to be affected by the rule. However, that was not the case. On the contrary, these formulae remained unaffected even when other wh-questions were preposed. This, then, is a clear example of a syntactic rule formulated independently.

In the light of both positions having convincing evidence, how can we resolve this debate? My proposal is a rather unexciting one: they are both right. I fail to see why some rules cannot derive from formulaic utterances while others from somewhere else. Language learners, whether it is L1 or L2, use multiple strategies simultaneously, including ways of formulating hypotheses about syntactic rules and testing them. Then, does it not make more sense to suppose that language learners derive rules from multiple sources? In short, these two positions on the role of formulae in SLA are not mutually exclusive; each of them highlights a different strategy for rule-formation.

Syntactic analysis and the status of formulae

Hakuta (1974), at the end of his article, poses an important question for further research: "do prefabricated patterns whose internal structure is finally perceived remain as convenient short-cut routes to production or are they simply discarded, never to be employed again?" (p. 296). Although their positions on the role of formulaic utterances in the formation of syntactic rules are different, various researchers all seem to agree on this point: that once the memorized expressions are analyzed, they lose their status as single units in the lexicon. Krashen and Scarcella (1978) note that "[formulaic utterances] may be a *temporary* strategy for the performer to outperform his analytic competence, to solve certain communication problems that his creative language has not evolved far enough to handle" (p.289, emphasis added). Peters' (1977, 1983) position is more ambiguous. She does mention the possibility of mature speakers using formulaic speech as a shortcutting device (1983, p. 3). However, elsewhere she takes the same stance as Krashen and Scarcella: "I will suggest that items in the lexicon are subject to analysis by the rules as they are induced and those items that yield to such analysis may lose their status as unitary items of storage"(1983, p. 15). From these accounts, it is easy to detect their assumption that formulaic utterances are a device that beginning language learners use to compensate for their lack of creative language and that once their

propositional language is on its way, formulae are no longer needed.

I, on the other hand, propose that formulaic utterances do not have to lose their status as single items in the storage even after their internal structure has been analyzed, as long as they still serve to save processing energy in sentence production. In other words, the most important defining character of such a formula is not that its internal structure is not known to the speaker but that it is stored as a unit in the lexicon and is retrieved as a whole whenever it fits the concept that s/he wants to express. When a speaker produces a sentence, there are a number of things s/he has to attend to other than the use of correct grammar. Given the fact that "humans are limited-capacity information processors" (McLaughlin, Rossman, and McLead 1983, p.137), it is logical to expect that they use whatever device available to save processing time and energy. If one aspect of production does not require much attention, the speaker can afford to pay more attention to other tasks. The use of formulaic utterances is one of such useful devices; regardless of whether their internal structure is perceived or not, if they are stored as single units in the lexicon, they can be retrieved readily, saving energy to construct the same structures from scratch.

Several researchers have pointed out the importance of formulaic expressions in the adult native speakers' speech (Pawley and Syder 1983, Vihman 1982, Gleason 1982, Widdowson 1989). According to Pawley and Syder (1983), in order to select native-like expressions among perfectly grammatical combinations which contain many non-native-like expressions and achieve native-like fluency, speakers must depend quite heavily on the use of formulaic utterances. They note that "native speakers do *not* exercise the creative potential of syntactic rules to anything like their full extent" (original emphasis, p. 193). Their view goes against the often taken-for-granted primacy of the 'principle of parsimony': far from minimizing the amount of description of the lexicon, it in fact promotes an enormous amount of redundancy in it. If these prefabricated sequences are known as units and also can be analyzed syntactically, they must be registered at least twice in the lexicon (Pawley and Syder 1983). However, I agree with Pawley and Syder that what is important is not how economical the description of competence is but how well it fits the psychological reality of linguistic knowledge that human beings possess. If we know

language in a fairly redundant form, the description of the knowledge should reflect that.

Indeed, much of current theory of language production is biased by the principle of parsimony. When Krashen and Scarcella (1978) and Peters (1977, 1983) maintained that formulaic speech eventually yield to more creative language, they were also influenced by the principle. They simply did not see the possibility of both existing at the same time; one or the other had to go. Since the importance of creative language in proficient speakers is indisputable, they had no choice but to discard formulaic speech: an unwarranted bias that is explicitly pointed out by Gleason (1982):

We have in recent years become so enthralled with the admitted power of generative systems, that memory, as an important process, and the possibly vast store of memorized units we each call upon everyday, have somehow fallen into disrepute . . . second language learners begin not so much with generative systems as with chunks, prefabricated routines, or unopened packages, as they have been called . . . The importance of routines in language acquisition, in second language learning, and in the everyday use of nonexceptional speakers has yet to be recognized. (p. 355)

If native speakers use formulaic speech quite extensively, there is no reason to posit that intermediate- or advanced-level L2 learners, whose syntactic and lexical knowledge has developed considerably, do not use it. In fact, it has been suggested that L2 learners use more formulaic utterances than L1 learners (Hatch 1972). There are a number of reasons for this. First, L2 learners are cognitively more mature than L1 learners and therefore are capable of memorizing longer sequences (Hatch 1972). In my observation, after five months of exposure to naturalistic as well as classroom English, Philip, 10-year-old Bulgarian boy, who made the most extensive use of formulaic utterances among all the children in my study, came up with such long sequences as Something strange going on here, you know? and Here is you chair, man, come and get it. Second, with the greater semantic development, they have a greater need to communicate their thoughts (Hakuta 1974). And third, L2 learners in a naturalistic setting are compelled to fare with native speakers and are under constant pressure to manipulate the language as fast as they can. If they do not speak fast enough, native speakers will soon interrupt. Thus, L2 learners have more

incentives as well as abilities to use formulaic speech than native speakers (Krashen and Scarcella 1978). What is important to note is that these incentives are just as strong for intermediate and advanced L2 learners as for beginners. As learners' L2 develops, their own expectations of what they should be able to do in L2 change together with the expectations of people around them. Very advanced learners, for instance, are expected to produce L2 sentences just as fluently and coherently as native speakers, despite the fact that it is still an L2 for them. They are thus just as much in need of energy-saving devices for sentence production as beginning learners, which enables them to allocate limited processing capacity to other tasks.

Empirical support

Logically, then, there is nothing strange about L2 learners using formulaic utterances whose internal structure they know. Is there any empirical evidence in SLA data to show that this is the case? Although there has been no empirical study which has dealt directly with this issue, there is a little information here and there that, when put together, points to that direction.

First of all, my own data suggest that a learner's stock of memorized formulae and syntactic and lexical development are not as independent from each other as have been considered. In fact, there seems to be a closer correlation between the syntactic, lexical sophistication of a child's formulaic utterances and his/her productive abilities. Sally, an eight-year-old Sri Lankan girl, was far behind everyone else in her syntactic development. In the last session of my observation (i.e. after seven months), she was still not able to insert verbs in her propositional speech in most occasions. Here are some examples of her creative construction:

- | | |
|--------------------------------|--|
| (5) Me good girl, Ron bad boy. | |
| (6) Me tree. | [meaning "I have three".] |
| (7) Me finished. | [meaning "I am finished". <u>Finished</u> is one of her formulae.] |
| (8) Grandfather is old. | [this was the only occasion that she managed to insert the copula in her creative speech in this session.] |

Her repertoire of formulae, on the other hand, was also very limited: What's this?, What's that?, Oh my god, You shut up, Finished, and Hurry up. These relatively simple expressions were accessible to her because their meaning was easy enough to guess from the context without much syntactic and lexical knowledge.

In contrast, Ron, eight-year old Rumanian boy, who was the most successful English learner in my study, had considerably more complex formulae at hand:

- (9) I'm gonna kill you next time.
- (10) Look what you did.
- (11) You are in big trouble.
- (12) You know song that everybody sings?

The last example is particularly interesting. This utterance was clearly a formula since he pronounced it without any pause and repeated exactly the same phrase several times that day. It sounded like a recitation. Every time he used it, it had nothing to do with the activity that he was engaged in. What is interesting about this utterance is its relation to another utterance he had made two weeks before, which was clearly a *rule-based* production:

- (13) Hunter is the one man who shoots fox.

It was the first time that I observed his use of a relative clause. He said this in reference to the picture book his ESL teacher was reading, in which a hunter appeared. What is significant here is that he acquired a formulaic expression containing a relative clause *after* he started to use relative clauses productively. In more general terms, some formulaic utterances are so complex that the learner must be able to parse them at least partially in order to understand their meaning. That is, in order to acquire and use fairly complex expressions as formulae, (partial) knowledge of their internal structure is a prerequisite. As the learner's syntactic and lexical development proceeds, s/he becomes capable of understanding more complex expressions and store some of them as units. There is always a gap between one's receptive and productive abilities; expressions that learners hear and understand but cannot produce themselves may be the prime candidate for formulaic utterances. This is consistent with my position that formulae may remain

as unitary items in the lexicon, regardless of the learner's accessibility to their syntactic structure.

Second, other researchers' data also suggest the existence of formulaic expressions as units after the syntactic analysis. One of the strategies that Clark's son, Adam, used was to include the whole of his previous utterances as a part of the next utterance:

(14) Baby Ivan have a bath, let's go see baby Ivan have a bath.

(15) Adam: Mummy you go.

Mother: Where?

Adam: Mummy you go swings. (Clark 1974, p. 2)

The pattern that Adam generated creatively in the first utterance was stored as a unit temporarily and used as a chunk in the second utterance. This way he did not have to construct that part of the second sentence from scratch and thus could attend to other parts. Since in this case, the formula in the second sentence was originally his own rule-governed production, its syntactic structure was obviously known to him. Note that formulaic utterances can be quite temporary constructs, as in this case, something to be forgotten as soon as they serve the intended purpose.

Another example that Clark gives lends further support to my argument. At one point, Adam was able to modify his idiosyncratic structure according to his mother's positive input:

(16) Adam: My shoe on a polish. [Trying to put polish on his shoes.]

Mother: The polish is on your shoes.

Adam: Polish on my shoes. (1974, p. 8)

However, when he wanted to insert another element into the sentence, he reverted to his old, more familiar structure:

(17) My shoes on a *brown* polish. (1974, p. 9)

A very similar phenomenon is observed in Hakuta (1974). His subject, Uguisu acquired these are as one of her prefabricated patterns in the second month. In the

fifth month, when her number agreement was getting established, she was observed to revert to her old formula in one occasion:

(18) These is for . . . these are for big person like my, I. (p. 292)

What these two examples suggest is that when, for one reason or another, processing cost exceeds the learner's capacity, s/he tends to resort to prefabricated expressions to take off some of the burden, as McLaughlin et al. (1983) notes: "The execution of new skills is costly in terms of workload involved and will occur only when other tasks and cognitive demands are minimized" (p. 145). In order to revert to formulaic utterances, however, the learner must keep them in the lexicon even after their internal structures have become clear.

If we accept the view that the internal structures of some formulaic expressions are known to the learner, we may be able to see far more of them at work in a L2 learner's production than we have so far been aware of. Take Uguisu's production of question forms in Hakuta (1974) for example. Among the list of numerous question forms that Uguisu used, Hakuta recognizes only one prefabricated pattern, i.e. do you. This is because these two words appeared together all the time from the very beginning; no other combination was used. Hakuta is probably correct in inferring that initially do you was not segmented and was learned as a question marker. However, a glance at his Table 3, part of which is reproduced in Table 1 below, clearly shows that there are also several other questions or parts of a question that are used repeatedly in the same form during a particular period of acquisition:

Table 1: examples of the question forms that Uguisu produced
(taken from Hakuta 1974, p. 294 Table 3)

Month 4	Where did you get that?
Month 5	What did she say? What did you say?
Month 6	What did you say? What did you do? What did you say?
Month 8	Do you saw these peppermint? Do you saw some star eye?

	Do you saw some star eye? Did everybody saw some blue hairs?
Month 10	Why did you do that? Why did you get this? Why did you go to a hospital? Why did you draw?
Month 11	Why did you put this?

Quite visibly there is what may be called the 'expression of the month' in Uguisu's development of question forms. It is equally apparent that she is capable of segmenting the elements of these expressions since she sometimes combines them with other words. For instance, what did you is used repeatedly in month 5 and 6, but already in month 4, she combined did you with where, which indicates that what and did you were syntactically separable for her by the time she used what did you. Similarly, why did you became a formula for her in month 10 and 11, although by then she was capable of segmenting all the three words in the expression. Another example, do you saw, is particularly interesting in this respect. Since this could not have happened in the input, it must have been her own creative speech turned into a chunk just like Adam's case (see examples 14 and 15 above).

Another phenomenon which may be better explained in term of formulaic utterances as an "energy saver" in speech production is overgeneralization in the learner's interlanguage. Again, Hakuta's data (1974) is pertinent. In the first stage, up to month 8, Uguisu inverted the subject and the verb in the embedded wh-questions most of the time:

- (19) I don't know where is it.
- (20) I don't know where is your house.
- (21) You know where is my house. (p. 296 take from Table 4)

This has traditionally been considered as a case of overgeneralization: sub-aux inversion in the main clause is incorrectly applied to the subordinate clause. In month 8, Uguisu goes onto the second stage of development, using the copula before and after the subject:

- (22) You will see where is your house is.

(23) I don't know where is the telephone number is.

(24) I don't know where is the woods is. (Ibid.)

Then in the last stage in month 9, the copula finally remains uninverted:

(25) I know where it is.

(26) I don't know where the bathroom is. (Ibid.)

Overgeneralization can account for the first stage: the learner assumes that what is applicable in the main clause is also true for the subordinate clause. However, it fails to explain the second stage of development such as (22) (23) and (24) since there is another rule operating that contradicts the previous hypothesis. If the learner assumed that the copula must be inverted, then why would she put it after the subject again? It seems to me that this development of embedded wh-questions can be explained more reasonably if we regard where is as a formula.

In the first stage, Uguisu invariably inverts the subject and the copula because where is is a fixed formula for her. It is reasonable to assume so since simple, unembedded wh-questions, in which sub-aux inversion is obligatory, are normally mastered before they are embedded in another clause. While learning to produce simple question forms, where is must have become a formula for her. Then there is nothing to prevent her from using this formula in the subordinate clause as long as she does not know the grammatical rule that prohibits it. Although it is grammatically incorrect, the meaning of the sentence is perfectly understandable.

Up to this point, there is very little to distinguish this "formula appropriation" from overgeneralization. However, the former explanation can hold in the second stage of development while the latter cannot. According to the "least effort principle" (Pawley and Syder 1983), Uguisu retrieves where is as a formula in order to save the processing workload; indeed, at this stage where is must be tied so strongly together in her memory that it is difficult for her to separate the two words without spending some energy for it. On the other hand, she is also aware of a new grammatical rule, although not as explicitly as to make her refrain from using the formula. So according to this rule, she inserts the copula after the subject. At this stage, both competing strategies--formula appropriation and rule observation--are at work but

neither is strong enough to negate the other. After a while, however, the rule becomes sufficiently strong to keep Uguisu from using the formula in this situation, thus yielding the correct form as in (25) and (26).

Brown and Hanson's (1970) case, which I quoted above, might be very similar. When prefabricated expressions What's that? and What are you doing? persisted in embedded clauses while other wh-questions are uninverted, they explained that these expressions become rigid enough in the learner's lexicon so that they become immune to structural reanalysis for a while. This is quite possible. However, another equally plausible explanation is that, even after they have been subject to reanalysis, they might remain in their prefabricated forms as a convenient energy saver until the learner becomes sufficiently aware of the grammatical rules that prevent the use of such expressions. In other words, Brown and Hanson's learners might have been capable of analyzing these expressions; they nonetheless used them as a short-cut to reduce processing energy until they became aware that they could not do so in this context.

In sum, formulaic utterances that are no longer useful or detrimental to rule development are either discarded entirely (although I think this is unlikely) or get certain constraints attached to them as to in which linguistic contexts they can be used. Thus where is for Uguisu became segmented in the embedded clauses but it might remain as a useful formula in the main clause questions. On the other hand, there are other numerous formulaic expressions which are highly useful and which do not disturb rule formation. These are the formulae that even native speakers use. Pawley and Syder (1983) maintain that adult native speakers use tens of thousands of them. Then formulaic speech is not a strategy that is used only at the beginning of the language development but continues to be used throughout the process and even at the final stage and ever after. How are you?, I am sorry, I should have known etc., etc. are just a few examples of such stable formulae.

Summary and theoretical implications

Thus far I have argued that the most important defining character of formulaic utterances is *not* that their internally structure is unknown to the learner but that they are stored as unitary items in the lexicon. A summary of what I have said so far

may be helpful for the reader to clarify the most important points:

- (1) Even after the internal structures of formulaic expressions become clear to the learner, these expressions can remain as 'chunks' in the lexicon as long as they serve to save processing cost in speech production.
- (2) Learners thus might resort to formulaic utterances even when they are vaguely aware that it is grammatically wrong to do so. This is likely to happen when they have to introduce new items which require much processing energy and the overall workload becomes more than they can handle.
- (3) When learners have acquired grammatical rules that prohibit the use of a formula in certain contexts, they will avoid it in these contexts. However, as long as it is still useful in other contexts, it may remain as a formula. In other words, formulaic expressions that are not "disapproved" by other rules remain.
- (4) Formulaic utterances play a crucial role not only in the beginning stage of language development but also in the later stages and even in the native speaker's speech production.
- (5) Formulae range from fairly permanent to short-lived ones.

What theoretical implications do formulaic utterances defined as above have in language development? I will mention two that I am currently aware of. First of all, interlanguage development has so far been characterized in terms of grammatical rule formation and vocabulary increase. However, if one takes into account the role of formulaic utterances in language development and also the fact that native speakers possess a large set of such formulae, IL development can also be defined in terms of the acquisition and selection of formulaic utterances. Learners start out with idiosyncratic formulae, discarding those that are mutually exclusive with newly acquired rules and storing syntactic and lexically more complex expressions as their knowledge in syntax and vocabulary increases, until their set of formulaic utterances converges on that of native speakers. Admittedly, it is difficult to define exactly what a native speaker's formulaic speech inventory consists of. A person's

formulaic utterances range from what Peters (1983) calls "cultural formulas", i.e. expressions that are shared as units in a particular speech community, to "idiosyncratic formulas", i.e. patterns that only s/he uses as fixed forms. Thus no two speakers have exactly the same set of formulaic expressions. However, in so far as there is such thing as "cultural formulas", learners must acquire them in order to be judged competent speakers.

