DOCUMENT RESUME

ED 358 719 FL 021 283

AUTHOR Otsu, Yukio, Ed.
TITLE MITA Working Papers in Psycholinguistics, Volume 2.
INSTITUTION Keio Univ., Tokyo (Japan). Inst. of Cultural and Linguistic Studies.
PUB DATE 89
NOTE 102p.; Volume 1 is unavailable. For selected individual papers, see ED 331 302, ED 323 759, and FL 021 286-290. Publication partly supported by a grant from the Japanese Ministry of Education and Culture and the INS Corporation.
AVAILABLE FROM Institute of Cultural & Linguistics Studies, Keio University, 2-15-45 Mita, Minato-ku, Tokyo 108 Japan.
PUB TYPE Collected Works - General (020)

EDRS PRICE MF01/PC05 Plus Postage.
DESCRIPTORS College Students; *English (Second Language); English for Academic Purposes; Error Patterns; Foreign Countries; Higher Education; High School Freshmen; High Schools; High School Students; *Language Processing; Linguistic Theory; *Second Language Learning; Semanti. ; Sentence Structure; Speech Acts; Verbs; Writing (Co..position)
IDENTIFIERS Clauses; Connectives (Grammar); Japan; Reflexives; Universal Grammar

ABSTRACT

Seven original research papers are presented. The titles and authors are as follows: "Acquisition of the Argument-Structure of Verbs" (Mika Endo); "A Note on Semantic Selection" (Yoshio Endo); "The Governing Category Parameter in Second Language" (Makiko Hirakawa); "The Use of Connectives in English Academic Papers Written by Japanese Students" (Yasuko Kanno); "A Note on English As-Clauses" (Yoshihara Kumagai); "Structure-Dependence in Second Language Acquisition" (Kazuhiro Naoi); and "Units of Processing in Sentence Production: Evidence from Speech Errors" (Yasushi Terao). (JP)

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MITA WORKING PAPERS IN PSYCHOLINGUISTICS

Volume 2

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1989

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PREFACE

Yukio Otsu
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The second volume of a working papers series tends to be thinner than the first, and ours is no exception. However, this does not mean that our activities have declined since the publication of our first volume. We have had a number of guest speakers in addition to our weekly psycholinguistics workshop in Mita. All papers in the new volume were written by people who participated in our activities in one form or another.

Our first volume attracted the attention of numerous people, and we regret to say that it is now out of stock. We appreciate your continuing support for our activities.

*Production of MITAWPP 2 was partly supported by a grant from the Japanese Ministry of Education and Culture for the Specially Promoted Project 'Theoretical and Empirical Studies of the Properties of Japanese in terms of Linguistic Universals' (No. 60060001, PI: Kazuko Inoue), and by a grant from INS Corporation (Mitsu Sugiyama, President).

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Volume 2

MITAWPP 2 (1989), 3-17

ACQUISITION OF THE ARGUMENT-STRUCTURE OF VERBS *

Mika Endo
Ochanomizu University

1. Introduction

With a decrease in the descriptive power of the categorial component within the principles-and-parameters approach, the role of the lexicon has become all the more important; the information about the argument-structure, or the θ-grid should be included in the appropriate definition of lexical entry in order to have the projection principle and the θ-criterion function properly. Independent of general linguistic theory, a problem such as "How do children recognize the correspondence between syntactic structure and semantic structure?", or "How do they add new lexical entries to the lexicon?" is intriguing in the study of grammatical development. The aim of this paper is to explore the acquisition of the argument-structure of verbs in the early stage, mainly based upon the data I collected using a naturalistic-longitudinal approach.

The organization of this paper is as follows. In section 2, I will survey adult grammar (i.e. the target grammar) to clarify the problems dealt with in this paper. Section 3 will present the observation of what actually happens in the process of acquisition. In section 4, I will discuss the problems raised in section 2.

2. Target Grammar

First of all, let us consider the following sentences.

(1)a. Mary slept.
   b. *Mary slept Lucy.
(2)a. *Mary hit.
   b. Mary hit Lucy.

According to the principles-and-parameters approach, these contrasts can be explained by the θ-Criterion stated in (3).

(3) Each argument bears one and only one θ-role, and each θ-role is assigned to one and only one argument. (Chomsky 1981: 36)

(1b) is a violation of the former part of (3): *Lucy* has no θ-role assigned to it, because the verb *sleep* has a θ-role to assign to a subject but it has no θ-role to assign to an object. (2a) is a violation of the latter part of (3): the verb *hit* has two θ-roles (i.e. one to assign to a subject and the other to an object) but it has only one argument in (2a).

Now let us consider what children should acquire in order to use such sentences as (1a) and (2b) correctly. We can assume at least two things:

(i) the association between the phonological properties of each verb and its meaning including the property of the θ-role, (ii) the correspondence between the θ-role which each verb has and its syntactically realized form. To be concrete, if a child comes to know that a verb pronounced *hit* is one which refers to both AGENT(i.e. hitter) and PATIENT (i.e. hittee), and that both of them are realized as NPs, (s)he can use (2b) correctly.

In this paper I will concentrate upon correspondence (ii). Half of this section will be devoted to the description of discrepancy between the syntactic structure and the semantic structure. To begin with, I will consider two-place-predicate verbs, quoting examples from Huddleston (1984):

(4)a. Ed was writing a letter.
a'. Ed is washing himself.
b. Tom hit Bill.

All the verbs used in (4) appear in the same syntactic configuration [NP__NP]. However, all of them cannot occur in [NP__]:

(5)a. Ed was writing.
a'. Ed is washing.
b. *Tom hit.

Comparing (4a-b) with (5a-b), we can see that verbs such as *write* and *wash* allow an implicit argument while a verb like *hit* does not: (5a) means "Ed was writing something." and (5a') can be interpreted as "Ed is washing himself"(=4a') or as "Ed is washing the clothes", while (5b) cannot be interpreted as "Tom hit something" nor as "Tom hit himself". The verb *hit* must take an NP object. We will assume that a verb which takes an implicit argument has the subcategorizational frame [__(NP)], and that a verb which does not take an implicit argument has [__NP].

What we have observed so far shows that the understood object can be an implicit argument. At this point, we are faced with the following problem: "How do children recognize that some verbs allow an implicit argument and that others do not?"

Before we deal with this problem, let us consider the argument-structure of three-place-predicate verbs in addition to (4) and (5). First, look at the following sentences:

(6)a. Bill put the book on the table.
b. *Bill put.
c. *Bill put the book.
d. *Bill put on the table.

The verb *put* has three arguments. We will refer to them as AGENT, THEME, and LOCATION (henceforward LOC). These are realized as NP, NP and PP respectively. THEME and LOC correspond to the post-verbal NP and PP. Neither of them can be an implicit argument: (6c) cannot be interpreted

as "Bill put the book somewhere" nor does (6d) mean that "Bill put something on the table". The representation of the lexical entry of *put* is as follows (our attention is paid only to the post-verbal position hereafter):

(7) put : <THEME, LOC> [___NP, PP]

Secondly, consider the following sentences:

(8)a. He gave the girl a doll.
b. *He gave.
c. *He gave the girl.
d. He gave a doll.

The verb *give* is also a three-place-predicate. Two NPs follow the verb: one bears the semantic role of THEME and the other bears the POSSESSOR (henceforward POSS) role. Unlike the verb *put*, both of them are not necessarily obligatory: while (8c) cannot be interpreted as "He gave the girl something", (8d) means "He gave a doll to somebody". Although the verb *give* usually takes two NPs in the post-verbal position, only indirect object can be an implicit argument (Quirk and Greenbaum 1973: 370). The representation of the lexical entry of *give* is shown in (9):

(9) give: <POSS, THEME> [___(NP1) NP2]

Here again, we are faced with the same problem as the one mentioned above: "How do children find which verb takes an implicit argument?" In addition, a new problem arises: "Which semantic role can be an implicit argument?" or "Which phrase must be present for the proper realization of the argument structure of a verb?"

In the following section, I will look into the data to see what happens in the process of acquisition, before trying to answer the questions presented in this section.

3. Acquisition of the Argument-Structure of Verbs

The overall aim of this section is to observe the facts concerning the relationship between the realization of the argument-structure of a verb and the acquisition of a verb as a lexical item, based upon a corpus I made following Wells' approach (1985).[1] In section 3.1 some relevant properties of the corpus will be mentioned briefly. In section 3.2. the observational facts connected with the problem stated above will be given.

3.1. Data

I collected spontaneous utterances of a girl from December 1987 to September 1988, from the age of 2;3 to 3;1. The girl, who is called Megumi(henceforth Meg) was born in New York on July 30, 1985. Her father is an American and his native language is English. Her mother is a

Japanese and she speaks both Japanese, as her native language, and English. When Meg was one year old, she moved to California with her parents. When she was 1;6, her sister was born. When Meg was 2;2, she came to Japan with her family. Meg's parents were speaking to her only in English when they were in the U.S.A. After coming to Japan, although her mother began to use Japanese depending on the situation, her parents usually spoke English.

It was when Meg was 2;3 that I met her for the first time. Up until that time she had not spoken Japanese. Gradually she began to speak Japanese. At this early stage, she used both English and Japanese words within a single sentence, but she did not utter sentences which contained only Japanese words. Although the comparison of the acquisition of English with that of Japanese or the interaction between them is a very interesting topic of study, [2] we will not pursue this matter here. In this paper we will concentrate on the acquisition of English only.

The corpus we use in this paper is drawn from conversations in which Meg, her parents, her sister and I took part. I visited Meg's house at least every two weeks (mostly once a week) and recorded her speech for one and half an hours on each occasion. A small-sized tape recorder was used and care was taken to keep it unnoticed by the child in order to avoid creating an unnatural factor.

In the following sections we will investigate the acquisition of the argument-structure of verbs based on the corpus mentioned above. We will also look into Wells' corpus (1985) to examine whether what is true of Meg is also true of monolingual children.