This last point leads me to another theoretically important implication. One of the major problems of language acquisition has been the lack of negative evidence (White 1985, 1987, Pinker 1984): how can a learner tell what s/he is saying is wrong if there is nothing in the input to suggest that? However, if we consider the degree to which we rely on formulaic expressions, the learner might get the negative evidence from the lack of the item in the input. If the concept that learners express in their idiosyncratic fashion is represented in another form in the input, then they might infer that their own form is *conventionally* wrong and switch to the form that exists in the input. Expressions that we have never heard before do tend to sound strange. Language use may not be as productive as Chomsky has thought, although creative aspects of language development and language use are indisputably significant. There is a great deal of habit formation in our use of language.

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Are Subject Small Clauses really Small Clauses?¹

Miori Kubo

M.I.T.

1. Introduction

The ongoing debate over small clauses concerns the structure of the verb phrase in (1):

(1) I consider Bill smart.

Stowell (1981) and Chomsky (1981) argue that Bill smart is a constituent and propose the so-called small clause analysis. On the other hand, Williams (1983) and Schein (1982) consider it is not and that the object of consider can also be interpreted as a subject of a predication.

One of the stronger empirical arguments for the small clause analysis comes from Safir (1983). On the basis of the behavior of a small clause in subject position, Safir argues that a small clause is a real syntactic constituent. In this paper, however, I will demonstrate that the subject constituent in question is not a small clause, but an NP, following N. Chomsky's suggestion of this possibility mentioned in the footnote 3 in Safir (1983). It will be

¹ I would like to thank Joseph Emonds, Toshifusa Oka, David Pesetsky, and John Whitman for their valuable comments and suggestions.

shown that some peculiar phenomena under the small clause analysis are natural consequences of the noun phrase analysis.

2. Safir's Argument for Small Clauses as Constituents

Safir's argument consists of two steps: First, he argues that the underlined part in (2) is a single constituent and next that the constituent is not an NP.

- (2) Workers angry about the pay is just the sort of situation that the ad campaign was designed to avoid.
(Safir 1983, 732)

Let's start with the first part: Is the underlined part a constituent? First, "it is widely accepted that only a true constituent may occur in the subject position of S" (Stowell 1986, 299). Second, the underlined part can undergo subject-auxiliary inversion:

- (3) a. Is workers angry over their pay revolutionary?
b. ?Isn't workers angry over the pay just the sort of situation that the ad campaign was designed to avoid?
(Safir 1983, 732)

Third, the part in question undergoes raising.

- (4) Workers angry about the pay does indeed seem to be just the sort of situation that the ad campaign was designed to avoid.
(Safir 1983, 732)

Since only a constituent undergoes movement, it is conclusively shown that the underlined part is a constituent.

Then the next question is which category the constituent belongs to. There are at least two possibilities: one may be called the small clause analysis; namely, the constituent is S or AP, whether you take Chomsky's or Stowell's position. This option is indirectly taken by Safir. Safir gives two considerations which go against analyzing the constituent as an NP. One is concerned with the agreement facts between a subject and a verb. Observe that the verb in (2) is singular; thus he concludes that workers cannot be the head of its subject constituent. The other is drawn from a peculiarity of the interpretation of the sentence. The sentence must be interpreted as a situation (clausal interpretation), rather than as a real NP with attributive adjectives (attributive interpretation). Safir therefore concludes that the constituent is not an NP, and that it must be a small clause.

To be more specific, consider a sentence with a singular subject in a situational construction as follows:²

² The clausal interpretation is allowed only in certain restricted constructions. Some examples are:

- ... is a situation.
- ... is in a mess.
- ... makes me sad/happy.
- ... upsets people.
- ... depresses people.

(5) A man angry over his pay makes me sad.

This sentence is ambiguous between a clausal (the situation in which a man is angry over his pay makes me sad) and an attributive (A man who is angry over his pay makes me sad) interpretation. What Safir is claiming is thus that the same apparent constituent belongs to different categories, depending on its interpretation: namely, the subject is an AP or S in the clausal interpretation and is an NP in the attributive interpretation.

The alternative to the small clause analysis may be called a noun phrase analysis; namely, it analyses the constituent as an NP, whether it takes clausal or attributive interpretation. This option is argued for in this paper.

3. Arguments for the Noun Phrase Analysis

I will give three arguments below. All show that "small clauses" in subject positions syntactically behave the same as ordinary NPs, rather than like small clauses in post-verbal positions (from now on, post-verbal small clauses).³

Although I don't try to specify the environment which permits the clausal interpretation, I will call this the situational construction and call the predicates used the situational predicates.

³ I don't commit myself to whether there are small clauses in general. To argue for the noun phrase analysis here, it suffices to show that subject small clauses are entirely different from post-verbal small clauses, and rather are exactly the same as NPs, even granted the small clause

To call the constituent in question a "small clause" in subject position confuses the discussion: thus, I will call it a predication constituent.

3.1. On a Restriction on Postnominal Modification

It is well-known that most bare adjectives, specifically those termed characterizing adjectives by Milsark (1974), cannot modify a noun in post head position.⁴ On the other hand, small clauses in post-verbal position of course don't exhibit such a restriction. (6d) and (6e) are both grammatical:

- (6) a. *I burned some books yellow.
 b. I burned some books yellow with age.
 c. I burned some yellow books.
 d. I consider these cloth dirty.
 e. I consider these books dirtier than necessary.

Let us observe whether the predication constituents exhibit this restriction.

analysis for post-verbal position.

⁴ His state-descriptive adjectives (e.g., drunk/thirsty/sober/hungry/available/absent/dead, etc.), on the other hand, can occur in postnominal positions in their bare forms. With the exception of one configuration which I return to in section 4.2, both NPs and predication constituents behave the same ways with regard to this two types of adjectives, so the argument in the text remains valid.

- (7) a.*Lots of books dirty is a common problem in libraries.
 b. Lots of books dirty from mistreatment is a common problem in libraries.
- (8) a.*Workers angry is just the sort of situation that the ad campaign was designed to avoid.
 b. Workers angry over their pay is just the sort of situation that the ad campaign was designed to avoid.
- (9) a.*Children fat upsets me.
 b. Children far from overeating upsets me.

The (a) sentences in (7-9) are all unacceptable, while the (b)s are all well-formed, which is exactly the same pattern as in (6).⁵ It is thus shown that predication constituents behave exactly the same as NPs rather than as post-verbal small clauses. If Safir's analysis is correct and a predication constituent is a small clause, then it is not obvious at all why small clauses in subject position obey a constraint which governs NPs, while post-verbal small clauses do not.

3.2. Distributional Differences with regard to Cleft and Pseudo-cleft Sentences

Post-verbal small clauses cannot occur in focus

⁵ The grammaticality increases in sentences like (7a), (8a) and (9a), when certain specifiers (e.g., almost) are used with the bare adjectives in the post-head positions. However, since the same degree of improvement is obtained in sentences like (6a), this does not affect the argument in the test, but rather reinforces it.

positions either in cleft and pseudo-cleft sentences, as shown in (10) and (11):

- (10) a.*It is Bill silly that John believes.
 b.*It is my brother intelligent who/what/that John considers.
 c.*It is Bill off the ship that John expects.
 d.*It is Bill the best student that John thinks.
- (11) a.*What Chinese students consider is the current leadership rotten.
 b.*What John thinks is long trips stupid.
 c.*What they want is those new Toyotas off the ship.
 d.*What they declared was Plate's Republic the best seller of the year.

On the other hand, both NPs and predication constituents do occur in focus positions both in cleft and in pseudo-cleft sentences, as demonstrated in (12-15):

- (12) **Focused NPs in cleft sentences:**
- a. It is Bill that John believes silly.
 b. It is my brother who John considers intelligent.
 c. It is Bill that John expects off the ship by midnight.
 d. It is Bill that John named the best student.
 e. It is Bill that the student selected president.

(13) Focused predication constituents in cleft sentences:

- a. It is workers angry over their pay that looks revolutionary.
- cf. Workers angry over the pay looks revolutionary.
- b. It is streets filthy with litter that makes me sick.
- cf. Streets filthy with litter makes me sick.

(14) Focused NPs in pseudo-cleft sentences:

- a. What Chinese students consider rotten is the current leadership.
- b. What John thinks stupid is long trips.
- c. What John want off the ship is those new Toyotas.
- d. What they declared the best seller of the year was Plato's Republic.

(15) Focused predication constituents in pseudo-cleft sentences:

- a. What lessens my appetite is apples shiny with wax.
- cf. Apples shiny with wax lessens my appetite.
- b. What discourages the ordinary consumer is huge parking lots filled with cars.
- cf. Huge parking lots filled with cars discourages the ordinary consumer.

Again predication constituents behave the same as NPs rather than like post-verbal small clauses.

In addition, since pseudo-clefts can focus any XPs, the grammatical difference between the post-verbal small clauses and predication constituents suggests that the former are not constituents, even though the latter are. At the least, they are quite different constructions. Moreover, since clefts accept only NPs or PPs in their focus positions, the

grammaticality in (13) shows that the predication constituents are NPs. If we analyze predication constituents as small clauses, as Safir argues, then we need some ad hoc device to explain why the post-verbal small clauses cannot be focused in clefts or pseudo-clefts, while the subject small clauses can. Beyond this, although the cleft sentences have been considered to be one of the most rigid tests for NP-hood, the description of the test would need to be changed to something like "any NPs, any PPs and small clauses that are in subject position, but not post-verbal small clauses, can appear in the focus position in the cleft sentences."

It might be possible to say that the subject in a post-verbal small clause cannot get a case when it appears in a focus position and for this reason the sentences in (10) and (11) are ungrammatical. However, it is not apparent first of all that an NP in focus position exemplified in (12) and (14) gets a case from the matrix verb, because be does not assign case anyway. Further, whether a subject of a post-verbal small clause gets a case or not in a focus position, it still cannot be explained why there is a difference in focusing ability between a predication constituent and a post-verbal small clause in the small clause analysis. Put another way, whatever the role of a matrix verb be in assigning case to an NP in focus position, there is no clear explanation on the grammaticality difference between a post-verbal small clause and a predication constituent in the small clause analysis.

On the other hand, in the noun phrase analysis argued

for in this paper, the fact that a predication constituent appears in a cleft sentence focus position like an ordinary NP does is a natural consequence.

3.3. On a Restriction on the Subject in a Predication Constituent

The final argument for the noun phrase analysis is drawn from the fact that a predication constituent obeys some restrictions which govern a noun phrase. The expletive it cannot occur in a predication constituent, while it freely occurs in a post-verbal small clause:

- (16) a. I consider it sillier than anything.
 b.*It sillier than anything makes me upset.
 c. Mary finds it appropriate that you take a summer vacation.
 d.*It appropriate that you take a summer vacation doesn't make me less jealous.

This phenomena is explained if predication constituents are NPs, because the expletive it cannot be a head of a noun phrase.⁶ On the other hand, in the small clause analysis, it cannot be accounted for neatly why such a restriction applies to small clauses in subject positions, but not to post-verbal small clauses.

To summarize, throughout the three arguments,

⁶ This fact has been pointed out to me by David Pesetsky.

predication constituents behave exactly the same as NPs, rather than as post-verbal small clauses. The explanation for the difference between predication constituents and post-verbal small clauses must depend on some totally ad hoc restrictions in the small clause analysis, while they are natural consequences in the noun phrase analysis. I believe it has conclusively been shown that a predication constituent should be analyzed as a noun phrase, rather than a small clause.

3.4. Other (Possible) Subject Small Clauses

There are other constructions which could possibly be argued to be subject small clauses, other than the type we have so far concentrated on.

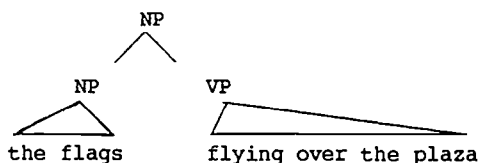
- (17) a. Playing the piano is one of the most popular hobbies in Japan.
 b. The children's playing the violin encourages me to study music.
 c. The flags flying over the plaza is a good scene for a postcard.
 d. Children in dangerous parks is a scene used to convince women to quit their jobs.

As for (17a) and (17b), they are gerunds, and it is well-known that they have the same distribution as NPs (Chomsky 1970 and Emonds 1976, among others). The subject in the gerund is not a head of the whole NP, but it is still controversial as far as its exact internal structure goes

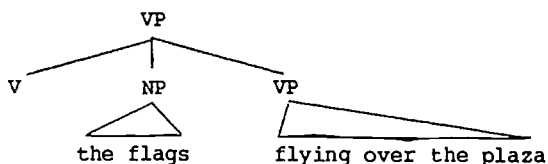
(Suzuki 1988, Emonds 1990). No matter what its internal structure is, however, the outermost brackets for the subjects in (17a) and (17b) are uncontroversially NPs, not small clauses.

Constructions as in (17c) are called accusative gerunds and they are well-examined in relation to perception verbs in Akmajian (1977). He argues that the constituent in the subject position in (17c) is an NP with the structure as in (18a), although the VP (i.e., flying over the plaza) adjoined to NP (i.e., the flags) can sometimes be extraposed in the post-verbal position as in (18b).

(18) a.



b.



Gee (1977) has argued against Akmajian's analysis by pointing out the "mis-agreement" between the plural subject and the singular verb, as exactly the same way as Safir has against the noun phrase analysis. I will explain in the next section this phenomenon on the basis of a closer examination of the

percolation mechanism.

Turning now to the sentence (17d), the subject is again an NP, rather than a small clause (i.e., either PP or S):

(19) Children in dangerous parks and adolescent crime is a scene used to convince women to quit their jobs.

As is well known, the conjunctions can only conjoin the categories of the same type. Since adolescent crime is doubtlessly an NP, the grammaticality of the sentence (19) argues that the constituent in question children in dangerous parks is an NP.

For (17c) and (17d), together with the adjectival type (e.g., workers angry over their pay), I will propose two different structures, one for the clausal interpretation, and the other for the attributive interpretation, and thereby explain the "mis-agreement" phenomenon and the peculiarity of interpretation, which are both used by Safir to argue against the noun phrase analysis.

4. Agreement and Interpretation

4.1. The Structure of the Predication Constituents

Let's now consider the two observations which are used by Safir as arguments against the noun phrase analysis: as summarized in section 2, one is the agreement facts and the other is the peculiarity of the small clause interpretation.

Observe the following examples:

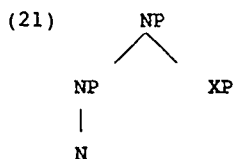
- (20) a. Paris and its perfumes fascinate American women.
 b. Paris and its perfumes fascinates American women.
- c. Sake and tofu make me sick.
 d. Sake and tofu makes me sick.

First of all, although Safir argues that workers in (2), a plural noun, cannot be a head of a constituent in subject position because of the following singular verb, this does not guarantee that the predication constituents as a whole is not an NP. For, (20b) and (20d) literally show that plural NPs can take singular verbs.⁷ Now, a question here is how we explain in the noun phrase analysis the fact that workers is not behaving as a head for the subject as a whole in (2). Taking into account the intuition that the small clause analysis tries to capture, namely, the fact that the NP and a postnominal modifier are in a predication relation, together with the fact that the whole subject is an NP, as we have demonstrated in the previous section, I propose the following structure for a predication constituent.

⁷ There should be no doubt that Paris and its perfumes and sake and tofu are noun phrases. They cannot occur where small clauses occur:

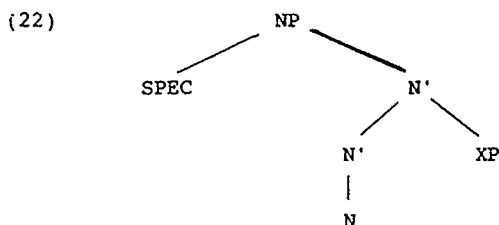
- (i) a. *I believed Paris and its perfumes.
 b. *I believed sake and tofu.

The sentences in (i) are ungrammatical with the small clause interpretations of (20).



XP = AP, PP, (and possibly NP for "accusative gerunds")⁸

Here, the XP is adjoined to NP and the structure is clearly different from the well-argued structure for NPs (Hornstein and Lightfoot 1981) with attributive modifiers as in (22).



XP = AP, PP, (and possibly VP for "accusative gerunds")

As we have demonstrated in the previous section, XP adjoined to N' and NP share the same restrictions.

If we analyze a third person singular verb as a certain kind of default form which is taken when no [+plural] feature is available, the mis-agreement phenomenon discussed above can be explained by the difference in the two types of NPs in

⁸ Jackendoff (1977) argues that "measure phrase" NPs are always between X' and NP. So it may be that any adjunct NPs should be measure phrases, and not predicates.

(21) and (22). The only thing we must say is that the number feature on N percolates as expected to the whole NP in the structure (22), but that it cannot reach the topmost NP in (21): The smallest XP is the domain for percolation from the head X. Since the topmost NP in (21) is not specified for number, the corresponding verb simply manifests itself in the unmarked singular form.

There are actually three more reasons for favoring the idea that the structure of the predication constituents is (21), rather than (22) of an attributive NP. First, consider the following data.

(23) **Bound variable anaphora**

- a. Every worker (who is) angry about pay is in just the sort of situation **he** should avoid.
- b.*Every worker angry about pay is just the sort of situation **he** should avoid.
- c.*Every worker being angry about pay is just the sort of situation **he** should avoid.
- d.*The situation of every worker angry about pay is just the sort of situation **he** should avoid.