3.2. Observational Facts

In this section, I will deal with the problem pointed out in section 2 in the following way. First I will briefly comment on Meg's grammatical development. Secondly, I will classify the verbs used by Meg based upon the syntactic configuration in which the verb occurs. Thirdly, I will present a close investigation of some particular verbs.

The majority of Meg's utterances from the age of 2;3 to 3;1 are simple sentences. Embedded sentences rarely appear although the verb *want*, which is followed by an embedded sentence without its subject, is productively used (e.g. "I want to go downstairs" (2;7)).[3] Focusing our attention on the simple sentences, we classify the verbs used by Meg based on the syntactic configuration in which the verb appears. (See Table 1.)

Let us now state the general phenomena in Meg's acquisition of the argument-structure of verbs before going on to a closer investigation of some particular verbs. As is shown in Table 1, the major class of verbs used by Meg is monotransitive. The argument-structure of those verbs is properly realized from the beginning. As for pure intransitive verbs which do not take an implicit argument in the post-verbal position (e.g. *come, sleep, cry, talk, walk*, etc), no subcategorizational mistakes are found in the corpus. As one of the relevant examples, I will cite all utterances which contain the verb *come* from the corpus:

Table 1. First Appearance of Each Verb in the Corpus

<1> The vertical column shows Meg's age.
<2> The horizontal column shows the classification of verbs.[4]
A. Intransitive ; I sleep / I go [$_{PP}$to school]
B. Monotransitive ; I have [$_{NP}$a book]
C. Ditransitive ; I give [$_{NP}$you] [$_{NP}$a book]
D. Complex Transitive ; I put [$_{NP}$the book][$_{PP}$on the desk]
<3> **verb** : A verb which can occur in A and B in adult grammar.
<4> *: Incorrect use in adult grammar.
<5> ?: It is questionable whether the verb is properly used or not.

	A [__][__(PP)]	B [__NP]	C [__NP NP]	D [__NP PP]
2;3 | 2;5	come sleep go look read sit	eat like take find open touch get play want have read wear hold remember	ask	*put
2;6 | 2;7	cry talk drink write	bite lost show cut make sing do need wash drink see write	give gave show	put
2;8 | 2;9	walk wash fall pick	bring help broken love brought try	---	---
2;10 | 2;11	?move ?break swim happen *stand study	break lose buy tear	---	---
3;0 | 3;1	dance laugh stay	catch kill hit kiss	---	---

(10)a. You come in. (2;3)
b. Can you come? (2;7)
c. Come here, see. (2;9)
d. See, Gloria's coming. (2;9)
e. And Gloria come to there. (3;1)
f. Mika, Mika, come here. (3;1)

Generally speaking, both the monotransitive verbs and the pure intransitive verbs are productively used in the proper subcategorizational frame from the beginning. Let us here refer to one curious utterance which does not violate this generalization but falls into the group of examples of improper use of a verb.

(11) We can't stand. (2;10)

Apparently this sample causes no problem. Judging from the situation in which Meg utters this sentence, however, the meaning of it should be understood as "We can't make the doll stand up". Then, how can we explain this? One might say that Meg simply omits some of the words in the sentence, that is, *make, the, doll, up,* because of her immature processing ability. This explanation, however, seems to be wrong, if we take it into consideration that she can speak a seven-word-long sentence (e.g. "I go to bed with my father" (2;7)). Rather we can say that she uses the verb *stand* as a causative verb without knowing that it always takes an object. Even when she is 3;1, she uses a real causative verb *break* without its object(i.e. "I break").

Concerning causative verbs, one more thing can be said. There are few verbs which can be ergative among the verbs used by Meg: *open, break, move.* Actually *open* is used only as a causative verb:

(12)a. Can you open it for me? (2;3)
b. She open it. (2;4)
c. Can you open it? (2;4)
d. I wanna open the door. (2;5)
e. Can you open there? (2;5)

The other two verbs are also used as causative verbs except the questionable samples like "Something breaking."(2;10) or "See, something ah, moving among"(2;10). Unfortunately we do not know what the referent of *something* is, so we cannot tell whether *something* can be really interpreted as "patient", or the object of a causative verb is simply omitted. In any case, the number of those verbs that can be causative or ergative is small in the early stage of (at least Meg's) verb acquisition. Although we could discuss this phenomenon along the line of the 'maturation of A-chain' (Borer & Wexler 1987), we had better await further empirical studies. Let us stop here by simply pointing out the fact that we can find only a few causative verbs or ergative verbs, in the early stage of Meg's verb acquisition.

In the following sub-sections, I will investigate the following three classes of verbs: (i) monotransitive (two-place-predicate) verbs which can take an implicit argument, (ii) ditransitive (three-place-predicate) verbs, some of which can take an implicit argument (e.g. *give*), and (iii) complex transitive (three-place-predicate) verbs which cannot take any implicit arguments.

3.2.1. Two-place-predicate Verbs

In this section I will consider two-place-predicate verbs which can take an implicit argument; *eat, read, drink, wash, write, study*. As we have observed in section 2, each of them can be used both as an intransitive verb and as a monotransitive verb in adult grammar. As for *read, drink, wash, write,* Meg properly uses them in both ways from the beginning:

(13)a.	Can you read?	(2;5)
b.	We reading book.	(2;5)
c.	I want you read this book.	(2;6)
d.	I read everything.	(2;6)
e.	Read this one, Mika.	(2;6)
f.	Daddy read[red] it.	(2;7)
g.	And mask when you can read a book.	(2;7)
h.	Mommy read[ri:d] this yesterday.	(2;8)
i.	Reading, um book, little book.	(2;9)
j.	Please read it.	(2;9)
k.	I can read by myself.	(2;10)
l.	I want to read something, another one.	(3;1)
m.	Now let's read um, do you have lots of book?	(3;1)
(14)a.	Mika, you can't drink medicine.	(2;6)
b.	Yeah, you can't drink.	(2;6)
(15)a.	I hope to wash my hand.	(2;6)
b.	Washing hands.	(2;9)
c.	He washing, washing, washing.	(2;9)
d.	Washing his face.	(2;10)
(16)a.	Can you write again Megumi?	(2;6)
b.	I write.(=I can draw pictures by myself.)	(2;6)
c.	I didn't write.	(2;7)
d.	Write a letter.	(2;8)
e.	Don't write on the wall, no.	(2;9)
f.	I want to write.	(2;10)

As for *eat* and *study,* they are also used properly although the configuration in which the verbs occur is always the same: *eat* always appears with its object NP and *study* is used without its object consistently. From what we have observed here, it can be said that the two-place-predicate verb which takes an implicit argument is acquired from a relatively early stage.

3.2.2. Three-place-predicate Verbs

3.2.2.1. Ditransitive Verbs

As for those verbs which can be used as ditransitives in adult grammar, all the verbs in the corpus are *ask, give, gave, show, bring, brought, buy, bought* and *tell*. Among them, however, those verbs which were actually used as ditransitives are restricted to the following: *ask, give, gave* and *show*. *Give* or *gave* appears most frequently. We cannot say that *ask* is productively used as a ditransitive verb since it appears only once in the corpus. The verb *show* is used as a ditransitive as well as a monotransitive verb:

(17)a. I want to show it mommy. (2;6)
b. I want to show my a lot of book. (2;6)
c. I want to show you books. (2;6)
d. Do you show my little chair? (2;8)
(=Do you want me to show my little chair?)
e. I show my rabbit. (2;8)

In addition, *buy* is always used as a monotransitive verb(e.g. "I want to buy ice cream" (3;1)).

One thing should be mentioned here. All the verbs concerned here can occur in both of the frames [__NP1 NP2] and [__NP2 Prep. NP1] in adult grammar. In our corpus, however, they do not appear in the latter frame. It can be said that dative verbs are acquired in the former subcategorizational frame earlier than in the latter one, although the former one is often referred to as a derived structure after the application of the dative alternation.

We will now present a further account of *give* or *gave*, which is used by Meg most frequently among the ditransitive verbs. A collection of Meg's utterances is shown in (18) with representations of semantic and syntactic properties (* indicates an empty place in the subcategorizational frame):

			<POSS THEME>
(18)a.	I wanna give it, again.	(2;6)	[___ * NP]
b.	Daddy gave me present.	(2;7)	[___ NP NP]
c.	I gave another fish, OK?	(2;9)	[___ * NP]
d.	Give pillow.	(2;10)	[___ * NP]
e.	Give me a shave(=shaver).	(2;11)	[___ NP NP]
f.	She's giving *osukuri(=okusuri).*	(2;11)	[___ * NP]
g.	Give your Sesame Street book.	(3;1)	[___ * NP]
h.	I will give you *ohana.*	(3;1)	[___ NP NP]
i.	I will give you, I will give you.	(3;1)	[___ NP *]

We cannot find any full NPs which bear the semantic role of POSS. NP1 (i.e. indirect objects) are easily realized as pronouns. Concerning this phenomenon, deVilliers and deVilliers(1985:94) points out that young

children tend to treat dative verbs with particular pronominal indirect objects as frozen forms. "Give me[gimi:]" is one of the typical forms. It is true that Meg uses a pronoun when she expresses an indirect object, but she seems not to treat the verb *give* and its indirect object as one unanalyzable form. She uses not only the present form of *give* but also the past form *gave* from a relatively early stage (See 18b). Further, she uses the pronoun *you* as well as *me*.

It can be said that Meg knows that the verb *give* or *gave* takes POSS and THEME as arguments from a relatively early stage (See 18b). We cannot tell, however, whether she knows that POSS can be an implicit argument while THEME cannot. How do children come to realize that NP2 is obligatory while NP1 is optional? Further how should this problem be dealt with in the total picture of the acquisition of verbs? Before we deal with this problem, we will observe the acquisition of one more verb.