(a) involves an NP with attributive interpretation, (b) a predication constituent, (c) an accusative gerund and (d) an NP which contains another NP. If the structure for (a) is the one of (22) and the structure for (b) and possibly (c) are like (21) as we have proposed, then the ungrammaticality of (b)-(d) can be explained straightforwardly; namely, the antecedent NP every worker does not c-command the bound

variable.

Secondly, there is a grammaticality difference between an NP with an attributive modifier on the one hand and a predication constituent or an complex NP (Ross 1967) on the other, with regard to the disjoint reference.

(24) **Disjoint Reference**

- a. *Workers (who are) angry over their pay are more useful to them than to their bosses.
- cf. Workers (who are) angry over their pay are more useful to themselves than to their bosses.
- b. Workers angry over their pay is more useful to them than to their bosses.
- c. Workers being angry over their pay are more useful to them than to their bosses.
- d. The situation of workers angry over their pay is more useful to them than to their bosses.

In (a), given the structure in (22), since them is c-commanded by workers in its governing category (Chomsky 1981, Chapter 3), the sentence is out. The fact that the predication constituents behaves the same way as an accusative gerund and a complex NP, in which it is well-known that the workers is not a head and is further embedded in another NP, supports the NP-adjunction structure for the predication constituents. In (b)-(d), them is far enough from workers for disjoint reference not to apply.

Thirdly, negative polarity shows a clear difference of accessibility of the head N to exterior material between an

NP with an attributive interpretation and a predication constituent.

(25) **Negative Polarity**

- a. No workers (who are) angry about working conditions are ever going to bring about a better situation.
- b.*No workers angry about working conditions is ever going to bring about a better situation.
- c.*No workers being angry about working conditions is ever going to bring about a better situation.
- d.*The situation of no workers angry about working conditions is ever going to bring about a better situation.

Again, a predication constituent patterns with a complex NP rather than with an NP with an attributive modifier. If items with negative polarity (i.e., ever here) must be c-commanded by a negative item (i.e., no (workers) here), then the above paradigm follows straightforwardly from the structures in (21) and (22). In (25a), which has a structure like (22), the negative item c-commands the item with negative polarity, while in (25b-d), the negative item is too far embedded to c-command the negative polarity item.

To sum up, Safir's observation that the N does not behave like a head for a predication constituent on the basis of agreement facts, together with other paradigms which reinforce his observation, are equally well explained by the NP-adjunction structure proposed for a predication constituent in the noun phrase analysis and this structural

difference from the structure of attributive NPs. The above three paradigms could not be better explained by a difference in category labels; all these paradigms involve c-command and hierarchy, and for them the label of a small clause subject is irrelevant.

4.2. Attributive and Clausal Interpretations

The second peculiarity of predication constituents pointed out by Safir (1983) is that they are interpreted as a situation, rather than as a referential NP.

Notice that the (a) and (c) sentences in (20) are ambiguous, while the (b) and (d) are not. For example, the (c) sentence has two readings: one is that sake makes me sick and that tofu makes me sick. The other is that sake and tofu together makes me sick. Put another way, the first interpretation is paraphrased by (26a) and the second is paraphrased by (26b).

- (26) a. Both sake and tofu make me sick.
 b. Sake and tofu together make me sick.

On the other hand, (20d) has only the (26b) interpretation. Notice this interpretation exactly corresponds to Safir's clausal interpretation for small clauses. Since a genuine noun phrase (coordinated NP's) can also take a clausal interpretation, this phenomenon itself does not conflict with the noun phrase analysis proposed here.

The structure proposed for predication constituents actually is proper for this clausal interpretation; namely, [NP XP] is a predication relation, where NP is a subject and XP is a predicate which modifies the subject.

Interestingly, there is a gap in the availability of the attributive interpretation, which may be explained nicely by the analysis proposed here: when proper names and personal pronouns are used with a post-nominal adjective, only a clausal interpretation, but not an attributive interpretation is available.

- (27) a.*Bill sad over his mother's death cries every night.
 b. Bill sad over his mother's death depresses me.
- (28) a.*Jim enthusiastic about baseball is spending all day exercising.
 b. Jim enthusiastic about baseball irritates me.
- (29) a.*Her furious about the neighbor's dog sued the family.
 b. Her furious about the neighbor's dog is an entertaining situation for her friends.

Chomsky (1970) argues that a fully specified definite N such as a proper noun or a personal pronoun cannot be doubly specified as definite by being modified by an attributive modifier within a single NP. If we take this view, then the above paradigm follows from the structural differences between the two interpretations. In the structure for an attributive interpretation as in (22), the fully specified

definite head N is directly modified by a restrictive modifier inside of a single NP, and thus, the sentence is ungrammatical. On the other hand, in the adjunction structure for clausal interpretation as in (21), two definite features don't conflict within a single NP; each can be associated with its own NP.

Summing up, the clausal interpretation, which is considered characteristic of a small clause can be well captured by the adjunction structure proposed in the noun phrase analysis. Beyond this, the analysis proposed here makes an interesting prediction on the distribution of the two types of interpretations, which the small clause analysis does not have anything to say.

5. Conclusion

We have examined in this paper on the nature of so-called subject small clauses. Starting from the adjectival type, (e.g., the constituent underlined in (2)), which is argued to be a small clause by Safir (1983), we have seen that all the possible subject small clauses share syntactic and distributional characteristics with noun phrases, rather than other kinds of small clauses.

On the basis of the interesting paradigms of bound variable anaphora, disjoint reference, and negative polarity, the adjunction structure as in (21) is proposed for the subject small clauses. We have seen that the "mis-agreement" phenomenon and peculiarity of interpretation, which are used

by Safir to argue against the noun phrase analysis, don't really conflict with the fact that the outermost bracket for the predication constituents is an NP. Rather, all the above paradigm show that the hierarchical structure is different between an NP with attributive interpretation and one with clausal interpretation. Beyond this, the noun phrase analysis makes an interesting predication on the availability of the two types of interpretations, attributive and clausal, whereas the small clause analysis have nothing interesting to say. One of the strongest arguments for the small clause analysis, therefore, turns out to be invalid.

Although we still have to wait for future research on the true nature of small clauses, we have clarified, in this paper, one of the basic facts which the small clause debate crucially depends on.

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THE PERFORMANCE OF THE JAPANESE CASE PARTICLES IN
CHILDREN'S SPEECH: With Special Reference to
ga and o.

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1. INTRODUCTION

The study of first language acquisition in Japan has been examined through collecting a certain specific child's utterances extended over a long time and designing experiments. We find, however, that there are very few studies combined with linguistic theory.

The main purpose of this paper is to demonstrate that children's use of the Japanese case particles obeys the grammatical principles introduced at the earlier stage of language development. In previous studies concerning the acquisition of Japanese case particles examined through the experimental method, it has been suggested that children acquire the functional use of case particles at around 5 years of age. (Hayashibe, 1975; Sano, 1977; Iwatate, 1980; Hakuta, 1982; Goto, 1988; and others) This study examines the performance of Japanese case particles in children's natural speech in 2 to 5-year-olds within the framework of the theory of generative grammar. I will analyze the data focusing on the phenomena of 'Case marker drop'.

In conclusion, this paper demonstrates that 2-year-olds use Japanese case particles in much the same way that adults do and it will be further suggested that their use of case particles obeys the hierarchical structure of the Japanese language as well as that of the semantic structure.

1.1 Assumption on the modularity of language acquisition process

The process of the language acquisition has been discussed among the linguists for many years. It involves several aspects of the human mind: the physical development, cognitive mental development and the development of pragmatic social skills. The child must learn and comprehend the meaning of individual lexical items and sentences. He or she, then, must understand the linguistic form and put the form into proper use in real situations. He or she, then, finally acquires the language which is based on correct grammar.

Within the framework of the theory of generative grammar developed by Chomsky and others, acquisition of a language is achieved by Language Acquisition Devise (LAD) which the human possesses innately. LAD

consists of an initial stage of grammar called Universal Grammar, which has a small number of principles and some principles of learnability for individual languages.² Intake data³ which the child gets during the acquisition process makes UG active and this UG is realized as a core grammar of a particular language. In this paper I shall assume the module of language acquisition is that of Input Data + UG + Cognitive capacity.

1.2 The relation of semantic and syntactic structure

In preceding studies pertaining to early word comprehension and production, it is suggested that the onset of comprehension is in advance of production and there is a tendency that children comprehend action words better than objects words in the early stage of utterance. (Benedict, 1979) Cognitive semantic categories and syntactic categories relate reciprocally during the acquisition process. Grimshaw defines this process as Canonical Structural Realization (CSR). CSR(object) is projected on the nominal, and CSR(action) is projected on the verb in syntactic categories.

Verbs assign O-role directly or indirectly to the lexical items and each O-marked lexical item is projected on the syntactic structure by O-criterion.

The O-roles assigned to NPs are Agent, Theme, Goal, Source, Location, Patient, Experiencer, and Proposition as shown in (1).

- (1) a. Taro-ga hon-o tukue-no-ue-ni oi-ta.
Agent Theme Location
(Taro put a book on the desk.)
- b. Jiro-ga hana-o Junko-ni oku-t-ta.
Source Theme Goal
(Jiro presented flowers to Junko.)
- c. Taro-ga Jiro-o tata-i-ta.
Agent Patient
(Taro hit Jiro.)
- d. Sono news-wa kare-o odoroka-se-ta.
Experiencer
(The news suprised him.)
- e. Kare-wa Hanako-ni isha-ni-iku-youni
proposition
settoku-shi-ta.
(He persuaded Hanako to go to see the doctor.)

A child who acquired a verb, 'oku' (put) knows that the verb selects three arguments - [Agent, Theme, Location]. In other words, he/she who has

that the verb selects three arguments - [Agent, Theme, Location]. In other words, he/she who has acquired the verb, 'oku', knows that 'an Agent puts something on somewhere'.

Thus I put two hypotheses together in order to examine children's performance of case particles: 1) the function of the grammatical structure starts working at the early stages while the onset of the language acquisition is triggered by the cognitive capacity. 2) children use both semantic features and syntactic ones for their performance of their mother tongue from the early stage of language development.

2. Case marker drop in adult speech.

Japanese case particles play the role of representing the grammatical relation of the noun phrase in a sentence but it is sometimes deleted in colloquial expressions. We will look at what makes this deletion possible through a theoretical hypothesis. Theoretical assumptions are made through examining three aspects - subject/object asymmetry, a stative sentence and unaccusative construction.

First, Saito(1985) suggested that the nominative Case marker can not be dropped whereas the dative case can be dropped as shown in below (2).

- (2) a. Dare-(ga) ki-ta-no
 who-NOM come-PAST-Q
 'Who came?'
- b. (Kimi-wa) nani(-o) yonde-ru-no
 you-TOP what-ACC reading-PRES-Q
 'What are you reading?'

[Saito(1985) p.230]

Saito argued that this subject/object asymmetry with respect to the "Case marker drop" is derived from the difference of the Case assigned to each position. He assumes that object NPs in Japanese are assigned abstract Case but subject NPs are assigned nominative Case by INFL which is not abstract. Thus, the object Case marker assigned abstract Case to the NP can be dropped while the subject Case marker can not be dropped.

In contrast with Saito's analysis, Takezawa(1987) pointed out that there exists contexts where Case marker ga can be dropped. He argued that Case marker ga can be dropped in contexts of stative predicate, which we unconsciously accept as illustrated below in (3).

- (3) a. Kimi-ni nani-(ga) wakar-u-no
 you-DAT what-NOM understand-PRES-Q
 'What do you understand?'

- b. Kimi-ni dono mondai(-ga) deki-ru-ndai
 you-DAT which problem-NOM can-do-PRES-Q
 'Which problem can you do?'

[Takezawa(1987) p.124,125]

He analyzed that the NPs assigned ga in stative contexts have the object status and proposed the generalization of 'Case marker drop' on the premise that surface Case is an abstract Case as shown below.

- (4) When an NP is adjacent to and c-commanded by V, then the Case marker attached to it (whether o or ga) can be dropped.
 Case Marker Deletion (optional): Delete o/ga if the NP containing them is adjacent to and c-commanded by V in PF.

[Takezawa(1987) p.126]

Another phenomenon of dropping ga is pointed out by Nishigauchi(1992). He proposed the construction of the unaccusative sentence where the subject has Theme O-role and the verb has two functions - transitive and intransitive such as 'aku' vs. 'akeru' (open). He analyzed that the subject NP in unaccusative sentence was generated onto the object position and that the case marker ga could be dropped.

- (5) a. Ah, doa-(ga) a-i-ta!
 Oh, door-(NOM) open-PROG-PRES
 (Oh, the door opened!)

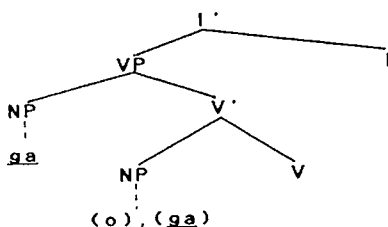
- b. Asoko, nani-(ga) ochi-te-ru-ka mi-te- kite.
 (Go and see what is on the ground over there.)

[Nishigauchi(1992)pp.45]

As a result of his analysis of case marker ni and preceding studies of the 'case marker drop' (Saito(1985), Shibatani(1986)), Nishigauchi suggested the following conditions of case marker drop.

- (6) The condition of Case marker drop:
 (i) governed by lexical category that assigns Case
 (ii) adjacent to it and
 (iii) receive strong s-selection of the lexical category

Here I assume that the conditions of the 'case marker drop' suggested by Nishigauchi(1992), that can be represented as follows.



3. Performance of case particles in children's speech

3.1 The data for analysis

In this section I analyze the use of case particles in children's natural speech focusing on 'Case marker drop'. I use three source shown in (7). The data in (a) and (b) are from individual children and data (c) contains 2500 utterances of 2 to 9 year-olds from various areas in Japan.

(7)

- (a) Data of a three-year-old girl for the duration of 6 months
- (b) Youji no Kotoba Shiryou (1), (5), National Japanese Research Institute
- (c) Kodomo no Kotoba, Group Eruson

3.2 The data analysis

In section 2, I represented the phenomena of 'case marker drop' in adult speech and the conditions requisite for it, which obey the structural position of the Japanese language. That is, the case particle ga which assigned to NP in subject position can not be dropped whereas the case particle ga and o assigned to the object position can be dropped. How do native Japanese children, thus, make the distinction between the particles ga and o when acquiring language? In preceding studies, it was pointed out that a child comes to utter case particles at approximately 20 months to 26 months and he/she understands a sentence using the knowledge of case particles after four and a half years. If this is true, the following question will naturally arise. How do children especially under the age of 5 years use these case particles readily and correctly without having any formal grammatical background? To examine this interesting point I will analyze toddlers' spontaneous speech. The data containing subject and object were classified by age and

analyzed according to the categories which were distinguished from the positions on the structure as shown below (8).

(8)

A. Classification of case particle 'ga'

- a. 'ga' assigned to NP of subject position
- b. stative predicates
 - 1. adjective, stative predicate
 - eg. "aru"(exist), "ooi"(many), "sukunai"(few), "iru"(need)
 - 2. NP of the object position with stative predicate
 - eg. subject marked ga with follow predicates "wakaru"(understand), "dekiru"(can), "kikoeru"(hear), "hoshii"(want), "sukida"(like)
- c. subject marked ga in an unaccusative construction
- d. dropping ga

B. Classification of case particle o

- a. object with o
- b. object dropped o

Firstly, I analyzed the data of four to five years old children, who are said to have already acquired the knowledge of case particles. Among 180 cases containing a subject, 162 cases were with the overt case particle ga. That is, I found 18 cases dropped case particle ga. However I analyzed that these NPs which dropped ga were all classified to A-b and A-c in the above classification (8) except in one case. This means that those NPs dropped the case particles belonged to object position in the structure. As for the cases containing an object, among 144 cases with an object, the cases with overt o were 42.

From the results of the analysis of 4 to 5-year-olds, it was observed that they didn't drop case particles which were assigned to the subject position, while they tended to drop case particles assigned to the object position. This feature also tends to be true in adult's speech.

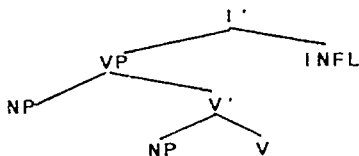
Then, how about younger children? Is this same phenomena reflected in the speech patterns of even younger children? The preceding studies suggested that they have not acquired the grammatical function of case particles yet. If this assumption is correct,

then, their speech performance should be correspondingly different from those of adults'. I analyzed the data for 2 to 3-year-olds according to the above classification (8) and observed a specific phenomena in their use of case particles. (Refer to Appendix 1.)

Among 326 cases containing the subject, 47 cases were uttered without the overt case particle ga and furthermore, almost all the NPs without the overt case particle ga were seen to be in the object position - the sentences with stative predicate or with unaccusative constructions. In the case of the object, 123 cases out of 161 dropped case particle o.

The results of these analysis showed that the use of case particles of 2 to 3-year-olds were the same as those of adults': they do not drop the case particle ga assigned to the subject position while they tend to drop case particles ga and o assigned to the object position.

(9) A 5-year-old Child's Utterance



Kotaro-chan ga
gamu de abuku (o) tuku-t-ta yo.

Kotaro-chan ga gamu de abuku (o) tuku-t-ta yo.
Kotaro-chan NOM chewing gum with bubbles (ACC)
foam-PAST.
(Kotaro foamed bubbles with chewing gum.)

To sum up the results of the above analyses, I have shown the following two points.

1. We found that there is an asymmetry between the subject position and the object position with respect to the case marker drop in toddlers speech. toddlers don't drop the case particles ga on the subject position while they often drop the case particles, ga and o on the object position. Their use of case particles is almost the same as that of adults.

2. It is assumed that even 2-year-olds' usage of Japanese case particles is related to the knowledge of the syntactic structure.

3.3 Performance of ga and O by Thematic Relation

I put forth the hypothesis that both syntactic features and semantic ones are already developed from the early stage of language development. According to this hypothesis, the following question arose. What are the semantic features of the noun both or a subject position and an object position? We can predict that there should be specific semantic features in toddlers' use of case particles. In this section, I will briefly examine how the semantic features are related to the child's use of the case particles by focusing on the O-role which will lead to syntactic structure. I will reanalyze the data shown in (7).

The possible O-role for a subject are the Agent role (10(A)), the Theme role (10(B)), and the source role (10(C)).

(10)

- a. Ken-ga Jiro-o tata-i-ta.
Agent Patient
(Ken hit Jiro.)
- b. Densha-ga tu-i-ta.
Theme
(The train arrived.)
- c. Taro-ga Hanako-ni shashin-o oku-t-ta.
Source Goal Theme
(Taro sent a picture to Hanako.)

On one hand in it, then on the other hand, the possible O-roles for an object are the Theme role, the Patient role, and the Experiencer role. the Theme role can be assigned to both a subject and an object. Here I focused on the Agent role and the Theme role for this analysis. Verbs which select the Theme role as an argument have an 'action' meaning, that is, it affects something by moved or being exchanged. Miyagawa(1989) defines the character of this affectedness as:

(21)

A partial characterization of affectedness

- a. That which is exchanged:
(tori)-Kaeru 'exchange'
- b. That which is created: tukuru 'make',
kaku 'write', tateru 'build', kosiraeru
'concoct', hanasu 'speak', yobu 'call out',
sakebu 'cry out'
- c. That which is converted: naosu 'correct,
repair'

- d. That which is extinguished, consumed, destroyed, or got rid of: *taberu* 'eat', *nomu* 'drink', *korosu* 'kill', *nakusu* 'lose, get rid of', *usinau* 'lose, wasureru 'forget'

[Miyagawa(1989) SYNTAX AND SEMANTICS: Structure and Case Marking in Japanese p.57]

All these are, however, semantic characterizations. we need, thus, to define the notion Theme by an independent test for the syntactic purposes. Miyagawa suggested a test for themehood. I adopt the test to distinguish Theme from the other O-role.

(22) INDEPENDENT TEST FOR THEMEHOOD

The construction consisted of the gerundive form of the verb (-te/-de) plus aru allows a transitive verb that assigns the Theme role to its object, which surfaces as the subject of the verbal complex V-te aru.

[Miyagawa(1989)]

For example, akeru 'open' assigns the Theme role to its object but aisuru 'love' does not according to the test as shown in (23) and (24).

(23) Doa ga akete aru.
Door NOM opened
'The door is opened.'

(24)*Taro ga aisite aru.
NOM loved
'Taro is loved.'

I analyzed the data in (7) to examine the relationships between the thematic property and children's use of the case particles. A part of the data analysis is shown in Appendix 2

As a result of the analysis, I found that there is a definite contrast between the Agent role and the Theme role. Children do not drop the case particle ga assigned to the Agent role while they often drop it assigned to the Theme role. As seen in the above section, the case particle o assigned to an object position can be dropped syntactically and it is suggested that most of the NPs which are dropped the case particle o on the object position is assigned the Theme role. The assumption can be made, therefore, that the case particle ga assigned to the NP with the Agent role is not dropped while the case particles assigned to the NP with the Theme role tend to be dropped.

4. Experiment

4.1 Purpose

I will present an experiment designed to investigate where or not toddlers have a grammatical knowledge of case particles when they interpret sentences. Through the analysis of children's spontaneous speech, it was found that children have the grammatical knowledge as well as the strategies based on meaning from the early stage of language development. In other words, children have two ways in which to express their language competence. They have to, however, depend on either one or another in order to interpret the meaning of a sentence in the case where both are not available. The experiment was, thus, designed to investigate whether or not children use grammatical knowledge in contexts where they can not interpret a sentence solely by its meaning.

4.2 Method

Subjects: 10 subjects, who are all mono-lingual native speakers of Japanese living in Osaka, were tested. 5 of them were 3-year-olds (range 3;3-3;9) and 5 of them were 4-year-olds (range 4;4-4;11)

Procedure: Each subject was tested individually. Seven types of stimuli sentences were presented, one at a time, as shown in (9):

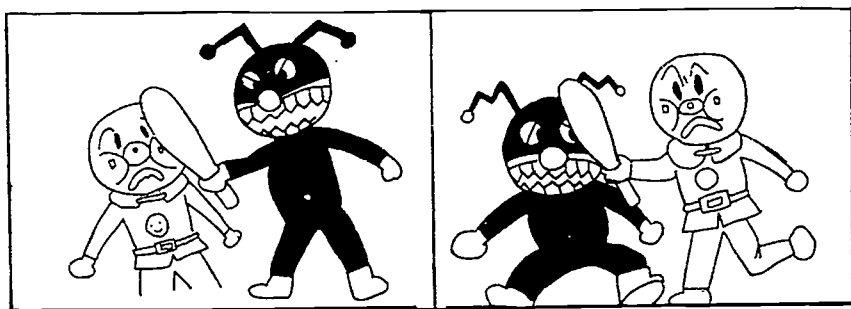
- (9) A: S-ga O-o Verb. (S-NOM O-ACC V)
Anpanman-ga Baikinman-o tataiteiru.
(Anpanman is hitting Baikinman.)
- B: O-o S-ga Verb. (O-ACC S-NOM V)
Kirin-o Usagi-ga aratteiru.
(A giraffe is washing a rabbit.)
- C: S-ga O-(*) Verb. (S-NOM O-(*)ACC V)
Kareipanman-ga Anpanman-(*) noseteiru.
(Kareipanman is putting Anpanman on his back.)
- D: O-(*) S-ga Verb. (O-(*)ACC S-NOM V)
Neko-(*) Buta-ga oikaketeiru.
(A pig is chasing a cat.)
- E: S-(*) O-o Verb. (S-(*)NOM O-ACC V)
Usagi-(*) Buta-(o) ketteiru.
(A rabbit is kicking a pig.)
- F: O-o S-(*) Verb. (O-ACC S-(*) V)
Osaru-o usagi-(*) onbushiteiru.
(A rabbit is carrying a monkey on her back.)

G: N1-(*) N2-(*) Verb.
 Neko-(*) buta-(*) tataiteiru.

((*) means that the case particle is deleted.)

The pictures for the stimulus sentence A.

(Anpanman ga Baikinman o tataiteiru)



Japanese is basically an SOV language. The examples A, C and E have the basic word order, while B, D and F are scrambled sentences. No case particles are assigned to the NPs in pattern G.

Two pictures were shown to the subject accompanied with the stimulus sentence. One picture was drawn to match the stimulus sentence and the other was drawn in the way that Agent and Theme in the stimulus sentence were reversed as shown in below example.

All the stimuli sentences were recorded and given out in order. The child was asked to select the picture which matched the stimulus sentence.

Results: The results are summarized in Table 1. These figures represent the correct response from the viewpoint of adult grammar. The figure in pattern G represent the response that the subject regarded the N1 as a subject in the stimulus sentence.

Table 1

+ \	A	B	C	D	E	F	G
++	ga-o o-ga ga-() ()-ga ()-o o-() ()-()						
3	5	4	4	3	1	3	5
4	4	5	3	2	5	2	4

(+: PATTERN, ++: AGE) THE UNIT: a man

4.3 Discussion

From the results, it clearly appeared that both 3 year-olds and 4 year-olds judged the first noun as the subject in the case where no case particles were given in the stimulus sentence as shown in the pattern G. They, however, interpreted the scrambled sentence (B) correctly when both nominative and accusative case particles are assigned to the NPs. On the other hand, when one of the case particles was deleted, the responses were different according to the selected patterns. This implied that word order was not the only variable used in judging the stimuli sentences. Thus, this results showed that not only 4-year-olds but 3-year-olds also have the ability to contextualize using their grammatical knowledge of case particles if given an accompanied context, that is, they can interpret the context by word order if there are no case particles included.

Further evidence of early Japanese interpretation of scrambled sentences which demonstrates that short-distance scrambling constitutes part of the grammatical knowledge of 3-year-olds acquiring Japanese as a first language is also of importance. Otsu (1992) conducted experiments and found that three-year-olds can manipulate scrambled sentences using their grammatical knowledge with almost error-free results if given an appropriate discourse context.

In addition to these experimental results, I would like to present 2-year-olds' reaction to a scrambled transitive sentence.⁷ The children quickly and correctly responded to the stimuli sentences with both basic word order and scrambled word one. If they were, however, given a stimuli sentence in which the case particles were assigned improperly, they responded nothing and were furthermore embarrassed. Some children said 'What?' when the stimulus sentence was given. It is suggested in previous experimental studies with a judgement task that early children have not yet acquired the grammatical knowledge of

Japanese case particles because they can not answer 'wrong' to the ungrammatical sentences (Goto;1988, Nakayama;1988). If this is correct, how can we explain the clear contrast between the reaction to grammatical sentences and the ungrammatical ones? If young children don't use the grammatical properties of case particle to interpret grammatical sentences, we should find their ambiguous responses to grammatical sentences as well as ungrammatical scrambled sentences. From my observation of two-year-olds performance, it is possible to suggest that even 2-year-olds use the grammatical knowledge of case particles to interpret a sentence but they can not judge whether it is correct or not because of their immature cognitive ability. It is, thus, concluded that infants have active grammatical knowledge of case particles.

5. Conclusion

In this paper, I represented toddler's use of case particles ga and o with respect to the 'case marker drop'. Although it has been suggested that Japanese children acquire the grammatical function of case particles at around 5 years, the data analysis in this paper has showed that 2-year-olds use case particles in the same way that adults do and also their use of them is in obedience to the grammatical structure of Japanese.

Children need to know grammatical relations such like subject and object in a sentence in order to understand. In Japanese, it is case particles that play the important role in representing grammatical relations in a sentence. As in a language like English which restricts word order comparatively, children acquiring English easily know the grammatical relation by word order. Japanese, on the other hand, is said to be comparatively free of word order when compared with a language like English. It is, thus, suggested that children acquiring Japanese as a first language need to acquire case particles at an earlier stage of language development to distinguish between the different grammatical relations in a sentence. Furthermore, it is assumed from their usage of case particles that both syntactic and semantic properties work as module from the early stage of language development.

NOTE

1. This paper is based in part on my Master's thesis, submitted to Osaka University, January 1992. I am greatly indebted to Professor Taisuke Nishigauchi. I also would like to thank to Professor Takao Gunji for his invaluable advice and suggestions. I would like to express my appreciation to Dr. Yukio Otsu for his insightful comments and suggestions. Any mistakes that may remain are entirely my own.
2. Weler K. and Manzini R. (1987) argue about the relation between these two kinds of principle as follows.
"each choice that the child makes in his or her growing language is determined by a principle of language or by a principle of learning or by the interaction of these two kinds of principles."
3. Nakayama (1988) has referred two kinds of linguistic data: The data available in the language environment are called "input data". They are to be distinguished from "intake data" (White, 1981), which are the data that are accessible to the child at a particular point in language development.
4. He points out that there is no possibility that the dropped marker is 'wa' not 'ga' as interrogative nouns are not assigned topic marker 'wa'.
5. Miyagawa (1989) analyzed the construction of the "ergative" sentence in which the verb selects the Theme role to the subject. According to his analysis, the subject of the intransitive verbs originates in the object position in D-structure and moves to the subject position at S-structure to acquire case because the ergative verb fails to furnish the case, as shown in (1).
6. Nishigauchi analyzed that the NP assigned nominative case marker 'ga' in unaccusative construction does not have the subjective characteristic but rather objective one. The NP in unaccusative construction is generated to the position governed by the verb. He suggests that the NP in the subject position corresponds to expletive in Japanese.

7. A pretest was designed to investigate children's reaction to the improper stimuli sentences against the given situation. The test was given to 8 subjects ranging in age from 2-year-old to 5-year-old. The experimenter talked with the each subject working puppets individually. The discourse contained the following stimuli patterns.

- a) S-ga O-o Verb
 b) O-o S-ga Verb
 c) *O-ga S-o Verb
 d) *S-o O-ga Verb

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APPENDIX 1

[2-year-olds' utterances with a subject]

Classification (a)

UTTERANCES	[+]
Akichan ga ki-t-ta. (Akiko cut.)	[a]
Boku ga take-ta. (I attached.)	[a]
Boku ga oi-ta-no. (I put.)	[a]
Tomato to cheese ga ohanashi shite-ru-yo (The tomato and the cheese are talking to each other.)	[c]
Wanwan ga hadashi de aruiteru! (The dog is walking with bare feet)	[c]
Kewpie ga suwa-t-te kangai-te-ru-yo (The kewpie doll is sitting and thinking)	[c]

[+ : DATA SOURCE in (7)]

Classification (b)

UTTERANCES	+
Nani <u>ga</u> mieru-no? (What can you see?)	a
Doko ni hitode <u>ga</u> iru-no? (Where is the starfish?)	c
Okaasan, ochi no naka nimo ohisama <u>ga</u> iru-yo. (Mommy, there is a sun in the house, too.)	c
Onaka <u>ga</u> itai. (I've got a stomach ache.)	c
Ah, Takeshi no yama <u>ga</u> nai! (There isn't Takashi's mountain.)	c
Techhan, medaka no gakko <u>ga</u> iru-yo (Techhan, here is a school for medakas.)	c

Classification (c)

UTTERANCES	+
Obaachan, ha <u>ga</u> kowarecha-t-ta no? (Gran-ma, are your teeth broken?)	c
Kono jam mushi <u>ga</u> tuite-i-ru yo. (There is an insect in this jam.)	c
Obaachan, te kara chi <u>ga</u> deteru yo. (Grandma, there's blood coming from your hand.)	c

[2-year-olds' utterances without the nominative marker, ga]

UTTERANCES	+
b Onetsu (<u>ga</u>) aru yo. (He has fever)	c
b Ashi (<u>ga</u>) makkuro dato barei (<u>ga</u>) dekinai yo (I can not play ballet with dirty legs)	c
c Okaasan, otukisama (<u>ga</u>) yabuke-te-ru yo (Mommy, there's a half moon.)	c

[2-year-olds's utterances with the object maker o]

Classification (a)

UTTERANCES		
Ryukkusakku (o) mottoru-ka-ne? (Do you have a backpack?)	4	c
Okaasan, Tomochan oboshi (o) wasurecha-t-ta ne. (Mommy, I've forgotten my hat.)	4	c
Otosan, ashi (o) arainasai. (Daddy, wash your legs.)	4	c
Futon (o) orose. (Put the bedding down.)	4	c
Ice koori (o) taberu. (Eat ice.)	4	c

Classification (b)

UTTERANCES		
Osora o tobitai-n-da-mon. (I want to fly in the air.)	4	c
Okaasan, kaze o ya-t-tuke-te, onegai. (Mommy, knock the wind over, please.)	4	c

APPENDIX 2

UTTERANCES			
<u>Karasu ga</u> isoide ouchi ni kae-t-te-iku yo Agent (A crow goes home in haste.)	4	c	*
Kitto <u>okaasan ga</u> ma-t-te irun-da ne Agent (For sure Mother is waiting.)	4	c	
<u>Otamajakushi ga</u> <u>zoukingake (o)</u> shiteru-n-da ne Agent Theme (Tadpoles are wiping with their clothes.)	4	c	
<u>Kei ga</u> nao-shi-ta-n-da Agent (Something was repaired by Kei.)	4	c	

(+: AGE OF THE CHILD, *: DATA SOURCE)

UTTERANCES	+ *
<u>Kotaro-chan ga</u> gamu de <u>abuku (o)</u> tuku-t-ta yo. Agent Theme (Kotaro blew bubbles with his chewing gum.)	4 c
<u>Watashi ga</u> jibunn de tuku-t-ta no Agent (I made it by myself.)	4 c
Hakase ni na-t-te <u>taimumashin (o)</u> tuku-t-te.. Theme (I'll be the doctor and make a time machine..)	4 c
<u>Ochawan (o)</u> aratou Theme (Mommy is washing a rice-bowl.)	4 c
Nande <u>konnakoto (o)</u> kaku no? Theme (Why are you writing such a thing?)	4 c
<u>Osora o</u> tobi-tai-n-da-mon Theme (I want to fly in the air.)	4 c
Boku datte <u>onaka (ga)</u> deteru zo. Theme (I also have a potbelly.)	3 c
<u>Gamu (ga)</u> tu-i-te ru Theme (Chewing gum is attached.)	3 a
<u>Futon (o)</u> oro-se. Theme (I put the bedding down.)	4 c
Datte yume ni <u>obake (ga)</u> uturu-n-da mon Theme (Because a ghost appears in the dream.)	3 c
Otousan <u>ashi (o)</u> arainasai Theme (Daddy, wash your feet.)	2 c
<u>Namae ga</u> ka-i-te-ari-masu Theme (The name is written down.)	4 c
Okaasan Tomochan <u>oboushi (o)</u> wasure-cha-t-ta ne Theme (Mommy, I forgot to take a hat with me.)	4 c

UTTERANCES	+ *
Hora, <u>Janba</u> ^(o) kite-ru-de-sho	3 c
Theme	
((I) am putting on a jacket.)	
<u>Ofuton</u> (o) katazuke-ru-n-da yo	3 c
Theme	
(Let's put the bedding in order.)	
<u>Kore</u> (o) taberu to tuyoi otoko ni	3 c
Theme	
Inareru?	
(If I eat this, will I be come a strong man?)	
<u>Mizu</u> (o) ire-te-kure	4 c
Theme	
(Can you put water in (something).)	

On the Interpretation of the Past Tense and the Acquisition of English¹

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1. Introduction

'What is time' is still an open question, nevertheless we conceive of time, and our concept of time is reflected in our language. The present work proposes a hypothesis for the interpretation of tense in English from the viewpoint of how our conception of time is reflected in linguistic temporal expressions. The hypothesis is then verified in light of acquisition data.