3.2.2.2. Complex Transitive Verbs

In this section we will consider a complex transitive verb. Although in our corpus only *put* falls within this class, as is shown in Table 1, the study of this verb makes us notice an important aspect of the acquisition. The first sentence which contains *put* appears when Meg is 2;5. The relevant samples are shown in (19) with representations of semantic and syntactic properties [5] :

			<THEME	LOC>
(19)a.	Can you put the book?	(2;5)	[___ NP	*]
b.	You can put this.	(2;7)	[___ NP	*]
c.	Can you put birdie?	(2;7)	[___ NP	*]
d.	No, put it there.	(2;7)	[___ NP	PP]
e.	Can I put this?	(2;8)	[___ NP	*]
f.	Don't put this one, OK?	(2;9)	[___ NP	*]
g.	*Kuma-chan* sick and I put it down.	(2;10)	[___ NP	PP]
cf.	Put more, put more. (=Give him more medicine.)	(3;0)		

In comparison with the adult lexical entry of *put* shown in (7), Meg seems to drop the obligatory phrases freely, especially PPs bearing LOC. Even when a LOC phrase appears, it always takes the form of a single word such as *there* or *down* (See 19d,g). At this point, one might suspect that Meg does not use full locative prepositional phrases at this stage, but this is not the case because such phrases have already begun to appear in several different contexts since Meg was 2;6. Some examples are shown in (20).

(20)a.	I have a red *on the basket.*	(2;6)
b.	Sleeping *in a towel.*	(2;6)
c.	A Gloria is *in a basket.*	(2;7)
d.	Don't write *on the wall,* no.	(2;9)

Now it can be said that the reason she drops PPs bearing LOC is not because she does not know how to express locational meanings. Moreover, her processing ability does not matter either, for the same reasons stated in 3.2. Then how can we explain what we have observed? Before we try to answer this question, let us refer to Wells' corpus.

We would like to mention three children here. To begin with, let us consider a girl called Elspeth. A collection of all her utterances which contain *put* is as follows:

(21)a.	Shall I put it on your finger?	(2;6)
b.	Shall I put it on my fingers?	(2;6)
c.	Shall I put it on your finger George(v)?	(2;6)
d.	I will put that one.	(3;0)
e.	Pussycat put any faster (laughs)	(3;0)
f.	I put him on the path.	(3;3)
g.	Shall I put the caterpillar on the path.	(3;3)
h.	Why - why you want to put your sock back on?	(3;3)
i.	- take it - the put the box down.	(3;6)

Although we cannot precisely say what was happening right before or right after 3;0 because the recording interval of the corpus is three months, we can presume that she drops an obligatory phrase of *put* around 3;0.

Judging from the data of the two children including Meg, we might be tempted to say that only a LOC phrase can be optional in children's grammar. Further investigation, however, indicates the possibility of dropping an NP bearing the semantic role of THEME. Some of the examples are shown in (22).

(22)a.	Put round there.	(Jonathan	3;0)
b.	Me put in a - in a <table>.	(Iris	3;3)

Here we should say one more thing. It is true that both Jonathan and Iris drop not only a LOC phrase but also a THEME phrase, but the frequency of the latter case is lower. Although there may be reasons for this, we will put it aside for the time being.

Now let us consider how we can interpret the phenomena shown in (19) and (21). One thing we can assume is that children do not know which phrases are obligatory ones although they can deduce from the meaning of each verb the number and the kind of the arguments they can take. To be more concrete, children know that either a THEME phrase or a LOC phrase can follow the verb *put,* but they do not know that both of them are obligatory phrases. Speaking of Meg, she regards a LOC phrase as optional at least during the period mentioned in (19). Here we have a question: how do children recognize that these phrases are obligatory?

4. Discussion

In the preceding sections, we have observed that children undergo a

period in which they drop the arguments of certain verbs; in other words, they seem to regard obligatory phrases for a verb in adult grammar as optional ones at a certain stage of acquisition. Then how do children shift to the very knowledge that adults have? In this section we will deal with this problem.

Before starting our discussion, it is necessary to remember what we have observed in 3.2. First, the major class of verbs used by Meg is monotransitive. Secondly, we can hardly find mistakes in the subcategorization of the monotransitive and the intransitive verbs. In these respects, it can be said that the monotransitive verbs and the intransitive verbs (although the number of them is smaller) are used correctly and steadily from a relatively early stage of the acquisition of verbs. In the same stage, however, the classes of verbs that we have investigated in 3.2.2 is still unstable. Based on these observations, we will assume that before children start to use such verbs as *put* and *give*, the two molds shown in (23) [6] are established connected with the argument-structure of intransitive verbs and monotransitive verbs:

(23)a. NP(AGENT) - V
b. NP(AGENT) - V - NP(THEME/PATIENT)

Once these two molds are set up, children begin to learn many of the intransitive verbs and the monotransitive verbs efficiently.

We will now start our discussion. To begin with, we will consider the role of 'experience'. Following Chomsky (1981), we will refer to three types of evidence that can (or may) be used in the process of the acquisition of grammar:

(24)a. Positive evidence
b. Direct negative evidence
c. Indirect negative evidence

Let us now consider the problem mentioned above in the light of (24). First, the positive evidence is available to children in the following way: they hear sentences spoken by adults around them, and they come to notice that *put* can take THEME and LOC as its arguments, or that *give* can take POSS and THEME as its arguments, although they are unaware of the notion of obligatoriness at this stage. Because of this unawareness, they sometimes drop obligatory phrases for a verb and cannot realize the proper argument-structure. Now we have to recall the tendency which we have noticed in the 3.2.2, that is, a phrase bearing the semantic role of THEME hardly drops. If children are unaware of the obligatoriness of any phrases, how is this tendency explained? For the purpose of dealing with this problem, consider the following sentences:

(25)a. You have candies in your pocket.
b. You put candies in your pocket.

In adult grammar the difference between the two verbs *have* and *put* is the obligatoriness of the prepositional phrase bearing LOC.

(26)a. You have candies.
b. *You put candies.

As for children, it is possible that they regard both *have* and *put* as monotransitive verbs, partly because both of the verbs can occur in the same configuration as is shown in (25), and partly because it is not certain that they would be given the direct negative evidence concerning the ill-formedness of (26b).[7] Moreover, just as they think of "in your pocket" in (25a) as something additional, because the prepositional phrase in question is not analyzable with (23b), so they regard "in your pocket" in (25b) as something additional when they encounter the sentence. If a child classifies *put* into the group of monotransitive verbs in this way, (s)he may sometimes drop a phrase bearing the semantic role of LOC, but does not drop a THEME phrase. To sum up what we have discussed so far, the fact that a phrase bearing THEME hardly drops and that a LOC phrase easily drops is attributed to (23b); children are still unaware of the obligatoriness of a certain phrase. Then how do children leave this stage?

Children who classify *put* into the group of monotransitive verbs based on (23b) gradually come to know that *put* is different from the other monotransitive verbs in the following point: while *put* (almost) always co-occurs with a LOC phrase, the others sometimes co-occur with a LOC phrase and sometimes do not. Then they conclude that *put* is a special monotransitive verb that always co-occurs with a LOC phrase. It is at this stage that children become sensitive to the obligatoriness of LOC. Until this stage, children just search for those verbs that are consistent with (23), and realize the syntactic structure of a sentence simply based on (23).

We would like now to consider the children mentioned in 3.2.2.2 once again. To begin with, let us take up the case of Meg (See 19). It can be said that she still stays at the first stage: she regards *put* as a monotransitive verb based on (23), and phrases bearing LOC which occur in (19) have the same status as the prepositional phrase shown in (24a) has. Secondly, as for the case of Elspeth (See 21), it may be said that she regards *put* as a monotransitive verb at least until 3;0 and that the shift to the adult lexical entry of *put* takes place during the age of 3;0-3;3. Our observation shows that only a LOC phrase that appears after 3;3 is treated as obligatory (See 21f-i).

So far we have shown that the acquisition of the argument-structure of *put* is a special case of that of monotransitive verbs. In other words, the argument-structure of each verb is generally acquired by means of the molds shown in (23), at least before the appearance of embedded subordinate clauses. It is only when they acquire the argument-structure of such a verb as *put* that children rely on indirect negative evidence concerning an obligatory phrase, besides (23).

Let us now consider the acquisition of ditransitive verbs. In 3.2.2.1 we observed apparently the same phenomena as in the case of *put*, that is, dropping an obligatory phrase. Then we are tempted to explain the phenomena or solve their problem, by using the same mechanism as stated above. If we consider the relatively large number of ditransitive verbs, however, we are uncertain whether we can use the mechanism for a minor class of verbs such as *put*, in order to explain the acquisition of a major class of verbs. It seems rather reasonable to suppose that there is another independent mechanism for the acquisition of ditransitive verbs, and that what we have observed in 3.2.2.1 should be dealt with within that mechanism. Before starting to search for a new mechanism, however, we should examine whether our observation is also true with monolingual children.

5. Conclusion

In this paper we have studied the acquisition of the argument-structure of verbs based upon the data collected in a longitudinal way. What we have discovered is that children drop arguments of verbs in the course of acquiring argument-structure. What we have discussed is how children notice the obligatoriness of a phrase bearing a certain semantic role. We have now come to know that children can solve the problem by means of indirect negative evidence, which is assumed to be necessary only for the acquisition of a special class of verbs such as *put*.

Further we have shown that children do not examine the obligatoriness of all phrases. To be more precise, they have to be sensitive only to the obligatoriness of phrases outside the mold shown in (23). Children do not have to explore all the possibilities by means of molds such as (23). It seems reasonable to assume that children have an innate ability to set up a limited number of molds, in order to acquire the argument-structure of verbs efficiently. One of the next tasks for us is to make this idea much clearer.