A number of theories on the interpretation of tense emphasizing the different aspects tense bears have been proposed. According to the theory, the primitives posited vary. Regarding the semantic structure and the mapping to linguistic expressions, Reichenbach (1947) and his successors (Ota 1973; Smith 1981; Declerck 1986; Hornstein 1990; among others) claim that three temporal entities, namely, Speech time, Event time and a third, rather controversial term called Reference time, are indispensable and tense is interpreted in terms of a relation of these three terms.¹⁾ In the tense logic of Prior (1967) and his followers in linguistics (e.g. Dowty 1982), tense is claimed to be an operator. In Prior (1967), Reference time is discarded and only the first two entities and the relation between them are considered sufficient.²⁾ Focusing on its syntactic representations, others claim tense to be a syntactic feature/ a set of features (e.g. Huddleston 1969; McCawley 1971); and Enç (1987) argues for a sole syntactic referential entity as a primitive.

From the analysis of simple sentences and main clauses, tense is said to have a deictic function (e.g. Reichenbach 1947; Clifford 1975; Lyons 1977; Smith 1981), and its anaphoric nature is noted mainly from the analysis of embedded clauses (e.g. Huddleston 1969; McCawley 1971; Araki et al. 1977; Smith 1981; Enç 1987). Some confine their analysis to single sentences in isolation (e.g. Enç 1987; Hornstein 1990) whereas others (e.g. Weinrich 1977; Smith 1978, 1981; Partee 1984; Declerck 1989) argue for the interpretation of tense in discourse. Regarding the interpretation of tense in embedded clauses, two conflicting proposals have been made: One which endorses the application of the sequence of tense rule (e.g. Costa 1972; Hornstein 1990) and the other which does not (e.g. Reichenbach 1947; Smith 1981; Enç 1987).

Although not much discussed in linguistic literature, intensionality is another aspect involved in the interpretation of tense. As we will see in detail below, Lyons (1977) analyzes tense in simple sentences in terms of the intensional world of a speaker, and Abusch (1988) proposes an analysis of tense in embedded clauses with regard to the intensionality of the matrix verb.

The conventional direction of investigation in linguistics is to seek mapping from morpho-syntactic expressions to semantic or conceptual structure. Here the direction is reversed. We will

first see how we conceptualize time, and then analyze how this conceptual structure is mapped to linguistic expressions via a language particular semantic level, initially in simple sentences and main clauses (hereafter 'simple sentences' for both) and then in embedded clauses. In what follows 'an event' is used for a situation denoted by a proposition.

The present work claims that following from the analysis of the conception of time in section 2, three temporal entities, namely, Speech time(t_s), Event time(t_e) and Cognition time(t_c), and either a simultaneous or an ordinal relation between two of them, should be posited as primitives.³⁾ Tense is considered here as a notion of a language particular semantic level.⁴⁾ It represents a set of temporal configurations each of which consists of a temporal relation of the three terms incorporating the temporal characteristics of an event to be described. Each configuration maps to a morpho-syntactic expression, allowing a one-to-multiple correspondence. All the three temporal entities are regarded as variables to be specified. Extra-sentential elements are included as possible specifiers. In addition to these temporal entities, the speaker and the perceiver or the conceiver (called 'cognizer' here) of a proposition are also considered as primitives and they too are treated as variables to be specified. It is argued that if we take into consideration the cognizer and the speaker of the embedded proposition, the interpretation of tense in embedded clauses naturally follows from the principles for simple sentences.

Based on the proposed hypothesis for an adult's interpretation of tense, acquisition data on the deictic use of past forms of an English-Japanese bilingual girl are analyzed. The implications the acquisition data have on the proposed and competing hypotheses for the interpretation of tense are discussed.

Here, analysis is confined to the temporal relations either simultaneous or anterior to the Speech time. The posterior relations are not included for they involve the modal auxiliary 'will', and the question of whether a structure with 'will' reflects only a temporal relation or the wider notion of possibility under which futurity may be subsumed is still open.

2. The Conception of Time

The conception of time involves the two factors:

A) A relation either simultaneous or ordinal between two or more events, in which the events can be either external or internal.

B) A notion of 'now' or 'present' defined by the conscious perception or cognition of an event by man.

For any linguistic expression, three events are involved:

i) First, there must be an event, such as a dog barking, to be described.

ii) A person must perceive or cognize the event, the barking, in order to talk about it. His cognition is the second event.

iii) Finally, what is cognized is uttered and realized as a linguistic expression. Speaking is the third event.

Each of the three events occurs as a point on a time axis, and they are related either simultaneously or sequentially.

Conceptual analysis suggests that three temporal entities posited corresponding to the three events above, namely Event

time(t_e), Cognition time(t_c) and Speech time(t_s), are necessarily involved in the analysis of natural linguistic expressions. We now look at work explaining the interpretation of tense in terms of three temporal entities.

3. Previous works: Reichenbach(1947) and Lyons(1977)

As mentioned above, Reichenbach (1947) postulates three temporal entities: Speech time (ST), Reference time (RT) and Event time (ET). The 'tenses of verbs' are said to determine the relative temporal order of the three terms. The proposed mapping from the verb forms to the three-term structures are given in (1). (Hereafter symbolically $A=B$ stands for A and B are simultaneous, and $A>B$ for A is posterior to B.)

- | | | |
|-----|---------------|-----------------|
| (1) | a. $ST=RT=ET$ | present |
| | b. $ST=RT>ET$ | present perfect |
| | c. $ST>RT=ET$ | past |

In (1a) all three points are simultaneous and the relation is realized by a sentence with the present form, in (1b) the Speech time and the Reference time are simultaneous but the Event time is anterior. This is represented by a sentence with the present perfect. In (1c) the Reference time and the Event time are simultaneous and are anterior to the Speech time and the relation is represented by a sentence with the past form. Note that the present perfect is considered as a realization of tense here. We will return to this point later.

Lyons (1977) treats tense from an epistemic point of view and claims it to be a kind of modality. Tense is represented by a relation of three temporal points, each defining a different possible world: A time point at which an event takes place in the extensional world, a time point at which we are asked to look at the extensional world, and a time point of the actual world in which the speaker utters the assertion.⁵⁾

Unlike other previous studies, Lyons (1977; p.821) claims that two temporal relations map to sentences with past forms, and he gives an example of each as in (2) and (3). The example sentences are interpreted as in (2c) and (3c).⁶⁾

- | | | |
|-----|--|------|
| (2) | a. $t_s=t_c>t_e$ | past |
| | b. John was in a quandary. | |
| | c. It is a fact that John was in a quandary. | |
| (3) | a. $t_s>t_c=t_e$ | past |
| | b. It was raining. | |
| | c. It was a fact that it is raining. | |

The normal condition is considered to be as in (2a) where t_s and t_c are identical and it is called primary tense. Relation (3a) on the other hand is said to be a secondary tense which involves deictic projection.

Lyons (1977) does not treat a sentence with the present perfect as a realization of tense. Note that if we disregard the difference between the nature of Reference time and the time point of the intensional world, the configuration mapping to the present perfect in Reichenbach's formulation (1c) maps to the past in Lyons' (3a).

In light of the brief analysis of the conception of time in

the previous section, we adopt the formulations proposed by Lyons (1977) rather than Reichenbach (1947). However, Lyons gives only one example for each structure, and provides no explicit conditions for the different mapping to sentences with past forms. Only tense represented in simple sentences in isolation is analyzed and no reference is made to the specification of the time points.

In the following, we first investigate under what conditions the three temporal terms hold the relationship proposed by Lyons (1977). We focus our attention on the temporal relations between the Cognition time and the Event time, and see how the temporal characteristics of an event interact.

4. The Interpretation of the Past Tense in Simple Sentences and Matrix Clauses

4.1. Possible Temporal Relations between Cognition Time and Event Time

Both Speech time and Cognition time can be reduced to points on a time axis, but more commonly the occurrence of an event takes an interval of time. Following Langacker (1982), the temporal contour of an event is considered as a function of time, $y=f(t)$, where the value of 'y' represents a state 'a' at a given time t_i . Temporal characteristics of an event, usually called aspects, vary according to the event in question. It is necessary to clarify which point on a trajectory of an event is simultaneously related to the Cognition time, and under what conditions the ordinal relation holds between them.

The temporal characteristics of an event are often defined as one or quasi one-dimensional contrasts or discrete classes. However, in our analysis they are defined on two orthogonal dimensions: One is the perceived/conceived boundedness, that is whether an event has onset and terminal points, and the other is whether the temporal trajectory of an event is conceived of as constant ($y=a$; where 'a' is the initial value) or not ($y\neq a$). Depending on whether the relation between Cognition time and Event time is simultaneous or ordinal, different dimensions are at issue.

When the Cognition time is simultaneously related to the Event time, i.e. $t_c=t_e$, the dimension of constancy plays a crucial role. If an event is conceived of as constant ($y=a$), then as long as that event takes place, any point of its trajectory can be related to the Cognition time. However, if an event is conceived of as not constant ($y\neq a$), then the point of its trajectory at which one perceives/conceives becomes crucial. In English the onset of an event is simultaneously related with its Cognition time as can be seen in (4).

- (4) a. At nine o'clock, John swims in the lake.
b. At nine o'clock, John swam in the lake.

Equating the Cognition time with an internal point between the two end points of a $y\neq a$ event is possible under a marked, progressive form which converts the event to have the property $y=a$. Another marked form, the auxiliary verb 'have' plus a past participle, [₁HAVE + P.P.], also represents a $y=a$ event. In the case of a $y\neq a$ event this form represents the final state of the event or its extension (see Langacker 1982), therefore it is

treated as having the property of $y=a$.⁸⁾ Perfects and progressives, accordingly, are treated here as representing a temporal contour rather than a relation between the temporal terms.

When the Cognition time is posterior to the Event time, i.e. $t_c > t_e$, and one is looking back on an event which took place prior to his thinking about it, then only the dimension of boundedness becomes crucial. The event must have an end point, thus an event with a constant contour must terminate in order for its Event time to be posterior to the Cognition time.

4.2. Temporal Relations between the Three Terms and Mapping to Tense

As we have seen, what one cognizes is uttered and realized as a sentence. The two temporal relations between the Cognition time and the Event time therefore must be related to the moment of utterance, resulting in (5).

- | | | | | |
|-----|----|-------------------|-------------------------------------|---------|
| (5) | a. | $t_s = t_c = t_e$ | | present |
| | b. | $t_s = t_c > t_e$ | (bounded) P-configuration | past |
| | c. | $t_s > t_c = t_e$ | ($y=a, y \neq a$) I-configuration | past |

Hereafter, the temporal configuration in (5b) is called the P(erfective)-configuration, and the one in (5c) the I(mperfective)-configuration. In English both the P-configuration and the I-configuration map to sentences with past forms.⁹⁾

Examples in (6) represent the P-configuration. Irrespective of whether the initial state changes or not, they are conceived of as having terminal points. An event is interpreted as terminated, even for progressives, if it is accompanied by an adverbial specifying the interval as seen in (6f).

- (6)
- John found the key in the drawer.
 - Mary swam a mile in the lake.
 - Bill swam in the lake.
 - I saw a squirrel on the branch.
 - George lived in London.
 - She was swimming in the lake from 9 to 10 a.m. yesterday.
 - Sue knew the name of the criminal.
 - The robber had blue eyes.

When a simple sentence is presented in isolation, the Cognition time is generally interpreted to be simultaneous with the Speech time. Thus the P-configuration is usually mapped to a sentence with the past form. This is because in order for the I-configuration to be represented, the Cognition time, set in the past, must be specified. (The specification of temporal terms will be discussed in the next section.) The only exception is when the verb is in the progressive form and there is no adverbial to specify the interval. Due to this marked form, the event cannot have a terminal point (see Smith 1983). As seen in (5a) and (5c), the configuration mapped to a sentence with a present form and the I-configuration have the relation $t_c = t_e$ in common. As noted, when an event has a non-constant contour, the $t_c = t_e$ relation forces Cognition time to be set at the initial point. It follows from this that unless the emphasis is on the simultaneity of the Cognition time and the initiation of an

event, $y\#a$ events are not represented by (5a) or (5c), as is often noted in the use of present verb forms. Thus it is very rare for $y\#a$ events to be mapped to the I-configuration in normal discourse. Though rare in normal discourse, the initial point of a $y\#a$ event is freely equated to the Cognition time in narratives in which the focus is on the initiation of an event rather than its termination.

Equating the Cognition time with the Event time is possible in normal discourse, however, provided that the Cognition time is specified as in (7). (The Cognition time of (7f) is situationally specified by the time of the robbery.)

- (7) a. At 9 o'clock, John found the key in the drawer.
 b. At 9 o'clock, Bill swam in the lake.
 c. At 9 o'clock, I saw a squirrel on the branch.
 d. At 9 o'clock, she was swimming in the lake.
 e. At 9 o'clock, Sue knew the name of the criminal.
 f. The robber had blue eyes. (at the time of the robbery)

Note that unlike $y\#a$ events, events with a constant contour can have the Cognition time set at any point on the trajectory as long as it does not terminate. This means that the state existing when the Cognition time is set may still be holding at the Speech time.¹⁰⁾

4.3. Specification of the Speech Time, Cognition Time and Event Time

Here, all the temporal terms including the Speech time are considered variables to be specified. The specifiers of Speech time are: a) the moment of utterance for general cases, b) a decoding time, or c) in the case of the historical present, direct speech and the complements of verbs of saying in certain analysis (which we will see in the next section), a value for an Event time of a preceding utterance.¹¹⁾

Event time is specified by the clause-mate adverbial, either preposed or postposed. The adverbial can be one denoting either a time point or a time interval, depending upon the temporal characteristic of an event. If the Event time is not specified by an adverbial, and if it is related simultaneously to the Cognition time, then this clause-mate Cognition time serves as its specifier. When there is no adverbial and the Event time is not simultaneous with the Cognition time, $t_c > t_e$, then the Event time is given a specific but indefinite value.¹²⁾

Cognition time is specified by the Speech time when they are simultaneous. When they are not simultaneous, it can be specified by an adverbial reducible to a point on the time axis.¹³⁾ As suggested by Hornstein (1977), when an adverbial is preposed, it tends to be interpreted as a specifier of the Cognition time. However, as long as it is interpreted as indicating a point rather than an interval, a postposed adverbial can specify the Cognition time.

When there is no such adverbial and the Cognition time is not simultaneous with the Speech time, that is, when the I-configuration is represented, how is the Cognition time specified? Previous works (Clifford 1975; Weinrich 1977; McCawley 1971; Smith 1978, 1981; Partee 1984) suggest a value for an extra-sentential element as the specifier. More precisely, it is either an Event time or a Cognition time of a preceding

sentence. 14) The tendency mentioned above for a preposed adverbial to be interpreted as a specifier of the Cognition time can then be explained in terms of a more general rule: When the I-configuration is represented and there is no postposed adverbial indicating the point on the time axis, the Cognition time is specified by a preceding element.

In addition to these linguistic specifiers, both Event time and Cognition time can be specified situationally, provided that the speaker and the hearer share the same experience. This is the same mechanism as the one for the specification of the Speech time by the moment of utterance or the decoding time. The Cognition time for the narrative past is specified by this mechanism. In this case, the specifier is not the flow of time in the real world shared by the speaker and the hearer but instead the imaginary flow of time created by the text.

Table 1. Variable specifiers for Speech time, Cognition time and Event time (situational specifiers for t_c and t_e are excluded)

Speech time		The moment of utterance for general cases; Decoding time; t_e of a preceding context for the historic Present, direct speech, complements of verbs of saying
Cognition time	$t_s = t_c > t_e$ $t_s > t_c = t_e$	The clause-mate t_s An adverbial reducible to a point on the time axis; t_e or t_c of a preceding context; Imaginary flow of time for the narrative past
Event time	$t_c = t_e$ $t_c > t_e$	A clause-mate t_c or a clause-mate adverbial A clause-mate adverbial

4.4. The Deictic Nature and the Anaphoric Nature of Tense

When the moment of utterance of a simple sentence specifies the Speech time of the sentence/clause in question, the Speech time always bears an absolute value. While if it is specified by other values, the specification is indirect and may or may not take an absolute value. The deictic nature of tense is attributed to the Speech time being directly specified by the moment of utterance and the other terms being related to it transitively.

In general cases, that is, when the Speech time is specified by the moment of utterance, the anaphoric nature of tense is attributed to the Cognition time being specified by an Event time or a Cognition time of a preceding context. When the Speech time is specified by an Event time of a preceding context, it also serves as the bearer of the anaphoric nature of tense.

4.5. Specification of the Speaker and the Cognizer

As we have seen in section 2, the Cognition time and the Speech time are respectively, the time points at which a person cognizes an event and utters what s/he has cognized. The question then arises: who are the cognizer and the speaker? For simple sentences, the speaker of a sentence is always the speaker of the utterance in question except for the case of direct speech. When the speaker of the utterance perceives or witnesses the event to be described, there is no doubt that the cognizer is also the speaker of the utterance. In English, when the speaker describes an event based on his/her knowledge, or cognition obtained from others, the cognizer is also said to be the speaker of the utterance.¹⁵⁾ However, as we will see below, the speaker and the cognizer of an embedded clause may differ from the speaker of the utterance.

5. The Interpretation of Tense in Embedded Clauses

In this section, we will see that the interpretation of tense in finite embedded clauses follows from the principles we have seen for simple sentences. In the analysis, identification of the speaker and the cognizer of an embedded clause plays a crucial role.

It has been noted that the interpretation of tense differs for relative clauses and complement clauses (Huddleston 1969; Ota 1973; Araki et al. 1977; Smith 1981; Enç 1987). In the sections to follow we look at this difference and proceed to see if the theory proposed by Hornstein(1990), which is based on Reichenbach (1947) properly explains this difference. It is argued that the present principles proposed for simple sentences account for the interpretation of tense in embedded clauses. Here only the case in which both the matrix and embedded clauses are with past forms is analyzed.

5.1. Structural Differences Reflected in the Interpretation

Examples below show the differences in interpretation among the relative clauses (8), complements of verbs of thinking (9) and verbs of saying (10) with or without adverbials specifying the Event time of the matrix clause and the embedded clause.