NOTES

* This paper is based in part on my BA thesis, *A Longitudinal Study of the Acquisition of English,* submitted to Tokyo Gakugei University in 1988. I am greatly indebted to Professor Takao Yagi, Professor Osamu Koma and Professor Tsuguyo Kono. I would like to thank Professor Noriko Terazu Imanishi for her invaluable advice and suggestions. My thanks also go to professor Shuji Chiba, who gave me helpful comments. I am grateful to Professor John C. Lewis and Mr. John Loucky for their cooperation. Last, but not least, I would like to thank Dr. Yukio Otsu for his insightful suggestions and his encouragement. Any inadequacies in this paper are of course my own.

1. This corpus is in the appendix of Endo(1988).
2. Although we cannot deal with this topic in the text, Imanishi(1987-88) enlightens us about the various aspects of a bilingual child.
3. Subordinate clauses have also begun to be used. *Because*-clauses appear in our corpus when Meg is 2;5 and she begins to use them productively from 2;8. In addition, *When*-clauses (used as time adverbials) appear at 2;7. It is when Meg is 3;1 that we can first find *If*-clauses.
4. I adopt the classification by Quirk et al.(1985: 1171)
5. In this paper, I refer to not only a prepositional phrase such as *on the table* but also adverbial phrases like *there* and *down* as a PP.

6(a). The pair of molds shown in (23) indicates that children do not get confused between the two. In other words, children can distinguish between the intransitive verb and the monotransitive verb from an early stage. This claim is supported by the experimental results of Gleitman et al.(1987).

(b). These two molds are constructed by means of the notions which are given to children innately. We owe this idea to Pinker (1984, 1987): 'semantic bootstrapping', 'linking rules' etc.

7. As for 'negative evidence', its effect seems to still be a controversial matter. It is generally agreed, however, that the significance of negative evidence should be reduced as much as possible (Pinker 1987). In this paper we take the position that indirect negative evidence can be available to children while direct negative evidence is not reliable.

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(15)??[$_{AP}$ Dead by tomorrow] though that patient would be, the doctor will do his best.
cf.??[$_{PP}$ Off the ship] though that sailor would be, I hope to see him on the ship again.

These facts seem to suggest that the approach based on purely categorial selection, again, might be erroneous. Our semantically based approach, on the other hand, seems to be able to handle these recalcitrant behaviors of TA in a unified way: the phrases that may be involved in TA are those that express 'state of affairs' or STATE (cf. (12), (13a-b) and (14)).[4]

4. Seem

In this final section I would like to discuss another motivation for capturing the distribution of certain types of constructions in terms of such semantic notion of 'state of affairs' or STATE. The motivation comes from the distribution of the verb *seem*. Wasow (1977) and Siegel (1971), among others, extensively discuss the nature of the complement following *seem*. The distribution of the complement, according to them, is best expressed in categorial terms, i.e. a typical instance for this context is AP. In fact, not only AP but NP and PP, as is well-known, may occur in that position.

(16)a. Mary seems [$_{AP}$ honest].
b. That island seems [$_{PP}$ off the route].
c. It seemed [$_{NP}$ a misfortune].

What is crucial here is that this kind of purely categorial restriction does not seem to provide a natural answer to the question of where the ungrammaticality of the following sentences, despite their categorial status of AP and PP, comes from.

(17)a.??That sailor seemed [$_{PP}$ off the ship]
b.??That patient seemed [$_{AP}$ dead by tomorrow]

A plausible answer seems to lie in semantic selection of the verb *seem*, i.e. the phrases that may occur in the complement

3. *Though* Attraction

Our semantically based approach which attempts to capture the distribution of certain types of constructions seems to be given further support by the rule of what Culicover (1982) calls *Though* Attraction (TA). This rule moves certain constituents to a position immediately before *though* in subordinate clauses. Thus, (12a) below is related to (12b) by TA.

(12)a. Though John was busy, he finished his homework.
b. Busy though John was, he finished his homework.

Culicover, noting the following contrast, suggests that the phrases that may be preposed in TA are AP and NP, which he says is defined by [-N] in Chomsky's feature system.

(13)a.[$_{AP}$ Expensive] though the house is, we have decided to buy it.
b. [$_{NP}$ Genius] though John is, he can't tie his shoe laces.
c. *[$_{VP}$ Running down the stairs] though John was, they made no attempt at silence.
d.*?[$_{PP}$ In June] though the concert is, we decided to buy the ticket now.

However, there are examples that would conflict with this analysis. Consider, for example, the following sentence.

(14) [$_{PP}$ Off the route] though the island would be, we decided to take a picture of it.

This sentence clearly indicates, contrary to Culicover's claim, that PP as well may be involved in TA, which suggests that this categorial analysis leaves something to be desired.

Furthermore, it seems that AP, which Culicover claims to be allowed to be involved in TA, sometimes may not happily participate in this construction, as the follow- ing example shows.

This restriction, he further argues, may be unified in terms of Chomsky's feature system in (10), i.e. the phrases that may be focued in cleft sentences are characterized as those that are defined by [-V].

(10)

	NP	AP	VP	PP
N	+	+	-	-
V	-	+	+	-

However, while this purely categorial analysis, along with Chomsky's feature system, will account for the paradigm in (9), there are other cases which Culicover does not discuss which would not be handled correctly by this analysis. Consider, for instance, the following cleft sentences, where the predicates discussed in the previous section are substituted for the phrases focued in (9).

(11)a. It is [$_{PP}$ off my ship by midnight] that the sailor would be.
b. It is [$_{AP}$ dead by tomorrow] that the patient would be.
c.*It is [$_{AP}$ honest] that John would be.
d.*It is [$_{PP}$ off the route] that the island would be.

Contrary to Jackendoff's and Stowell's claim, the paradigm above indicates that AP may be focused in cleft sentences (cf. (11a-b)) and that the analysis based on categorial terms would have to add some *ad hoc* devices to capture the distribution of the cleft construction (cf. (11a) vs. (11d) and (11b) vs. (11c)), an undesirable approach that we, of course, do not want to pursue. These considerations, thus, lead us to the speculation, again, that the real generalization might be appropriately expressed in purely semantic terms. In fact, a careful examination of the paradigm above seems to suggest that the phrases that are successfully allowed to occupy the focus position of the cleft sentence are those that denote entity (cf. (9a)) or, more crucially, those that express 'change of state' or PROCESS (cf.(11a-b)).[3]

(7)a. *John wants [$_{AP}$ Mary [$_{A}$· honest]]
b. John wants [$_{AP}$ Mary [$_{A}$· dead by tomorrow]]
c.??John wanted [$_{PP}$ the island [$_{P}$· off the route]]
d. John wanted [$_{PP}$ the sailor [$_{P}$· off my ship by midnight]]

(8)a. John prefers [$_{AP}$ Mary [$_{A}$· honest]]
b. *John prefers [$_{AP}$ Mary [$_{A}$· dead by tomorrow]]
c. John prefers [$_{PP}$ the island [$_{P}$· off the route]]
d.??John prefers [$_{PP}$ the sailor [$_{P}$· off my ship by midnight]]

As the contrast between (7a) and (7b), for instance, indicates, the distribution of SCs involving *want* would not be correctly captured in purely categorial terms. Our semantically based analysis, on the other hand, seems to account straightforwardly for this otherwise mysterious behavior of SCs; i.e. *want* selects complements expressing 'change of state' or PROCESS (cf. (7b) and (7d)) and *prefer* selects those that denotes 'state of affairs' or STATE (cf (8a) and (8c)).

Assuming that the semantic approach on the restrictions on SC along this line is on the right track, I would like to discuss some implications of this type of semantic constraint in regard to problems of cleft sentences, *Though* Attraction, etc. that have defied proper characterization for many years. (I refer the reader to Endo (1988) and Appendix for some apparent problems of our semantic approach and what seem to me to be appropriate answers to the problem).

2. Cleft Sentences

Stowell (1981), who attributes the observation to Jackendoff (1977), claims that the phrases that may be focused in cleft sentences are NP and PP.

(9)a. It was [$_{NP}$ your book about double helix] that I wanted.
b. It was [$_{PP}$ under the chair] that I think left my coat.
c. *It was [$_{VP}$ go home early] that Jane did.
d. *It was [$_{AP}$ very angry at me] that John was.

This distribution can be expressed straightforwardly under Stowell's analysis, which requires that the verb *consider* select AP, not PP, and the verb *expect* have exactly the opposite selectional restrictions.

This analysis would provide a simple account for the distribution of SCs in (3)-(4) if it could be sustained, but unfortunately it seems that it cannot be. For instance, Stowell's assumption that the distribution of SCs should be expressed by purely categorial terms such as AP, PP, etc. is fairly directly contradicted, as shown in Kitagawa (1985), by the behavior of SCs containing predicates different from those in (3)-(4).

(5)a. *The doctor considers [$_{AP}$ that sailor [$_{A'}$ dead by tomorrow]]
b. Unfortunately, our pilot considers [$_{PP}$ that island [$_{P'}$ off the route]]
(6)a. *I expect [$_{PP}$ that island [$_{P'}$ off the route]]
b. I expect [$_{AP}$ that man [$_{A'}$ dead by tomorrow]] (Mafia talk)

As this paradigm indicates, both PP and AP, contrary to Stowell's claim, seem to happily participate in SCs preceded by *consider* and *expect*. This leads us to suspect that the correct restriction may not be stated in purely categorial terms and in turn raises a question as to what sort of restrictions govern the distribution of SCs. Kitagawa suggests that the correct restrictions are semantic in nature, which means that *consider* selects a complement expressing 'state of affairs' (cf. (5a)), while *expect* selects a complement expressing 'change of state' (cf. (6b)) (See Nakau (1985) for the discussion of these types of predicates, which he refers to as STATE and PROCESS respectively. According to Nakau, predicates are exhaustively divided into those that express ACTION, STATE and PROCESS on principled grounds.) [1]

The following paradigm would provide some supporting evidence for the semantic analyis over categorial analyis with respect to the distribution of SC. [2]

A NOTE ON SEMANTIC SELECTION*

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0. Introduction

This paper deals briefly with what is sometimes called categorial selection (c-selection) and semantic selection (s-selection) in recent studies of generative grammar. In section 1 I will take up the question of what type of selectional constraint is imposed on English small clauses and will present what seems to me to be an appropriate answer, after briefly examining previous studies of this issue. In section 2 I will suggest that the constraint on small clauses has some crucial implications for some problems of syntax and semantics involving cleft sentences, *Though* Attraction, etc.