- (8) a. John talked to the boy who was crying.
 b. Yesterday [=Friday], John talked to the boy who was crying
 { i. on Monday.
 { ii. this morning.
 c. John talked to the boy who is crying.
- (9) a. John thought that the boy was crying.
 b. Yesterday [=Friday], John thought that the boy was crying
 { i. on Monday.
 { ii.*this morning.
 c. *John thought that the boy is crying.
- (10) a. John said that the boy was crying.
 b. Yesterday [=Friday], John said that the boy was crying
 { i. on Monday.
 { ii.*this morning.
 c. John said that the boy is crying.

As seen by the co-occurrence of adverbials in (8b) relative clauses allow any ordinal relation between the matrix Event time and the embedded Event time, and when there are no adverbials as in (8a), the two Event times tend to be interpreted as simultaneous. Note that relative clauses can be with present forms as well (8c).

Unlike relative clauses, complements of verbs of thinking, as well as verbs of saying, cannot take the embedded Event time posterior to the matrix Event time as seen in (9bii) and (10bii). Complements of verbs of thinking never allow the present verb forms to be within a matrix clause with a past form as in (9c), whereas, those of verbs of saying do allow the present forms to be as in (10c) under certain conditions. In both types of complements, when no adverbial specifies the embedded Event time as in (9a) (10a), the matrix and embedded Event times tend to be interpreted as simultaneous as in relative clauses.

5.2. Problems with the Theory of Hornstein(1990)

Hornstein (1990) adopts Reichenbach's (1947) framework: The finite embedded clause, as well as the matrix clause, is rendered Speech time, Reference time and Event time and the interpretation of tense in embedded clauses is given by an optional application of the sequence of tense rule (SOT). This SOT rule associates the Speech time of the embedded clause with the matrix Event time. The rule is applicable only when the 'INFL' of the embedded clause is governed by the matrix verb, thus avoiding its application to relative clauses.

Note that his theory fails to explain the following points:

- 1) The tendency for a relative clause to be interpreted as simultaneous in (8a). This is due to the inapplicability of the SOT rule to relative clauses. Unless the SOT rule applies, the Event times of the embedded and matrix clauses are not related to each other.
- 2) The unacceptability of examples (9bii) and (10bii). This is due to there being no constraints on the temporal relation between the two Event times when the SOT rule does not apply.
- 3) The unacceptability of a present verb form in a complement of verbs of thinking as in (10c). As the SOT rule applies optionally to complement clauses, when it does not apply, such sentences are freely generated. 16)

5.3. Possible Temporal Combinations

We now turn to see how the principles proposed above for simple sentences explain the interpretation of tense in embedded clauses. For simple sentences the speaker and the cognizer are always the speaker of the utterance. However, the cognizer and the speaker of an embedded clause can be different from the speaker of the utterance. According to the identification of the cognizer and the speaker of the embedded clause, the possible temporal relations between the matrix and embedded Event times vary. It will be argued that when the embedded clause is within the scope of the intensional predicate, the denotatum of the matrix subject (hereafter matrix Subject) serves as the cognizer of the embedded event. The speaker and the cognizer of the complements of verbs of saying are the matrix Subject except for

the cases where the content of speech is re-analyzed by the matrix speaker.

Although a matrix clause can represent either the P-configuration ($t_s = t_c > t_e$) or the I-configuration ($t_s > t_c = t_e$), in the analysis to follow only the cases in which the P-configuration is represented are considered since the resulting temporal configurations do not differ in points which have relevance to the present discussion.

5.3.1. Matrix Clause Speaker Identical to Embedded Clause Speaker/Cognizer: the Relative Clause

First we will look at the case in which the matrix speaker is also the speaker and the cognizer of the embedded clause. In this case the principles for simple sentences directly apply to both the matrix clause and the embedded clause. Table 2 shows the possible combinations of temporal configurations mapped onto matrix and embedded clauses. The temporal relations between the matrix Event time (T_e) and the embedded Event time (t_e) are given in the intersecting cells. (Capital T's represent matrix temporal terms, and * stands for any possible relation.)

When all the temporal terms of an embedded clause are related simultaneously, the matrix Event time precedes the embedded Event time as shown in intersecting cell A. When the embedded clause is represented by the P-configuration, the Event times of two clauses are specified independently, thus the temporal relation between the two can exhibit any relation depending on the values of the specifiers (cell B).

Table 2. Matrix speaker/cognizer identical to Embedded speaker/cognizer
[condition: $T_s = t_s$]

	Embedded clauses		
	$t_s = t_c = t_e$	$t_s = t_c > t_e$ P-conf.	$t_s > t_c = t_e$ I-conf.
Matrix clauses $T_s = T_c > T_e$ P-conf.	A: $T_e > T_e$	B: $T_e * t_e$	C-1: ($t_c = T_e$) $T_e = t_e$ C-2: ($t_c \neq T_e$) $T_e * t_e$
Verb forms realized	present	past	past

* stands for any temporal relation

When an embedded clause represents the I-configuration, its Cognition time must take a value other than the Speech time. Note that the matrix Event time is a possible specifier for the embedded Cognition time. Cell C-1 shows the case when the matrix Event time serves as the specifier, just as an Event time of a preceding context does for a simple sentence. Here, the matrix and the embedded Event times take the same value, and thus are

simultaneous. If the embedded Cognition time takes other specifiers such as an adverbial or an extra-sentential element, then the relation between the two Event times cannot be decided as in C-2. The verb forms realized by the mapping of embedded configurations are shown in the bottom row of the table.

Generally, the cognizer of an event described by a relative clause is the speaker of the matrix clause. There is a case, however, in which the cognizer is not the matrix speaker but a matrix Subject. We will return to this shortly.

In a general reading, the cognizer of a relative clause as in (8) is the matrix speaker. The interpretation of tense for examples in (8) can then be explained by the combinations in Table 2, in which all relations between the two temporal configurations, and between the two Event times are allowed. The embedded clause in example (8a) has a past progressive without an adverbial, therefore, is forced to represent the I-configuration. This results in it holding the relation as in C-1, and giving the simultaneous reading. The preposed adverbial 'yesterday' in (8b) specifies the matrix Cognition time (thus the Event time as well), however, what the postposed adverbial 'Monday' actually specifies is ambiguous. If it specifies an interval, then the embedded clause represents the P-configuration, and thus results in cell B. If it specifies the embedded Cognition time, then the C-2 combination is realized. In both cases, the values of the specifiers decide the final relation, thus $T_e > t_e$ for (8bi) and $T_e < t_e$ for (8bii). Since the embedded Speech time is directly specified by the moment of utterance, any configurations/verb forms, including $t_s = t_c = t_e$ /present forms, are allowed, and thus resulting in the acceptability of (8c).

5.3.2. Matrix Clause Speaker not Identical to Embedded Clause Cognizer: Complements of Verbs of Thinking

Now consider the possible combinations of the temporal configurations when a matrix speaker cannot be the cognizer of the embedded clause. Note that on-going subjective thoughts of an individual are not accessible to others. Thus the cognizer must be the one actually thinking. This means that the complements of verbs of thinking, which express the contents of thoughts, must have the matrix Subject as their cognizer.

The contents of on-going thoughts are not usually verbalized. Therefore, no speaker is involved for the embedded clause, which leads us to disregard the embedded Speech time. The Cognition time of a thought must be simultaneous with the time of a mental process. This means that the embedded Cognition time must be simultaneous with the matrix Event time. This results in a linear transitive relation for the terms involved. Table 3 shows the possible combinations.

In a general reading, the cognizer of the complements of verbs of thinking is the matrix Subject. The simultaneous reading of example (9a) is given by cell A, and example (9bi) in which the embedded event precedes the matrix event, by cell B. Although the progressive form with an adverbial is used in (9bi), the event must be conceived of as bounded, for it is not possible for the embedded Cognition time to be anterior to the matrix Event when the former is specified by the latter. If the content of a thought refers to a future event, a different configuration, $t_c < t_e$, which maps to a structure with 'would', is

necessary. Prohibition of the present form for (9c) follows from the fact that the embedded Cognition time must be specified by the matrix Event time.

Table 3. Embedded cognizer specified by the matrix Subject
(no speaker for the embedded clause)
[condition: $T_e = t_c$]

	Embedded clauses	
	$t_c = t_e$	$t_c > t_e$ (bounded)
Matrix clauses $T_s = T_c > T_e$ P-conf.	A: $T_e = t_c = t_e$	B: $T_e = t_c > t_e$
Verb forms realized	past	past

It must be mentioned here that in certain readings, relative clauses represent the configurations in Table 3 as well. These are when only the matrix Subject is the cognizer (see Abusch 1988).

5.3.3. Matrix Clause Speaker not Identical to Embedded Clause Speaker: Complements of the Verbs of Saying

Another case in which the embedded cognizer differs from the matrix speaker is when the embedded speaker is specified by the matrix Subject and consequently the embedded Speech time is specified by the matrix Event time. As seen in Table 4, all the terms of the matrix and embedded configurations are transitively related.

Table 4. Embedded speaker specified by the matrix Subject
[condition: $T_s \neq t_s$ & $T_e = t_s$]

	Embedded clauses		
	$t_s = t_c = t_e$	$t_s = t_c > t_e$ P-conf.	$t_s > t_c = t_e$ I-conf.
Matrix clauses $T_s = T_c > T_e$ P-conf.	A: $T_e = t_e$	B: $T_e > t_e$	C: $T_e > t_e$
Verb forms realized	past	[_P HAVE+ED + P.P.]	[_P HAVE+ED + P.P.]

The structures representing these combinations of configurations are the complements of verbs of saying, in which one reports an utterance of another or his/her own. Before we proceed to see how the interpretations of the examples in (10) are derived, further analysis of the complements of verbs of saying is necessary.

Suppose the quotation in example (11) is the original speech. A report of this speech can be made either by direct speech (11) or by indirect speech (12)(13). In example (12) the matrix speaker intends to report the original speech as it was, but in example (13) the matrix speaker reports the original speech in his/her own words. Call these the D-type and R-type indirect speech, respectively.

- (11) Direct speech
 a. John said, "The boy is crying continuously."
 b. John said, "The boy was crying continuously."
- (12) D-type indirect speech
 a. John said that the boy was crying continuously.
 b. John said that the boy had been crying continuously.
- (13) R-type indirect speech
 John said that the boy kept crying.

The speaker of the embedded clause for both the direct speech and the D-type indirect speech is the matrix Subject and the embedded Speech time is identical with the matrix Event time. Thus they each represent combinations of the configurations in Table 4.

As seen in (11a) and (12a), the original speech is with the present form for direct speech while it is with the past form for the D-type indirect speech. (A similar contrast is observed between (11b) and (12b)). According to the mode of report, the same configuration maps to different linguistic expressions. How can this be explained?

In both examples (11a) and (12a), the configuration $t_s = t_c = t_e$ (hereafter the S(imultaneous)-configuration) represents the reported speech. However, they differ in the following respect. In direct speech, the original speech is presented to the hearer as if s/he too was one of the original addressees. In order for this impression to be formalized, we need to introduce a forth temporal term, that is the Decoding time (t_d). Combinatorial configurations in (14) show how the Decoding time is related to the embedded Speech time.

- (14) a. Direct speech:
 $T_s = T_c > T_e$ & $t_d > t_s = t_c = t_e$
 [where $T_s = t_d$, $T_e = t_s$]
- b. D type indirect speech:
 $T_s - T_c > T_e$ & $t_d = t_s = t_c = t_e$
 [where $T_s > t_d = t_s$]
- c. Simple sentences/matrix clauses:
 $T_d = T_s = T_c = T_e$
 [$T_d = T_s$: the moment of utterance]

The Decoding time of the embedded direct speech clause is at

the matrix Speech time, while that of the embedded indirect speech clause is at the matrix Event time. When the S-configuration maps to a simple sentence, the Decoding time is at the utterance time. The different mappings derive from the relation the Decoding time holds to the matrix Speech time (as seen in the contrast of (14a) with (14c)), and also from whether the Decoding time is specified by the matrix Event time or not (as seen in the contrast of (14b) with (14c)).

Now let us turn to the analysis of the R-type indirect speech. Example (13) is the case in which the reporter reconstructs the content of the original speech. In this case the speaker of the embedded clause is no longer the original speaker but the matrix speaker, and the structure too must be re-analyzed to reflect this. The temporal configurations mapping to R-type indirect speech are the same as those shown in Table 2.

However, a caution is necessary. Not all the combinations in Table 2 are permissible, because what is reported by the matrix speaker must be first uttered by the original speaker and the reconstruction should not contradict with what the original speaker said. Hence the constraint on the reconstruction/re-analysis (hereafter 're-analysis') is necessary.

Condition: In proceeding with the re-analysis, retain the value specifying the original speaker (thus the cognizer as well), the Speech time, the Cognition time, and the original configuration. The product of re-analysis should not contradict with the original values and configuration.

This constraint excludes the possibility of the embedded Event time being specified by a value posterior to the embedded Speech time while retaining the original configuration. The re-analysis allows a present verb form to be in the complement so long as the event is cognizable to the matrix speaker.

We now turn to see how the interpretation of the examples in (10) are derived. There are two possible combinations that map to (10a): If this is interpreted as the D-type indirect speech, the embedded clause is then represented by the S-configuration in Table 4, and the relation in cell A yields a simultaneous reading. If it is interpreted as the R-type indirect speech, then either the P-configuration or the I-configuration in Table 2 represents the embedded clause. If the I-configuration is represented, and the Cognition time is specified by the matrix Event time (C-1), then a simultaneous reading is derived. Because of the constraint on the re-analysis, the relation $t_e > T_e$ is excluded, leaving only the relation $T_e \geq t_e$. This gives the interpretation of the matrix event being either simultaneous or posterior to the embedded event.

Example (10bi) has both the matrix and embedded Event times specified, with the embedded Event time preceding the matrix Event time. For this relation to be expressed by the D-type indirect speech, the embedded clause must be with [_PHAVE+ED +P.P.]. The embedded clause in (10bi) is with the past form, therefore it is represented by the P-configuration in Table 2. Here again because of the constraint only the relation $T_e > t_e$ is permissible, which explains the unacceptability of (10bii). The complement clause with the present form seen in example (10c) is allowed because of the re-analysis.

We have seen that the principles proposed for simple sentences account for the different interpretations observed for

relative clauses, and complements of verbs of thinking and saying. Analysis suggests that the complements of verbs of thinking and saying must be treated differently. It reveals that the interpretation of tense in embedded clauses naturally follows from the principles for simple sentences if the identification of the embedded speaker and the cognizer is taken into consideration.

6. Acquisition

We now turn to the acquisition data of an English-Japanese bilingual girl, with regard to her use of past forms, and see what they lend to the hypothesis proposed. The results of the analysis will be discussed in light of the acquisition theory proposed by Weist (1986, 1989). It will be argued that a problem arises if the Reichenbachian framework upon which Weist's (1986) theory rests is adopted, whereas the principles proposed above explain the acquisition data more naturally.

The study reported here is part of a project conducted by an Ochanomizu University research group headed by Noriko Imanishi, of which I was a member.¹⁷⁾ The group recorded spontaneous speech samples of an English-Japanese bilingual girl, called Mary, from age 2:5 until 4:8.¹⁸⁾ Only the English data from age 2:5 to 4:4 are referred to here. In her detailed analysis of Mary's syntactic development in both languages until age 3:4, Imanishi (1987-88) notes that the relative orders in which Mary acquired the structures of each language are no different from those of a mono-lingual child. (See Appendix A for the description of the child and the data collection procedure.)

We seek to answer two questions in analyzing Mary's acquisition data: 1) Is there any developmental difference between the mapping of the P-configuration and the I-configuration? 2) In what order, if any, are the mapping of the two configurations to sentences with past forms acquired: The P-configuration first, or the I-configuration first, or simultaneously? If the mapping of the P-configuration precedes, then the often cited, but controversial tendency of children to distinctively mark completed actions with the past forms in their early phase of development can be explained without claiming that the past forms only mark aspectual distinctions and lack deictic function.¹⁹⁾ In what follows we analyze Mary's spontaneous speech samples for any data that substantiate a difference in the mapping and give evidence of their relative order of acquisition.

6.1. The Initial Use of Structures Requiring the Mapping of the I-configuration

We will first look at the initial use of structures in the samples requiring the mapping of the I-configuration to a sentence with the past form. As we have noted, a structure represents the I-configuration when a preceding contextual element sets a Cognition time. The structures which uniquely represent this configuration are those structures with 1) a past progressive without an adverbial specifying an interval, 2) an auxiliary verb 'be' plus 'going to' used in the past forms, 3) a preposed adverbial referring to a time point in the past, and 4) complements of verbs of thinking. Mary's first use of such structures in the samples are given in (15) through (21) in

chronological order, where C, M, and X stand for child, mother and observer, respectively.

The first use of the past progressive in the sample was at age 2:10 as in (15).

- (15) a. M: She [=doll] is Mary, I see
 C: She is hiding with xx
 This is my xx and elephant was hi hiding
 M: Elephant was hiding?
- b. M: One for the doll and the elephant too
 C: Today, today, today elephant was sleeping [2:10]

The samples in (15) are spontaneous comments in pretend play. They are spontaneous in the sense that there is no previous linguistic or situational context that sets the Cognition time in the past. In (15a) there is no such context to set the Cognition time. In (15b) an adverbial 'today' is preposed. From this utterance, it is not clear whether 'today' is meant to set the Cognition time in the past or to specify an interval. In adult grammar, 'today' is not reducible to a point, and even if it is preposed, it needs further specification of a time point in order to serve as a specifier of the Cognition time. These utterances suggest that either the Cognition time is set only in her mind, or that these events are conceived of as having been terminated. Further study is necessary to clarify this point. For the present purpose, however, suffice it to note that a possibility of a representation of the I-configuration was observed at this age.

It was at age 3:2 that the past progressive with a required preceding linguistic context was observed (16). At 3:6 it was used productively (17).

- (16) C: I had a little book I was xing [3:2]
- (17) a. X: I've been nice.
 C: You were fighting with the girl, girl, because I
 was seeing you (we)er not sleeping [3:6]

At age 3:5, establishment of the Cognition time by the preposed adverbial clause led by 'when' was observed as in (18).

- (18) C: When I was a baby I didn't do anything
 When I was a baby I just ate cereal and ... mashed
 potatoes [3:5]

Beside the problematic use of 'today' in (15b), the use of a preposed adverbial to specify the time point in the past was first observed at 3:6 (19). Note the contrast in the sample at age 3:3 given in (20) where the preposed adverbial 'one time' is followed by a clause without the past marking.

- (19) C: Remember, last time I was wearing it? [3:6]
- (20) C: One time we need to wait ... Because everyone ride
 on Dumbo That's why we waited
 (portion of conversation in (28)) [3:3]

Shown in (21) is the use of the auxiliary verb 'be' in the

past form plus 'going to' first observed at age 3:7. Thereafter it was used frequently.

- (21) C: Oh who is knocking on the door? I was going to sleep [3:7]

At age 3:7 a complement of the verb 'think' was used also with the past verb form as in (22) line 3. There had been only one previous instance at 2:11, seen in (23), where she used the matrix verb 'think' in the past form, but then the complement was not with the past form.

- (22) 1 C: Who are you?
X: I'm Charlie Brown.
2 C: Oh, but I didn't know that
X: You know, you know me, you don't know me?
3 C: No But I thought you were lion [3:7]
- (23) C: I thought you are going to teach [2:11]

Samples in (24) at age 3:10 show complements of the verb 'know' embedded under a matrix with the past form.

- (23) a. C: I didn't know why it was a tiger [3:10]
b. C: Oh, I was, I was losing you I didn't know you were coming and get me [3:10]

After the age of 3:10 no new use of the structures relevant here was observed.

We have now seen in the samples the first use of structures representing the I-configuration which requires the Cognition time to be set previous to the Speech time. These structures, except for the past progressives, all appeared gradually during the period of 3:5 through 3:10. As noted, the past progressives without a required linguistic context were first observed at 2:10, and with it at age 3:2.

6.2. Four Citations from Samples before 3:5 to Support the Earlier Acquisition of the P-configuration

The structures we have seen so far all involve elements which add complexity to the total structure. Therefore, it is necessary to look into the use of the past forms before age 3:5. The structures analyzed above all require the mapping of the I-configuration. The analysis of the rest of the samples requires estimation of how Mary conceptualized the events she talked about, and therefore involves complexity. As the detailed analysis is still in progress, only a few points can be tentatively made here. There are some data, however, that suggest that the mapping of the P-configuration to sentences with past forms precedes that of the I-configuration, at least in a productive way.

Let us first see Mary's use of past forms. According to Imanishi (1987-88) the following points are observed through age 3:4: When the data collection of Mary's spontaneous speech started at age 2:5, all the verbs observed were in root forms (3; 110).²¹ From 2:6 to 2:7 the use of the present forms for the third person singular became stable, but the use of past forms was restricted to a few irregular verbs (found, had, did) and in

many cases verbs were used in the root forms (4; 111). At 2:8, the first marking with the -ed inflection was observed in the utterance "I spilled" (5; 99). At 2:9 a use of 'was', a past form of the verb 'be', was observed. Although irregular past forms gradually appeared, regular -ed inflection was still absent in some required contexts (6; 95). From 2:10 to 2:11, to a considerable extent, both regular and irregular past forms were used to indicate an action completed. Structures mentioned are: We forgot curry/ You went to the park/ I turned (on) cold water / I did take you home/ I did pour any tea/ You didn't drink milk (excerpted from Imanishi (1987-88)(7; 50; 179-181)). At the end of 2:10 and the beginning of 2:11, past forms were used in the form of 'did' plus the root forms, for both regular and irregular verbs (7; 53).²²⁾

We turn to see the data that suggest the early mapping of the I-configuration. As seen before, the Cognition time cannot be set in the past without a specifier in the previous context, or a clause-mate adverbial indicating a time point in the past. First, it should be mentioned that no use of adverbials of this kind was observed until 3:5. The exceptional cases were the use of 'today' and 'one time' seen in (15 b) and (20). However as noted, the verbs in sample (20) were not in the past forms.

The second point is that the majority of the utterances with the past forms before age 3:5 were her spontaneous comments on past events without any preceding linguistic or situational context referring to past events. The events described are $y \neq a$ events except for a few cases mentioned below. As noted by Imanishi (1987-88), the earliest deictic use of $y \neq a$ event verbs are: found, had, did, forgot, [2:7]; spilled [2:8]; opened [2:9].²³⁾

As noted previously, the mapping of the I-configuration to a $y \neq a$ event rarely occurs even in adult speech except for the narrative past. This, together with the fact that spontaneous comments do not have a preceding context to set the Cognition time in the past, means that spontaneous comments describing $y \neq a$ events are very likely to represent the P-configuration. As noted by Imanishi (1987-88), by age 2:11 the number of new verbs representing $y \neq a$ events was increased and at this age the mapping of the P-configuration to sentences with past forms was productive. Occasional absence of the past marking was observed for these spontaneous comments describing $y \neq a$ events until 3:5.

An early spontaneous comment describing a $y = a$ event is the utterance with 'had' in (16) at age 3:2.²⁴⁾ The structure itself does not tell which configuration is represented by the sample. If the I-configuration maps to it, the Cognition time must be specified by a situational context. Or as in the case of the earliest use of the past progressive, Mary might have set it in her mind.

It is not clear whether the second utterance in sample (25) should be treated as a spontaneous comment or not.

(25) C: I opened
It was like this [noise of handling paper]
[2:9]

The first one is spontaneous, uttered in pretend play referring to an imaginary wrapped candy. Although which configuration is actually represented by the second utterance is ambiguous, there is a possibility for the I-configuration to be represented. Note

that the verb used is the copula verb 'be' in the form of 'was'. We will return to this point later.

The third point comes from the analysis of utterances following the introduction of a topic referring to a past event. It was at age 2:9 that such conversation was first observed. In (26) Mary described what happened to her table one morning. In this sample however, the verbs are either omitted or not in the past forms.

- (26)
- M: Would you like to sit at the table?
 C: No, it ... no ... orange
 M: It's for what?
 C: Orange
 M: Orange? Oh it's full of orange?
 C: I spill out
 M: You spilt out? Did you spill juice on it?
 C: Yeah, tissue paper and, and I dirty
 M: Oh did you. Tissue paper in what? What did you put tissue paper in, Mary?
 C: Juice
 M: In the juice and then?
 C: And then clean the table
 M: And then cleaned the table with the tissue paper.
 C: And it get dirty [2:9]

Here she is trying to explain in order what she witnessed. She is aware that the events took place in the past, preceding the utterance time. What (26) suggests then, is that the I-configuration is conceptualized but it is not represented by the appropriate linguistic expression.

In another conversation at this age, past forms are used as in (27).

- (27)
- 1 M: Who else came today?
 C: Sharon didn't come
 M: That's right, Sharon didn't come.
 2 C: Sick
 M: Sick, yeah, she probably was sick. Who else did come?
 3 C: Vicky was there
 M: Vicky was there, that's right. [2:9]

In this sample the copula verb 'be' and the auxiliary verb 'do' are in the past forms. Note that in this conversation Mary is answering the questions. We will return to this sample in the next section where we analyze replies to questions asked with past forms.

Dialogue (28) is a conversation between Mary and her mother about their visit to Disneyland at age 3:3.

- (23) a.
- M: It rained that afternoon so they didn't have a parade
 1 C: That's right He [=Mickey Mouse] stays in his home
 M: What we saw was the Mickey Mouse review. Yes, and we did see him. Didn't shake his hands but we did see him.
 2 C: And Minnie Mouse and Pooh and Piglets

- M: Minnie Mouse and Pooh and Piglets and everybody That's interesting.
- 3 C: And Goofy
M: Goofy too?
- 4 C: And xx?
M: You didn't see him?
- 5 C: Mr. Robin
6 But we didn't see Mr. Robin
X: Did you ride on the Dumbo?
- 7 C: One time we need to wait
M: We had to wait.
- 8 C: Because everyone ride on Dumbo
9 that's why we, we waited
10 we wait and wait and wait and wait
- b. M: Did you enjoy the ride around [=merry-go-round]? You have to wait a long time for that, too, I think.
- 11 C: We saw that at Koorakuen [=amusement park]
M: Koorakuen?
- 12 C: Koorakuen And Mummy didn't go Just Mary and Dad
[3:3]

Notice that though Mary uses the past forms in a context referring to a past event as seen in lines 6, 9, 11, 12, the verbs are not in the past forms in lines 1, 7, 8, 10. The same verb 'wait' is marked in line 9, yet not in line 10. After this sample, it was next at age 3:5 that a conversation concerning past events was observed. Even then some verbs were not in the past forms. Thereafter, such conversations became more frequent, and by age 3:10, Mary could engage in pretend play, setting the main event of the play in the imaginary past and carrying on a conversation referring to it throughout the play.

At age 4:4 in the elicited conversation presented in Appendix B, she narrated a short skit presented in a video. She started to narrate the main events of the scene after being prompted by her mother's question. Her narration of the events suggests that even representing $y \neq a$ events with the I-configuration was possible at this age.

The fourth point regards responses to questions with past forms, hereafter referred to as the 'question'. Analysis of the response to a question is rather troublesome, because even though the question is with a past form it does not seem to force a response representing the I-configuration. So it is difficult to know which configuration the child has conceptualized. The analysis presented here is therefore tentative.

At age 2:5 Mary gave correct answers to questions but not with the past forms as seen in (29).

- (29) M: What did you do with Haruto [=boy's name] yesterday, Mary?
- C: A...pay [=play]
M: What?
- C: Pay
M: Play?
- C: Play
M: What did you play with?
- C: Cayons

- M: What?
 C: Crayons
 M: Crayons, that's right, crayons. You played with crayons xx Haruto, didn't you. [2:5]

The first replies with the past forms were observed at 2:9, as we have seen in sample (27). Subsequently, at 2:10 samples (30) to (32) were observed.

- (30) M: What did Cresta do today?
 C: She did, she did, she did, she did eat cookies
 M: She did eat cookies?
 C: She didn't xx cookies [2:10]
- (31) M: You went into the woods with Taisuke [=boy's name], didn't you?
 At Karuizawa [=name of a resort area].
 Do you remember? You played in the woods?
 C: Taisuke was not there, right? [2:10]
- (32) M: Who wrote on it?
 C: Monster
 M: Do you think it was the monster?
 C: Yeah
 M: Bad monster, isn't it?
 C: No, it was xx
 M: What?
 C: It was baby monster [2:10]

The configuration representing these utterances is ambiguous. The event described in sample (30) is a $y \neq a$ event, therefore it is very likely that the P-configuration is represented.

Recall that the verbs used in (27) are 'didn't come' and 'was'. Note that the verbs used in the past forms in samples (31) and (32) are also the copula verb 'be'. Interpreting from the contexts and the use of the verb 'be' indicating a state, the utterances in (31) and (32) very likely represent the I-configuration. The analysis of the interpretation of tense when a proposition is negated as in (27) and (31) needs further investigation.²⁵⁾

6.3. P-configuration Preceding the I-configuration in Productive Mapping

What does the analysis above suggest for the order of acquisition of the mapping to the appropriate linguistic expressions for the P-configuration and the I-configuration? Analysis of Mary's spontaneous comments has revealed that the mapping of the P-configuration to sentences with past forms was first observed at 2:7. Three different verbs in the past forms were observed to be in use at this time. Thereafter, the number of her new verbs increased gradually, and the mapping of the P-configuration to sentences with past forms became fully productive at age 2:11.

The cases in which mapping of the I-configuration to sentences with past forms is possible were first observed at 2:9.

The analysis of her spontaneous comments, conversation on a topic referring to a past event, and replies to questions with past forms suggest that early mapping was restricted to the copula verb 'be' in the form of 'was'. She used the 'was' in some instances during the period 2:9 to 2:10 but after this, no productive use was observed until 3:5. She also used the past progressive with an auxiliary verb 'be' in the form of 'was' at 2:10, but then without any situational or linguistic context to specify the Cognition time. At 3:2 (sample (16)) a linguistic context was supplied. Different verbs other than 'be' began to be used in conversation at 3:3. These findings suggest that the onset of the mapping of the I-configuration to sentences with past forms was later than the mapping of the P-configuration. It began to be productive at 3:2 to 3:3 and was fully productive at 3:5 to 3:6. This was again later than that of the P-configuration.

We have seen the data on Mary analyzed in terms of the principles proposed earlier for an adult's interpretation of tense. The analysis suggests that developmentally there is consistent difference between the mapping of the P-configuration and the I-configuration to sentences with past forms. This supports the claim that two separate configurations map to sentences with past forms.

7. Discussion

7.1. The Theory of Weist (1986, 1989)

Let us now turn to the theory of acquisition of tense proposed by Weist(1986, 1989), and see if the analysis presented here conforms to his theory. It should be noted that Weist(1986) adopts Reichenbach's framework, which posits the Speech time(ST), the Reference time(RT) and the Event time(ET). Recall that it claims that sentences with the present perfect are treated as representing the temporal configuration, $ST=RT>ET$.

Investigating cross-linguistic acquisition data as well as his own in Polish, Weist(1986, 1989) proposes a hypothesis, in which he claims that children progress through a sequence of four temporal systems. An initial temporal system is called the Speech time (ST) system, where RT, and ET, are frozen at ST. Speech time is the only functional time concept at this stage, and only the distinction between statements and requests is expressed.

The second system, called the Event time (ET) system, allows the ET to be ordinal to ST while RT remains frozen at ST. Children begin to express the deictic relationship between ST and ET, as well as the aspectual distinction between internal and external perspectives of situations. The past verb forms begin to be used at this stage.

The concept of Reference time becomes functional in the third temporal system, which is called the restricted Reference time system. The restricted Reference time system allows RT to be shifted away from ST. Reference time is defined as the temporal context for an event. It either remains at ST or incorporates the time of the event. The system is characterized by the onset of the use of temporal adverbs and temporal adverbial clauses, and also by the absence of temporal prepositions signifying 'before' and 'after'. In the fourth the free Reference system, ST, ET and RT can represent three

different points in time and can be related freely.

What Weist means by 'remain frozen' is not very clear. In Weist(1989) he states concerning the Speech time system, "Initially children code events as if they occurred during the Speech time interval, and the child's point of temporal reference is also at Speech time." (Weist, 1989; p.66) Reasoning from this, RT 'frozen' at ST means RT at the same point with ST.

Now let us see if the order of acquisition Weist(1986, 1989) proposes conforms to our analysis. As Weist's notion of Reference time differs from our notion of Cognition time, and he infers children's temporal concepts from linguistic expression, whereas the approach taken here is the reverse, the two hypotheses make different claims if compared in detail. However, it suffices now to note that the following two points are in accordance. First, children map two different temporal configurations to sentences with past forms. (In Weist's(1986, 1989) theory this happens sequentially in the course of development, whereas the claim here is that the two different mapping coexist even for an adult, as we will argue in detail below.) Second, the temporal configuration children first map to sentences with past forms is the one in which the Reference time or the Cognition time is set at the Speech time.

7.2. Reichenbach's Theory Examined in Light of Acquisition Data

If we try to explain this general order of acquisition within the framework of Reichenbach's theory, a problem arises. Notice that in the Event time system, the Reference time is at the Speech time and the Event time itself is placed prior to both, i.e. $ST > RT > ET$. As we have seen earlier, this temporal configuration corresponds to a sentence with the present perfect in the Reichenbachian framework. This means that children first map this temporal configuration to sentences with past forms, and when they proceed to the third restricted Reference time system, the mapping established in the second system is abandoned, because in the Reichenbachian paradigm, only the temporal configuration, $ST > RT = ET$, which emerges in the restricted Reference system corresponds to sentences with past forms. They establish the mapping for the present perfect still later.

Weist(1986, 1989) avoids this complexity of mapping by claiming that the present perfect is acquired in the third system, when children become capable of shifting the Reference point. But as long as Reference time is said to 'remain' at ST, this is not very convincing. In Weist(1986), after admitting that RT remains frozen at ST, in the second system, he states, that the concept of Reference time emerges in the third system. These statements seem contradictory, but if we accept the concept of Reference time emerging only in the third temporal system, the second ET system must lack this concept, thus as Smith(1980) claims only ET is related to ST. In this case, however, a child's grammar does not conform to an adult's.

These complexities derive from the Reichenbachian notion of 'Reference time', and are also due to letting the temporal configuration, $ST = RT > ET$, map to sentences with the present perfect. The hypothesis for the interpretation of tense proposed here avoids these complexities. It simply claims that a child acquires the mapping of the temporal configurations in order. Not only that, as the temporal configurations incorporate aspectual distinctions, the hypothesis here also accounts for the

aspectual distinctions children make in acquiring past forms.

8. Summary and Conclusion

The analysis of the adult's interpretation of the past tense seen in sections 2 through 5 has led us to postulate the following hypothesis: Speech time(t_s), Cognition time(t_c) and Event time(t_e), are the primitive temporal terms. Each of them is considered a variable to be specified, allowing an extra-sentential element to be a specifier. The past tense is interpreted in terms of a relative order of the values of these variables. Two temporal configurations, the P-configuration ($t_s=t_c>t_e$) and the I-configuration ($t_s>t_c=t_e$), map to the English sentences with past forms depending on how an event is conceived of. In addition to the three temporal terms, the speaker and the cognizer are also posited as primitive variables to be specified. This allows the interpretation of tense in embedded clauses to naturally follow from the principles proposed for simple sentences. The different interpretations of the past tense observed among relative clauses, complements of verbs of thinking and verbs of saying are explained with respect to the intensional world in which the embedded event occurs, and the relative order of the temporal values.

Analysis of the acquisition data of an English-Japanese girl, Mary, in terms of the hypothesis proposed, has revealed that the two temporal configurations mapping to sentences with past forms follow different developmental trends. It has been shown that the mapping of the P-configuration to sentences with past forms is acquired and becomes productive earlier than the mapping of the I-configuration. The results conform to the developmental trend reported in Weist(1986, 1989). Acquisition data support the present hypothesis rather than the Reichenbachian scheme.