1. The Problem of Small Clause

Stowell (1981) proposes an interesting analysis of the syntax of small clauses (SC) like those italicized in (1).

(1) John considers *Mary smart*.

According to Stowell, a SC is analyzed as a projection of its head or predicate, which is italicized in (2).

(2) John considers [$_{AP}$ Mary [$_{A'}$ *smart*]]

The strongest empirical argument for this analysis, I believe, comes from the restricted selection of SCs by higher predicates.

(3)a. I consider [$_{AP}$ him [$_{A'}$ honest]].
b. *I consider [$_{PP}$ that sailor [$_{P'}$ off my ship by midnight]]
(4)a. I expect [$_{PP}$ that sailor [$_{P'}$ off my ship by midnight]]
b. *I expect [$_{AP}$ him [$_{A'}$ honest]].

position of *seem* could be characterized as those that express 'state of affairs' or STATE (cf.(16)), as opposed to those that express 'change of state' or PROCESS (cf. (17)).

5. Concluding Remarks

In this short squib, I have discussed, in a preliminary way, the problem of how to characterize the distributions of certain types of constructions with special attention to the nature of semantic selection and categorial selection. I suggested that a promising answer to this problem lies in semantic selection rather than in categorial selection. This point was discussed with reference to small clauses, cleft sentences, etc. with special attention to such semantic notions as 'state of affairs' or STATE, and 'change of state' or PROCESS. The task before us now seems to be to make explicit exactly what these semantic notions are and to work out the mechanisms that would regulate the correspondence between these semantic and categorial selections, which awaits further research (cf. Endo (in prep) for a proposal along this line).

Appendix

Kitagawa's semantic restrictions on small clauses, as persuasive as it sems to be, does have some problems. Contreras (1987), for instance casts doubt on her semantic explanation for SC on the grounds that this approach cannot provide a natural account for the ungrammaticality of SCs like the following, where SCs do express 'change of state' or PROCESS, and consequently, is wrongly predicted to be grammatical under Kitagawa's assumptions.

(i) *I expected [you an attorney by the end of the year]

It seems to me that a way out of this dilemma, which preserves the merits of Stowell's and Kitagawa's analyses but overcome their difficulty, would be to pursue the possibility of what Chomsky (1985) calls canonical structural realization (CSR), which stipulates that a predicate selects a complement of certain semantic type, which in turn is realized as a category of a certain syntactic type. See Endo (in prep.) for an approach along this line.

Notes

*I would like to express my gratitude to Prof. Yukio Otsu for reading an earlier version of this paper and giving me a number of helpful comments. Thanks are also due to Lori Mays and Simon Pearson, who provided me a lot of valuable suggestions and stylistic corrections in this paper. All remaining errors in this paper, needless to say, are my own.

[1] See also Endo (1985) on this point.

[2] See Adachi (1985) for the discussion of other restrictions on SCs.

[3] See also Nakau (1985) on this point.

[4] I have no explanation at present for the grammatical status of (12d).

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The Governing Category Parameter in Second Language Acquisition[1]

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1. *Introduction*

This paper reports on an experimental study designed to examine how and to what extent native speakers of Japanese acquire syntactic properties of English reflexives. In particular, the focus will be on the effects of the Governing Category Parameter (Wexler and Manzini 1987)[2], which relates to Principle A of the Binding Theory (Chomsky 1981). The goal of this paper is to support the hypothesis that second language (L2) learners are still constrained by Universal Grammar (UG), despite the influence of the parameter setting of their native language as well as the non-operation of the Subset Principle.

Principle A of the Binding Theory states that a reflexive (an anaphor) must be bound in its governing category. In other words, a reflexive must have an antecedent within a certain domain, defined as the governing category. However, it has been suggested that the choice of governing categories is subject to parametric variation. Wexler and Manzini (1987) have proposed the Governing Category Parameter with five values, of which English is set to value (a) which is the most unmarked while Japanese and Korean are set to value (e) which is the most marked, as shown in (1).

(1) The Governing Category Parameter

α is a governing category for β iff
α is the minimal category which contains β and
a. has a subject, or
b. has an INFL, or
c. has a TNS, or
d. has an indicative TNS, or
e. has a root TNS

(Wexler and Manzini 1987:53)

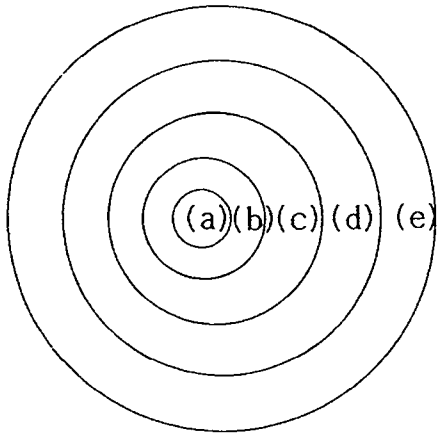
According to this parameter, languages differ with respect to how far away the antecedent can be from the reflexive. For example, in a sentence such as (2) below,

(2) [Susan knows that [Ann wants [Mary to introduce herself]]].

a type (a) language such as English allows only the NP closest to the reflexive, Mary, to be its antecedent since the minimal clause including the reflexive and the subject is the governing category in this type of language; a type (c) language such as Russian allows either Mary or Ann to be the antecedent as the governing category for this type of language is a

clause containing a finite verb and the reflexive; a type (c) language such as Japanese or Korean allows all three NPs (either Mary, Ann, or Susan) to be the antecedent since the whole sentence is the governing category for the reflexive[3]. Thus, a type (a) language is the most restrictive language in that it allows only the closest NP to the reflexive to be its antecedent; on the other hand, a type (c) language is the least restrictive language in that any NP in a sentence can be the antecedent of the reflexive[4]. The values for this parameter setting shown an 'entailment' relationship as illustrated in (3).

(3) The Governing Category Parameter



The data which motivates the smallest grammar is also compatible with any of other grammars.

In a learning situation of this parameter in first language (L1) acquisition, it has been proposed that the Subset Principle (Berwick, 1985; Wexler and Manzini, 1987) leads a child to choose the parameter value generating the smallest subset language first, and proceed beyond that value only when positive evidence for a more inclusive grammar is available. It prevents the child from hypothesizing the wrong grammar; in consequence, his or her grammar is free from errors caused by overgeneralization. A number of studies have found that children correctly bind reflexives to the local antecedent (Jakubowicz 1984; Chien and Wexler 1987; Deutsch, Koster and Koster 1986; Wexler and Chien 1985).

Assuming that the Subset Principle acts in L1 acquisition, we may then ask whether or not it operates in L2 acquisition. Studies have been conducted to examine this issue using parameters with two values, and suggest that the answer is negative where the L1 setting is marked while the L2 setting is unmarked (White 1989; Zobl 1988). L2 learners seem to transfer their superset L1 value in the acquisition of the L2.

The present study examines how native speakers of Japanese set the value of the Governing Category Parameter. An interesting point about this parameter is that it has five different values instead of two; therefore, other values in addition to those found in learners' L1 and L2 are looked into. We are concerned here with three possibilities: whether the Subset

Principle operates, whether the L1 transfer occurs, or whether learners assume neither their L1 or L2 value, but a value in between. Although the last possibility seems the least likely, such was found by Finer and Broselow (1986) among Korean learners of English. Evidence from any of these three possibilities will be compatible with the theory of UG, and thereby argue against the hypothesis that UG is not operative in L2 acquisition.

A study by Finer and Broselow is discussed in detail in the following section, followed by a presentation of my experimental study.

2. Study by Finer and Broselow (1986)

One small pilot study by Finer and Broselow (1986) investigated the Governing Category Parameter in the acquisition of English reflexives by six Korean subjects[5]. Korean is similar to Japanese in that the reflexive can be bound in the whole sentence; hence, it is a type (e) language for the Governing Category Parameter. At the time of testing, the subjects were students in an intensive English language program at a university in the United States. A picture identification task was conducted in which subjects were shown pairs of pictures. The subjects then listended to a sentence and were asked to indicate which of the two pictures was appropriate for the sentence, or whether both pictures could represent the sentence (as would be the case in Korean). The test sentences were of the following two types; each type was represented by four sentences.

(4) a. Mr. Fat thinks that Mr. Thin will paint himself.
b. Mr. Fat wants Mr. Thin to paint himself.

The results show that Korean learners assumed the local antecedent in the tensed clauses but often failed to do so in the tenseless clauses. Results are shown in (5) (Finer and Broselow 1986: Appendix B).

(5)

	Local	Non-local	Either
[Tensed Clause]			
	22	2	0
	(91.7%)	(8.3%)	(0%)
[Infinitive Clause]			
	14	9	1
	(58.3%)	(37.5%)	(4.2%)
Total	36	11	1

Finer and Broselow interpret the result as indicating that the learners have picked neither their L1 value or L2 value, but an intermediate value of the Governing Category Parameter, as it seemed that the learners distinguished [±TNS] as taking the local antecedent in the tensed clause but rejecting it in the infinitival. It would be an appropriate distinction if the target language was either type (c) or type (d) language.

However, this study raises some questions. Although Finer and Broselow argue that their subjects chose an intermediate value, Mr. Fat and Mr. Thin in sentences (4) are both conceivable antecedents for himself in Korean. If there is some strong tendency in the subjects' native language to prefer Mr. Fat in a sentence like (4b) rather than one like (4a), the choice o non-local antecedents may be traceable to the L1. Since no control group of Korean speakers was involved, we cannot confirm this possibility. In order to determine whether or not the subjects chose the intermediate value, we need a test of more complex structures such as the following[6]:

(6) [John says that [Mr. Fat wants [Mr. Thin to paint himself]]].