Although further study awaits in many areas, only a few of them can be mentioned here. They are: the adult's interpretation of tense in interrogative and negative sentences, and embedded subject clauses; analyses of temporal configurations represented by nonfinite embedded clauses, and the mapping of configurations which involve posterior relation to the Speech time and the Cognition time. Regarding the acquisition of the past verb forms and mapping of the two configurations to sentences with past forms, a comparison of Mary's English and Japanese data will reveal how the development of the conceptual structure and the mapping of the configurations to the linguistic expressions are related.²⁶ A comparative analysis with data of mono-lingual children is also necessary.

Notes

* The portion of this work which deals with the adult's interpretation of tense, is partially based on my Master's thesis, On the Interpretation of Tense in Finite Embedded Clauses, submitted to Ochanomizu University in 1990. The spontaneous speech collection and the elicited conversation reported here were conducted while I was preparing my M.A. thesis under the supervision of Noriko Imanishi. I would like to thank

her for her valuable suggestions and insightful comments given throughout the preparation of my work, as well as for her constant encouragement and patience.

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Sections 2 through 5 are revised English versions of what appeared in Sano(1990, 1991), and sections 6 and 7 are partly based on Sano(1992). Analysis in section 6.2 is newly added for the present work.

1) The nature of Reference time is not clarified in Reichenbach (1947). It is employed to explain the past perfect, and is always located with the Event time except for the perfects. As Declerck (1986) notes, RT is used to refer to two distinct notions: i) 'The time of the situation being referred to,' and ii) 'the time relative to which the situation is located.' (p. 320) Thus depending on researchers who adopt the Reichenbachian schema, interpretation varies (e.g. Hornstein 1990; Ota 1973; Smith 1978, 1981; Partee 1984), and has often invited criticisms (e.g. Comrie 1985; Nakau 1985; Declerck 1986).

2) In the recent works of linguists who take the model-theoretic approach, the notion of Reference time is revived (e.g. Dowty 1982, Partee 1984). For the reason why Prior(1967) discarded the Reference time see note 5.

3) As will be seen in the discussion in section 5.3.2., the fourth temporal term, the Decoding time(t_d) should also be posited as a primitive. However, for the following reasons and also for the sake of simplicity, the discussion here proceeds as if only the three terms are primitives: Previous works do not incorporate the Decoding time. For simple sentences it is always simultaneous with the Speech time except for some special cases mentioned later in the section.

4) The precise definition of the term 'tense' is not pursued here. In order to clarify the distinction between the semantic representations and corresponding linguistic expressions, I confine my use of 'tense' to the semantic representations and the mapping of them to linguistic expressions.

A simple sentence or a clause with the main verb in the past or present form is referred to here as a sentence/clause with the past or present form.

5) Madvig, cited by Jespersen (1924), was also aware of the time that an event is looked at. For the Latin temporal system, Madvig discriminated between the two futures and the two pasts, i.e., present at the future time versus future at the present, and present at the past time versus past at the present. However, Jespersen (1924) regarded the two to be redundant, and

his view was espoused by Reichenbach (1947).

Among the precursors of tense logic mentioned in Prior (1967), Findley was aware of the time of the intensional world. He posited the equations in (i) as a part of his tense logical laws.

- (i) a. x present = (x present) present
 b. x future = (x future) present = (x present) future
 (Prior (1967) p. 8-9)

Clearly, Findley noted the different points of time from which we look at the extensional world. In the calculus of truth values, however, the two futures in (i) can be treated as equivalent, thus in the tense logic of Prior (1967), such differences are discarded, and the equations in (i) are represented simply as in (ii).

- (ii) a. $x = x$ present x present = x
 b. x future

6) In Lyons' (1977) original notation, different subscripts are used to represent the different worlds, but for the sake of simplicity, they are represented by the ones employed here.

7) Among many others are, Declerck (1979a, 1979b), Dahl (1981), Langacker (1982) for the former and Vendler (1967), Leech (1971) for the latter.

8) It is considered here that two different temporal relations, $t_c = t_e$ and $t_c > t_e$, map to the auxiliary verb 'have' plus a past participle. The relation $t_c = t_e$ represents only $y = a$ events when mapped onto this form. Therefore a $y \neq a$ event must be converted to have the property of a $y = a$ event. We let the [_IHAVE + P.P.] represent this temporal relation. The difference between the unmarked $y = a$ event and the event represented by the [_IHAVE + P.P.] is that only the onset of an event is bounded in this form. Hence, the event can never be interpreted as terminated, which forces the Cognition time and the Event time to be always simultaneous.

The relation $t_c > t_e$ forces the event to be bounded and terminated. We let the [_PHAVE + P.P.] represent this temporal relation. The past form of this is represented here as [_PHAVE+ED + P.P.]. As more precise analysis of the structure involving the auxiliary verbs is necessary, we will not go into detailed analysis of these forms here.

9) What is presented in (5) is for English. Other languages such as French need two separate configurations for (5c), i.e. $t_s > t_c = t_e$ ($y = a$) and $t_s > t_c = t_e$ ($y \neq a$), since they map onto different linguistic expressions.

10) Observe the contrast of (6f) vs. (7d); (6g) vs. (7e); and (6h) vs. (7f). In (6h), which represents the P-configuration, the robber is interpreted as being dead at the Speech time, whereas in (7f), which represents the I-configuration, the interpretation is that s/he is very likely to be alive.

11) Precisely, it is the value of a term that specifies a variable, but we say that a term specifies a variable. Likewise we call a term as a specifier.

12) Weinrich (1977), Partee (1973) and Peterson (1979) suggest

that the temporal reference (of t_c and t_e here) can be either definite or indefinite. When indefinite, it is either specific or nonspecific, just like a nominal reference.

13) The value of the adverbial which specifies the Cognition time does not have to be the one indicating an exact point on the time axis.

(i) Yesterday/ Last week, John swam in the lake.

As in (i) if the value of an adverbial represents a unit on the time axis, and if macroscopically it can be reduced to a point on the time axis, such as, a day of a week, a particular month etc., can serve as a specifier.

14) The specifying Event time and Cognition time do not have to be those of the immediately preceding sentence. See Smith (1978).

15) In other languages such as Turkish, what is directly witnessed by the speaker and what s/he comes to know via other person's reports map to different verb forms.

16) Beside Hornstein (1990), Ota (1973) and Smith (1978, 1981) also adopt Reichenbach's framework to explain the interpretation of tense in embedded clauses. Both Ota (1973) and Hornstein (1990) propose operational principles which work on the schematically represented configurations, and their analyses are confined to a single sentence. Smith (1978, 1981) on the other hand, treats the temporal terms as referential and proposes interpretive rules applicable across sentences.

Ota (1973) does not conform to the SOT rule, but instead proposes movement and deletion rules for the embedded Speech time and the Reference time. The last two problems noted in Hornstein (1990) can be avoided, but the first remains with his theory as well.

Smith's (1978, 1981) theory is free of the problems mentioned above. The analysis presented below has been aided by her discussion of tense in embedded clauses. It should be noted, however, that her analysis of the interpretation of tense in simple sentences is different from the analysis here. She considers that a combination of 'tense' and an adverb establishes the Reference time. In the example, 'Roger called before noon' (Smith 1981, p.216) the combination of past 'tense' and noon specifies a past RT and before indicates that ET precedes RT. The principles below are derived from the analysis of simple sentences seen above, which differs from Smith's (1978, 1981).

17) The research group was organized by Noriko Imanishi (professor) and started the collection of Mary's speech in January 1986. The members of group were Michiko Nishio (professor), Hiromi Kizu Hayashi and Mika Yuzurihara Kobayashi (both undergraduate students then) and I.

18) I would like to thank Mary's parents and grandparents for their understanding and cooperation. I owe special thanks to her mother, who kindly served as an experimenter as well. Only with her help was my study possible. My thanks also go to several former students at Ochanomizu University, especially Hiromi K. Hayashi, Tomomi Kougo and Miwako Shimazu, for their help in transcribing the speech samples. The final check of the

transcription to age 3:4 was done by Noriko Imanishi and thence by me.

19) For claims that early past verb forms mark only an aspectual distinction, see Bronckart and Sinclair (1973), Antinucci and Miller (1976) and Bloom et al. (1980) among others. For claims that early past forms are used deictically to indicate the temporal relation between an event and the Speech time, see Smith (1980), Fletcher (1985) and Weist (1986, 1989).

20) Sounds that cannot be distinguished as speech are indicated by 'xx' and ambiguous speech is in parentheses. Situational contexts are given in brackets.

21) The numbers in parentheses stand for the serial number of the paper, the page where a comparable description is found and, the example number in Imanishi (1987-88).

22) I noted the following points in the analysis of Mary's speech after age 3:4: At age 3:6 one instance of overgeneralization of the -ed inflection (broken) was observed, and another at 3:11 (taached). Occasional absence of the past marking in required linguistic and situational context was observed until she reached the age of 3:5.

Although the number of English verbs she used was relatively small, Mary's developmental trend for past forms accorded with that of an English mono-lingual child. Sophie's speech samples, reported in Fletcher(1985) show the same general trend noted for Mary at about the same age: At 2:4 Sophie uses verbs only in root forms. At 3:0, the past forms of some irregular verbs and only one instance of a regular verb, are observed. At 3:5 both regular and irregular past forms appear in required context, but an instance of the lack of the past marking is also noted.

23) For 'had' and 'did', there were preceding utterances of her mother using the same verbs in the past forms. No contrastive forms were observed for 'forgot'. This is probably why it is not listed in Imanishi (1987-88). The sentences in which Mary used these verbs were: I found it/ [Mary had a white blanket...What color is it?...It's as white as snow] Mary had white one/ [You did lots of unchi [=feces], didn't you?] I did a big one (excerpted from Imanishi (1987-88)(4; 108; 111) / I forgot (not mentioned in Imanishi) / Ah I spilled (5; 99; 146)/ I opened (6; 93; 162).

24) I excluded the use of 'had' observed in note 23. Because it was a kind of repetition and no other use was observed until sample (16).

25) We just note here that for (27), even if the Cognition time and the Speech time are set at the time when Mary was at school, she could still say "Sharon didn't come," but for (31) it would be "Taisuke isn't here."

26) I would like to thank Steven Pinker for directing my attention to this point.

Appendix A: The Child and the Data Collection Procedure

As the detailed description of Mary's language environment and the data collection procedure are given in Imanishi (1987, 1987-88), only a summary is presented here. Mary is the first child of an American mother and a Japanese father, both with post graduate educations. Since birth, her mother has consistently spoken English with her, (even when with company who speak Japanese). Her Japanese grandparents, who live near by, speak only Japanese with her. Her father spoke English with her until she reached 3:1, but after her return from the United States, mentioned below, he speaks Japanese with her. Her parents converse in English between themselves in her presence. She was born and has been raised in Tokyo. For two months at age 0:11-1:1 and 2:11-3:1 she was with her American grandparents in the United States, during which time, she spoke only English. She attended an international playgroup class at 1:4 and later a nursery school one to three times a week, where the teachers spoke English to the children.

The English and Japanese samples were collected separately, the former at her home and the latter at the home of her Japanese grandparents. Three student members of the research group made home visits two at a time. The language used was according to the place of recording. On each visit, samples were recorded on cassette-tape and video for one and a half hours. The average frequency of the visits was twice a month for English, and the same for Japanese. Besides these recordings by the research group, her mother occasionally provided cassette-tape recordings of conversations with Mary. During her two month stay in the U.S. at 2:11-3:1, only a few tapes were recorded at age 2:11 by her mother. The U.S. stay accelerated her English development, but right after her return to Japan, she did not speak Japanese for a while. During this readjustment period only a few visits were made. Thus there are no samples for the age period of 3:0 to 3:1.

Appendix B: Elicited Conversation at Age 4:4

Purpose:

I conducted a series of experiments to investigate Mary's acquisition of the past forms and the mapping of the configurations to linguistic expressions. Reported here is the first of a series conducted specifically to elicit the use of past forms as naturally as possible, by presenting stimuli via video.

Procedure:

Two short skits from Sesame Street were edited and presented to Mary. After each skit she was asked questions by her mother, who was previously instructed on the object and the procedure of the study. Her mother was instructed not to explain the scenes, and to start with general questions such as 'what happened?' before proceeding to more specific ones. While the child was responding, a plain blue screen was on the video.

Stimuli:

Skit 1: (Duration; two minutes 40 seconds) Ernie stacks seven 'beautiful' cupcakes he has just baked on a plate. While he is gone to get his camera to take a picture of them, Cookie Monster snatches the top cupcake and hides under the table.

Ernie returns and finds that the top cupcake is missing. He is puzzled but he puts another one on the top and tries to take a picture. While he is behind his camera, the top cupcake is lost again. Even more puzzled, Ernie places the last cupcake on the top and then he takes a picture with a flash. Again the top cupcake is gone. After a few seconds, a polaroid picture is developed. There Cookie Monster is, putting a cupcake into his mouth.

Skit 2: (Duration; one minute) A boy wakes up and looks out of the window. He finds it is raining. He gets dressed and puts on his raincoat and rainboots. He runs down the stairs and goes out. But it is sunny out. He goes back to his room and looks out of his window again. He sees rain. He dashes out and finds that what appeared to be rain is water from a sprinkler.

Skit 1 has Ernie's speech, boasting of his cupcakes, counting the cupcakes on the plate, and being puzzled by their disappearance. Skit 2 has only musical accompaniment.

Results:

The mother's questions and the child's answers are shown below.

Skit 1:

CHILD

MOTHER

Oh Mary, what happened?
What happened, love?
That was fun.
What ...what happened, hmm?
Hmm, what happened?
What happened?

(pretends to eat cupcakes)

What's that?
Who did what? Huh?
What happened, love?
That was so funny.
What happened?
Did you eat all the cupcake?

1 Cookie Monster ate the top cupcake

Cookie Monster ate the top cupcake. What did, who, who, whose cupcake were they?

2 Ernie n-toko
[Ernie's in Japanese]

Ernie's. Umm.
So Ernie made some cupcakes and then, Cookie Monster ate the top cake.
Did he do it just once?

3 No (indicating four with the fingers)

No? How many times?

4 Four (whisper)

Four times. Yeah. I think maybe that was it.
What was happening? Huh?

- 5 'Cause he was taking a picture
 picture
 Why didn't Ernie know, Mary?
 He was taking his picture. I see. Who, how did he know who was taking his cupcakes?
 Did he find out who was taking his cupcakes?
- 6 Because the picture (whisper)
 Because what?
- 7 Picture
 Because the picture.
 What about the picture?
- 8 Cookie Monster
 Cookie Monster?
 Cookie Monster what?
- 9 Cookie Monster's the name of it?
 Cookie Monster is his name.
- 10 Cookie cookie, cookie
 What did he do?
 Cookie Monster what?
 What kind of picture was it?
 What kind of picture..
- 11 Cookie Monster eating cupcake
 Cookie Monster eating cupcakes.
 Yes, Cookie Monster was eating his cupcakes.
 What about the picture in the very end?
- (Mother asked few more questions but Mary didn't answer to any hereafter.)
- Skit 2:
 Oh that was funny.
 That was a funny one, too Mary.
 What happened? What happened?
- 12 The boy went up and got on the hood, he got his shoes and then and then it was raining and the water coming out from the um, uh umm the hose
 So the water was coming out from the hose.
 In the very beginning, he woke up, didn't he?
- 13 Um
 What did he do after he woke up?
 Did he look any place?
 Where did he look?
 He got up and he looked..
 What did he do? He...
- 14 He looked
 He looked where? Under his bed?
- 15 No

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- 16 Guess He looked where?
- 17 Guess What?
Guess?
Guess? ...He looked where?
He looked out the window, didn't he?
- 18 Yes And then what did he think?
He looked out the window.
What did he think?
- 19 Raining He thought what?
- 20 It was raining He thought it was raining, that's right.
So then what did he do?
What did he put on?
Did he put on anything?
- 21 The raincoat and boots He... He did what?
- 22 He He ate the raincoat and boots?
- 23 No! What did he do?
- 24 He put on the boots and raincoat I see. And then?
And then he ran upstairs. Right?
- 25 No ran down OK. And then wha... wha...what happened when he...
Then what did he do, he ran downstairs, and then what did he do?
- 26 And then... was sunny so he went upstairs again It was sunny so he went upstairs again.
And he looked what, then what did he do when he got upstairs?
- 27 He got upstairs He got upstairs and then what did he do?
Did he do anything?
- 28 It was raining again It was raining again.
He thought it was raining again, didn't he?
So did he do anything?
- 29 He put on his raincoat and boots and then, and then went out and then the water was coming out of the hose. And the water was coming out of the hose.
That was funny, wasn't it?

It is evident from the results that Mary properly understood the order of events and their causal relations. For Skit 1, her description of the story was not spontaneous but she was being led by her mother's questions, as seen in lines 1 through 11. It is clear from her responses, however, that she properly understood the order of events and their causal relations. For Skit 2, as seen in line 13, she narrated the main events of the scene after being prompted by her mother's first general question. The events she omitted in her first account of what she saw were recounted in correct sequence later as her responses in lines 14 through 29 reveal. No finite embedded clauses were observed in any of her responses.

As marked in lines 1, 5, 12, 14, 20, 24, 26, 27, 28, and 29, she answered with the past forms when asked with the past forms. Furthermore, when an event in the skits was bounded, her response was in the simple past as in 1, 12, 14, 24, 25, 26, 27, 29, and when it was with a constant contour, the answer was then with the past progressive as in 5, 12, 20, 28, 29. Even in an situation like this, Mary distinguished the temporal properties of an event and used an appropriate form in depicting the scene.

The results show that at age 4:4, Mary could map the I-configuration to sentences with past forms. This is evident from her use of past progressives without adverbials in response to questions with the past forms (lines 5, 12, 20, 28, 29). Her narration of the events seen in line 12 suggests that the representation of γ a events with the I-configuration was also possible at this age.

Note

The use of Sesame Street video skits as stimuli was suggested by Noriko Imanishi.

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