If L2 learners pick an intermediate value, on the basis of whether a clause was tensed or not, they should not choose John as the antecedent of himself in (6). If it turns out that they allow the non-local antecedent, John, as the antecedent, we must conclude that they are choosing not the intermediate value of the Governing Category Parameter but the largest, as in their L1.

3. *Experiment*

The main concern of the study is to investigate how learners set the value of the Governing Category Parameter where the L1 (Japanese) and the L2 (English) differ.

Three hypotheses to be considered are as follows:

1. The Subset Principle operates identically as in L1 acquisition. This predicts that Japanese learners start with correct English grammar and that there is no misinterpretation of English reflexives.
2. Japanese learners transfer their L1 parameter setting, yielding the incorrect setting for the L2 grammar. This predicts that Japanese learners bind the reflexive to the NP which is not allowed by the English grammar.
3. The Subset Principle does not operate and L1 transfer does not occur either. This predicts that learners choose neither value (a) nor value (e), they somehow pick a value in between.

It can also be hypothesized that there may be progress during the subjects' exposure to English, leading to acquisition of the correct L2 value. To ensure that the experiment would be sensitive to such progress, the subjects were selected from different grade levels.

3.1. *Method*

3.1.1. *Subjects*

Four experimental groups and two control groups were involved in the experiment.

The experimental groups consisted of students from four levels: Group 1 consisted of 13 first-year high school students (age 15~16), Group 2, of 14 second-year high school students (age 16~17), Group 3, of 18 third-year high

school students (age 17~18), and Group 4, of 20 first-year college students (age 18~19). Subjects in Groups 1~3 were students at a private 6-year secondary school located in Ibaraki, Japan. Subjects in Group 4 attended a college located in Yokohama, Japan. They were graduates from various secondary schools. Except for the level difference, each subject was considered to have a similar background with respect to the age at which they had started English lessons and the amount of exposure to English[7]. It should be emphasized that no explicit explanation with respect to the antecedent of reflexives had been given in class.

22 native speakers of Japanese (age 17~18) served as the Japanese control group while 20 native speakers of English (age 17~19) served as the English control group.

3.1.2. Materials

The test was composed of two parts: one was the preliminary test and the other was the main test on reflexives. The preliminary test was to ensure that subjects had mastered the relevant structures and vocabulary in the main test. It was also examined whether they knew that a reflexive must have its antecedent and that a pronominal cannot have its antecedent, in a simple clause sentence. All these subjects passed the preliminary test.

In the main test, a multiple-choice grammaticality judgement task was used with four types of sentences. Types A and C sentences were bi-clausal; Types B and D sentences were three-clausal. Types A and B were made up of finite clauses; Types C and D had an infinitival clause in the most embedded position. NPs appearing in each sentence were of the same gender.

(7) Type A: Tom thinks that John hates himself.
[NP1 [NP2 refl. ||
Type B: Alice knows that May thinks that June hit herself.
[NP1 [NP2 [NP3 refl. |||
Type C: June wants May to understand herself.
[NP1 [NP2 refl. ||
Type D: Tom says that Paul told Bob to introduce himself.
[NP1 [NP2 [NP3 refl. |||

Subjects were asked to indicate who himself or herself referred to in each sentence by circling one of a set of given choices. For example, five potential antecedents are presented after sentence Type A or Type C:

(8) Tom thinks that John hates himself.
a. Tom
b. John
c. either Tom or John
d. someone else:_____
e. don't know

If they considered the sentence to be ambiguous (as it would be in Japanese), they were to choose an either NP1 or NP2 type of response as (c); if they could not find an antecedent in the choices, they were to circle

someone else and to write down who it referred to in the underlined space. The reason that the someone else choice was included was that the corresponding Japanese reflexive, ***zibun***, can be interpreted as having the speaker as its antecedent. It was considered that the subjects might make this interpretation in English. When they did not understand the sentence, they were to circle don't know. For Types B and D sentences nine choices were given: NP1, NP2, NP3, either NP1 or NP2, either NP2 or NP3, either NP1 or NP3, either NP1 or NP2 or NP3, someone else, and don't know.

Each type was tested with five sentences so that a total of 20 sentences were included in the test. The subjects all received the sentences in the same order. It was an unpaced task; however, subjects were encouraged not to spend too much time on each item.

English controls and Japanese controls responded to the same sentences in English and in Japanese respectively[8].

3.2. Results

Although the experimental groups consisted of four levels of subjects, results turned out that there are no significant differences among grades (analysis of variance shows that there is no significant grade effect ($F(1,3)=0.17$ $p=0.918$) nor interaction of grade by type effect ($F(9,183)=0.55$ $p=0.839$); only type effect was significant (a multivariate test of significance shows $F(1,3)=13.766$ $p<0.000$). Therefore the results of the four grades were collapsed into one experimental group.

The responses for the whole test from the experimental group, the English control group and the Japanese control group are given in (9) (in English, NP2 is the correct response in Types A and C, and NP3 is the correct one in Types B and D; in Japanese, all types of responses are correct).

(9)

Overall responses of the experimental group and two control groups

	Control (English) n = 20	L2 learners n = 65	Control (Japanese) n = 22
[Type A]			
NP1	1	55 (17.13%)	69 (62.73%)
NP2	99	247 (76.95%)	29 (26.36%)
NP1/2	0	19 (5.92%)	11 (9.10%)
	100	321	109
[Type C]			
NP1	2	117 (36.45%)	78 (70.91%)
NP2	98	177 (55.14%)	21 (19.09%)
NP1/2	0	25 (7.79%)	11 (10.00%)
	100	319	110
[Type B]			
NP1	1	13 (4.05%)	19 (17.27%)
NP2	0	61 (19.00%)	58 (52.73%)
NP3	98	217 (67.60%)	10 (9.09%)
NP1/2	0	10 (3.12%)	5 (4.55%)
NP2/3	1	11 (3.43%)	13 (11.82%)
NP1/3	0	2 (0.62%)	0 (0%)
NP1/2/3	0	5 (1.56%)	5 (4.55%)
	100	319	110
[Type D]			
NP1	1	12 (3.74%)	14 (12.73%)
NP2	1	107 (33.33%)	66 (60.00%)
NP3	98	172 (53.58%)	12 (10.91%)
NP1/2	0	2 (0.62%)	8 (7.27%)
NP2/3	0	22 (6.85%)	5 (4.55%)
NP1/3	0	3 (0.93%)	2 (1.82%)
NP1/2/3	0	2 (0.62%)	3 (2.73%)
	100	320	110

Note: The choices of don't know and someone else have been removed.

3.2.1. Experimental Group

The most frequent response was the correct one, i.e. the local antecedent, which is NP2 in Types A and C, and NP3 in Types B and D; however, there were subjects who chose the incorrect antecedent for the reflexive, i.e. a non-local antecedent or an 'ambiguous' response, such as either NP1 or NP2, either NP1 or NP2 or NP3, etc. These errors are evidence for the non-operation of the Subset Principle which predicts that subjects will only choose local antecedents for the reflexive.

When the mean number of correct responses in each type is caluculated, (the maximum possible score is 5 for each type), the subjects performed best in Type A sentences (mean 3.800), followed by Type B (mean 3.338), Type C (mean 2.723) and Type D (mean 2.646). Differences found in the following pairs are statistically significant ($p<0.05$): Types A and B, Types A and C, Types A and D, and Types B and C. Therefore, only the difference between Types C and D is not significant.

Regarding only the two-clause structures, the L2 learners were much accurate in finite-clause sentences (Type A) than in nonfinite-clause sentences (Type C). They accepted more non-local antecedents in Type C than in Type A, which replicates Finer and Broselow's finding (1986). When the sentences were made up of three clauses (Type B and Type D), the subjects tended to make more non-local choices. They were less accurate in Type B than in Type A, which suggests that the complex structure of Type B had an effect on subjects' identification of the correct antecedent.

An comparison between Types C and D (both including infinitivals) is of interest in that no significant difference is found. Moreover, the subjects chose local antecedents more on Type B, with a three-clause tensed structure, than on Type C, with a two-clause infinitival structure, suggesting that the subjects were affected by the infinitival more than by the levels of embedding.

3.2.2. Experimental Group vs English and Japanese Controls

The experimental group's responses are distinct from those of both the English controls and the Japanese controls. That is, these L2 learners did not arrive at the correct setting of the Governing Category Parameter; but neither did their response pattern match that of the Japanese controls.

English controls overwhelmingly chose the local antecedents (98%~99%).

Japanese conrols showed a definite preference for the non-local antecedent over the local one. In Types A and C where there were two possible antecedents (either a local NP2 or a non-local NP1), there were more subjects who chose the non-local antecedent (62.73% in Type A and 70.91% in Type C) than those who chose the local antecedent (26.36% in Type A and 19.09% in Type C). In both types, about 10% of the responses indicated more than one possible antecedent. As Japanese is the most inclusive language with respect to the Governing Category Parameter, any NP can be the antecedent for the reflexive in these sentences. It follows, then, that we could expect many subjects to notice this ambiguity. However, there were not many responses which indicated that more than one antecedent was possible. It may be that native speakers (and learners) simply notice

one interpretation even though others are available. If it is the case that native speakers of Japanese do not notice ambiguity where there actually is ambiguity, we might expect the local antecedent and the non-local antecedent to be randomly chosen at an equally frequent rate. However, the non-local antecedent was chosen much more frequently than the local antecedent, suggesting that there was a preference for the non-local antecedent over the local antecedent among native speakers.

When there were three possible antecedents (Types B and D), the middle NP was chosen most frequently (52.73% in Type B and 60.00% in Type D). The local NPs were chosen least frequently (9.09% in Type B and 10.91% in Type D). In both cases, there were some subjects who found ambiguity in interpreting the antecedent; 20.91% in Type B, and 16.36% in Type D. Among these subjects, 4.55% for Type B and 2.73% for Type D responded with either NP1 or NP2 or NP3. The remainder indicated that there were two possible antecedents.

In the Japanese control group, there is no significant difference in responses between Types A and C (χ^2=2.41 p>0.30) nor between Types B and D (χ^2=0.075 p>0.99).

3.3. *Discussion*

As the above results show, we have obtained evidence that the Subset Principle does not operate in L2 acquisition. Our L2 learners fail to set the value of the Governing Category Parameter correctly; specifically, they set the value wider than it should be, allowing non-local antecedents for the reflexive even in tensed clauses.

Finer and Broselow suggest that learners set the Governing Category Parameter to an intermediate value, distinct from either their L1 or L2. As Finer and Broselow's subjects correctly judged Type A sentences (91.7%) to have local antecedents but were much less accurate on Type C sentences (58.3%), their explanation holds for their subjects. A more recent study by Finer and Broselow (1989) replicated this result with many more subjects. However, my subjects made a considerably larger number of mistakes in Type A sentences (23.05%). This result is inconsistent with the value Finer and Broselow assume since no non-local responses are predicted with tensed clauses. In order to account for the non-local responses of my subjects, it is necessary to assume that they have in fact adopted the widest value of the Governing Category Parameter, i.e., the value required by their L1. This accounts for the non-local responses in all four sentence types. If the subjects were choosing an intermediate value of the parameter, then they should not make errors like choosing non-local antecedents or 'ambiguous responses' in the tensed clauses.

However, what remains a mystery if they have in fact retained the widest setting is that the learners made significantly more errors in Type C sentences than in Type A; i.e., the |+tensed| clause distinction observed by Finer and Broselow has real effects, at least in two-clause sentences. This distinction is not attributable to the subjects' L1, as the Japanese controls made no significant differences in responses between Types A and C.

Generally speaking, there were more subjects who chose correct

antecedents than incorrect antecedents. I would like to emphasize this point and argue that some subjects have set the correct value of the parameter for English. For example, there were 10 subjects (out of 65) across four grade levels who responded 100% correctly. These subjects show that resetting of the parameter in the L2 is possible, which argues against the hypothesis proposed by Shachter (1988 a, b) and Bley-Vroman (1989) that UG does not operate in L2 acquisition. There were also 6 subjects who responded almost perfectly but made one error. These subjects may have been misled by their L1 in some cases although they were in the process of arriving at the correct L2 setting.

A final question still remains, namely the lack of improvement over the different grade levels that were tested. The subjects are probably relatively low-level English learners, as they have received English instruction only in a formal classroom situation in Japan. Assuming that Finer and Broselow's subjects were more advanced (in that they were exposed to Englih in the United States), it may be argued that learners move from the widest value to the narrower values as they become more proficient in English (see Zobl (1988) for similar observations).

4. Conclusion

The experimental study reported on here suggests that L2 learners transfer their L1 parameter setting, and consequently make errors in the choice of antecedents for reflexives. Thus it can be concluded that the Subset Principle did not operate properly in L2 acquisition. Errors made by my subjects varied from sentence type to sentence type; as the subjects chose a relatively high number of non-local antecedents in tensed clause sentences, the hypothesis which states that L2 learners choose an intermediate value must also be rejected. All the errors made by the subjects are explained if we assume that they transferred their L1 value for the Governing Category Parameter. It should be emphasized that my results argue against the idea that UG is not involved in L2 acquisition. None of the subjects' responses was incompatible with a grammar of a natural language. Although it is suggested that learners move from the widest setting to the narrower settings, this sequence must be subjected to further empirical investigation.

Notes

1. I would like to express my appreciation to Lydia White for her valuable comments and Yukio Otsu and the members of the MITA Psycholinguistics Circle for their suggestions on the materials of the experiment. I would also like to thank the teachers and the students at Meikei High School in Ibaraki, at the College of Foreign Studies in Yokohama, and at LaSalle College in Montreal for their cooporation in conducting the experiment. This paper is based in part on my master's thesis, submitted to McGill University, April 1989.

2. The Governing Category Parameter has been proposed for both reflexives and pronominals. However, only reflexives are considered in this paper. In

3. Furthermore, it has been suggested that Italian is a type (b) language and Icelandic is a type (d) language.

4. Actually any subject NP can be the antecedent. In addition to the Governing Category Parameter, Wexler and Manzini (1987) propose the Proper Antecedent Parameter which has two values with respect to what is allowed as the antecedent of the reflexive, i.e. subjects, or subjects and objects. The present experiment does include sentences which examine this parameter; however, I will concentrate here on the Governing Category Parameter. The Proper Antecedent Parameter is discussed in detail in Hirakawa (in preparation).

5. Finer and Broselow also examined sentences with pronouns; however, I will not discuss those results here.

6. Sentences with control verbs such as the following, as well as those with ECM (exceptional case marking) verb, are included in the experiment.
[Mr. Fat told Mr. Thin [PRO to paint himself]].

7. Subjects were asked to identify the following in the questionnaire: the age at which they started English, the amount of exposure to English, any living experience abroad, and knowledge of other languages besides English. When the data were gathered, subjects who had had early exposure to English were eliminated; thus, most subjects had started learning English at junior high school (age 12), while a few started within a year of entering junior high school (age 11). Most subjects reported that they spent some time working on English through homework assignments outside the classroom. Those who had lived outside of Japan were excluded. Regarding knowledge of other foreign languages, group 4 subjects knew either French or German besides English. No one indicated that knowledge of another language superior to that of English. Initially, 169 students participated in the experiment; however, on the basis of the criteria described above, 51 subjects were rejected because of their experience abroad, 15 because of their early exposure to English, and 38 because they failed the preliminary test.

8. For the two control groups, the <u>don't know</u> choice was omitted.

Appendix

List of test sentences on reflexives

Type A: two-clause tensed sentence

1. John said that Bill hit himself.
2. June says that Alice understands herself.
3. Tom thinks that John hates himself.
4. Ann remembers that Mary introduced herself.
5. Bob knows that Paul blames himself.

Type B: three-clause tensed sentence

1. Alice knows that May thinks that June hit herself.
2. Paul thinks that Bob believes that John understands himself.
3. May says that Ann knows that Alice hates herself.
4. Bill believes that Tom said that Paul introduced himself.
5. Mary remembers that June said that Alice blamed herself.

Type C: two-clause infinitival sentence

1. John told Bob not to hit himself.
2. June wants May to understand herself.
3. Bob wants Tom not to hate himself.
4. Mary asked Ann to introduce herself.
5. May asks Alice not to blame herself.

Type D: three-clause infinitival sentence

1. June remembers that Alice asked May not to hit herself.
2. John thinks that Bill wants Tom to understand himself.
3. Ann knows that Mary told June not to hate herself.
4. Tom says that Paul told Bob to introduce himself.
5. Bill believes that John wants Paul not to blame himself.

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The Use of Connectives in English Academic Papers Written by Japanese Students

Yasuko Kanno

1. Introduction

Writing English involves skills and rules different from those of speaking, and for this reason, it poses difficulties to most native speakers of English. For non-native speakers of English, however, the task is even more difficult, since they face two additional problems: first, most of them are far more limited in their vocabulary and ability to compose complex sentences than native speakers; second, as Dillon (1981) suggests, writing conventions are culture-bound and therefore non-native speakers must learn them, whereas native speakers can acquire at least some of them naturally through their long exposure to the language and the culture behind it. The first is usually manifested as solecism occurring within sentences, whereas the second tends to cause problems in creating cohesion[1] between sentences. Although, intuitively speaking, grammatical problems typify the non-native speaker's English, problems of non-grammatical nature might in fact prove themselves to be more persistent: while grammatical mistakes can be corrected by consulting dictionaries and grammar books, there is no set way of verifying whether one's writing is in accordance with English readers' expectations.

Among many devices that serve to maintain cohesion in the text is the "connective"—a word or phrase, such as however, in addition, and therefore, that "explicate[s] the conceptual relation between different propositions . . . occurring in separate sentences" (Dillon 1981, p.69).[2] Having instructed writing courses at a Japanese university for several years, Reid (1983) concludes that Japanese students are generally not aware of the function of connectives and he considers this to be a main reason for the incohesion often found in their compositions. This paper will aim to develop further Reid's observation by categorizing and stipulating connectives in Japanese students' writings. At a glance, errors in the use of connectives seem to occur sporadically, but closer scrutiny reveals that they are in fact systematic and it is possible to specify the context in which certain types of error occur.

2. Data

Data was taken from forty-one academic papers written over the past five years by thirty students, ranging from sophomore to graduate, in Keio University, Tokyo. All the papers— from five to fifteen pages in length were written for an English-writing course offered in the Department of English and American Literature. Twenty-nine of the forty-one papers are on literature; five on linguistics; and the remaining seven on other subjects, such as politics and sociology.

3. Types of connectives

Connectives are not limited to one particular syntactic category; any words or phrases, regardless of their syntactic categories, which "show a relationship in ideas between two [or more] statements without connecting them in any grammatical way" (Kane 1983, p. 773) may be considered as connectives.[3]

For the present investigation, all the connectives are counted.[4] Judgment on whether a connective is used correctly or not is based on the corrections made by the native English instructor who has been teaching the course for the past several years and is quite familiar with Japanese learners' English.

There are many possible ways of categorizing connectives, but linguists and rhetoricians generally agree upon the four major types: **additive**, **adversative**, **causal**, and **temporal** (Halliday and Hasan 1976). These four connections can be represented by the words and, but, so, and then, respectively. Subcategorizing these major categories is a more controversial matter; here sixteen subcategories are presented, combining Halliday and Hasan's categorization with that of Quirk et al. (1972) and Ball (1986). They will hereafter be referred to as "connective types". In Table 1, each connective type is explained and connectives which appeared in the sample are listed (the first numeral shows the number of occurrences of a connective and the numeral in parentheses show the number of the correct use):

Table 1. Connective Types

1) **Additive**

- o **Additive** connectives add the following sentence to the previous sentence(s).
  also 49 (41), and 41 (12), moreover 20 (19), furthermore 15 (12), another 13 (13), besides 9 (2), too 5 (4), in addition 5 (2), other 3 (2), again 2 (2), similarly 1 (1), aside from 1 (0)

- **Enumerative** connectives list elements of a catalog.[5]
  first (of all) 23 (18), second 11 (9), one 7 (7), (the) other 6 (5), next 6 (3), another 5 (5), third 4 (4), finally 3 (2), (the) last 3 (2), thirdly 2 (2), secondly 2 (2), at first 2 (2), firstly 1(1), on the other hand 1 (1), fourth 1(1), fifth 1(1), then 1 (1), since then 1 (1), lastly 1 (1)

- **Summative** connectives introduce a sentence which summarizes the previous sentence(s)
  in conclusion 5 (5), in summary 3 (2), in short 3 (2), to sum up 1 (1), in one word 1 (0), all things considered 1 (0), it is concluded 1 (0), in brief 1 (0), my conclusion 1 (0)

- **Appositive** connectives introduce a reformulative sentence of the previous sentence(s).
  that is 6 (1), this means 6 (2), in other words 2 (2), that is to say 2 (2), namely 1 (0), I mean 1 (0)

- **Examples** connectives introduce a sentence which is an example of the previous sentence(s).
  for example 29 (25), for instance 8 (8), especially 2 (1), in particular 1 (1)

- **Manner** connectives indicate that the previous sentence describes the manner in which the content of the following sentence is conducted.
  in this way 3 (3), like this 1 (0)

- **Transitive** connectives mark a change of subject.
  now 6 (2), by the way 3 (0), incidentally 1 (1)

- **Referential** connectives indicate that the following sentence focuses on a particular point.
  as for 13 (3), concerning 3 (1), as to 2 (0), from the point of view of 1 (0), in terms of 1 (0), speaking of 1 (0)

2) **Adversative**

- **Corroborative** connectives indicate the writer's conviction that the the content of the following sentence is true.
  of course 7 (5), in fact 4 (4), indeed 4 (1), naturally 3 (1), clearly 1 (1), surely 1 (1), in effect 1 (1), as a matter of fact 1 (1)

- **Concessive** connectives indicate that the following sentence is contrary to expectation.
  however 72 (61), but 51 (43), yet 6 (5), nevertheless 3

(2), in spite of 2 (2), after all 2 (1), at the same time 2 (1), in any case 1 (1), though 1 (1)

- o **Contrastive** connectives introduce a sentence which contrasts with the previous sentence.
  on the other hand 18 (14), some & other 2 (2), in comparison 1 (0), by contrast 1 (0)

- o **Corrective** connectives introduce a sentence which corrects the previous sentence(s)
  on the contrary 6 (0), rather 2 (1), instead 1 (1), otherwise 1 (1), far from that 1 (0), or 1 (0) to the contrary 1 (0)

3) **Causal**

- o **Causal/Consequential** connectives indicate that the sentences between them are cause and effect.
  therefore 41 (31), thus 24 (15), so 18 (8), that/this/it is because 9 (5), consequently 8 (8), as a result 6 (4), that/this is why 5 (3), for these reasons 2 (2), because of this 1 (1), for 1(1), the reason 1 (0), that is a reason why 1 (0), it was partly due to 1 (0)

- o **Inferential** connectives indicate that the following sentence can be inferred from the previous sentence(s).
  then 11 (7), so 4 (2)

4) **Temporal**

- o **Temporal** connectives indicate that the sentences between them are connected in time.
  then 16 (11), finally 6 (4), later 4 (4), this time 3 (3), next 3 (2), now 3 (1), at last 3 (1), first 2 (1), at that time 2 (1), at first 1 (1), until then 1 (1), in the end 1 (1), after that 1 (0), from then on 1(0), from now 1(0), before this 1 (0), since then 1 (0), in the age 1 (0), after 1 (0), until now 1 (0), at this time 1 (0)

- o **Local** connectives indicate that the sentences between them are connected in place.
  here 19 (13), in this case 2 (2), from here on 1 (1), on this point 1 (1), up to this point 1 (1)

4. Use and misuse of connectives: categories

Using connectives correctly consists of two stages. First, the writer must correctly identify the connection between

sentences. Second, he/she must choose a connective which appropriately describes the connection; for instance, a concessive connection must be indicated by a concessive connective, not by an additive one. Using these conditions as criteria, the use and misuse of connectives in the sample can be classified into the following six types:

Table 2.

- **Appropriate use of connectives** (hereafter abbreviated as **AC**).
  1) The casting of the two narrators as 'normal people' is partly to keep the story close to earth, to make it realistic. They <u>also</u> serve to comment on the inadequacy of the common sense of 'normal people'.[6]

- **Misleading connectives (MC)**: the connection represented by the connective does not correspond to the connection which holds between sentences. This happens when the writer fails to identify the type of connection or to link the sentences as he/she intended.
  2) "Le cabinet de toilette" in the first half of this story is used as a prop to express Marguerite's duality. <u>And</u> [But], in the second half, "le cabinet de toilette" is no longer described.
  3) To insert a recollection in a story can confuse the juvenile reader. <u>That is why</u> Pearce tries to revolt against time using Mrs. Bartholomew's memories.

- **Wrong choice of connectives (WC)**: the connective correctly describes the connection between sentences; however, it sound clumsy and should be replaced with another connective of the same connective type.
  4) At the age of 51, past her best, Clarissa is faced with a sense of "vanity", "weariness", and a "fear" of death; nevertheless, she feels curiously attracted to death, her refuge from this tiresome world. <u>In one word</u> [in short], Mrs. Dalloway [Clarissa] is a symbol of the human conflict between life and death.

- **Redundant connectives (RC)**: the connection between sentences is so obvious that it does not require any connective.
  5) During Ellen's sickness, the boy and his sister spent some months in the house of their maternal aunt. <u>Furthermore</u>, when Aubrey went to a grammar school, his grandfather paid the fee again.

- **Deficiency of connectives (DC)**: the place where a connective is required is left blank.
  6) Although this novel contains the motif of Ophelia, those of Elaine and the lady of Shalott are also involved as

images of a woman related to water and death. [However,] the Ophelia motif is central while those of Elaine and the lady of Shalott are not.

- o **Miscellaneous (M)**: connectives that do not fall into any of the types above, especially those which are difficult to evaluate because the previous or the following sentence does not make sense.

5. Analysis

First of all, it becomes clear that certain types of errors can be associated with each of the four major categories (Table 3.); in other words, different types of connection pose different kinds of problems for the writer. We can illustrate this point by citing examples from the largest subcategory within each major category: additive, concessive, causal/consequential, and temporal.

Additive connectives are marked for **RC** and **WC** errors; this implies that they tend to be overused. In particular, the excessive use of and is conspicuous: out of twenty-nine **R** errors, twenty-two involve and:

7) Similarly, while Anne is teaching, at Avonlea, she goes on a picnic with her friends. There, she enjoys the beauty of the woods and feels refreshed. And, even after her marriage, Anne returns to her hometown sometimes.

8) The parlour, as mentioned above, is arranged for Linton by Heathcliff when Linton is looked after by him. And the first significance of this event is the physical separation of the parlour from "the house". . . Heathcliff, who dislikes his own son, "could not do at all with his sitting in the same room with him many minutes together". And from Zillah's further reports, we learn how Heathcliff uses this room as a prison . . .

In conversation, and often appears at the beginning of a sentence, linking it to the previous sentence. Ball (1986) notes that and is the most frequently used word in English, with the exception of the. The overuse of this word in writing may be due to influence of colloquialism.

Another example of the influence of colloquial expressions is the connective besides; out of nine instances found in the sample six are **WC** errors.

9) First, calligraphy is a very simple cultural pursuit compared with others in Japan. . . . you can start to write if you have a brush, an inkstone, India ink and a sheet of

paper. Besides it [Furthermore], you have to obey only a few rules when starting to learn.

If RC and WC errors of additive connectives are mainly caused by the influence of colloquialism, they may not be peculiar to Japanese learners of English; they may be also prevalent in the writing of native speakers of English.

On the other hand, concessive connectives are noted for their DC errors. (6) is one example, and the following is another:

10) In the above work, there is an assumption that time has only a single flow. In C. S. Lewis's Narnian books, [however,] there are two flows of time: one is of the real world and the other is of Narnia.

Dillon (1981) suggests that, between the additive and the concessive connections, the former is unmarked and the latter marked; when there is no connective, the reader tends to take the next sentence additively, and thus, when it is in fact connected concessively to the first sentence, concessive connective is generally required. Many Japanese students may not be aware of this convention; consequently, concessive connectives tend to be omitted.

Causal connectives play a very important role in academic papers, which are by nature intended to prove or claim something. Nevertheless, these connectives are the most difficult for Japanese writers of English; they use them when they are not required and omit them when they are necessary.

One possible explanation of the excessive use of causal connectives (RC and MC errors in Table 2) is the transfer from Japanese. Petersen (1988) notes that in academic papers written in Japanese, the causal connective shitagatte is the most frequently used connective, saying that he has never seen a Japanese academic paper without shitaggate in it.

This strong liking for the connective shitaggate is probably due to the pattern of argument in Japanese. There are two ways of developing one's argument: one is to introduce the main point first and support it with examples or evidence; the other is to leave the generalization until the very end and start off with examples or evidence (Itasaka 1973). In English writing, both types are used, with possible preference for the first, while in Japanese writing, one generally chooses the second type. That is probably why the connective shitaggate is quite frequently used in Japanese academic papers; it serves to indicate the main point as well as the causal connection between sentences.

In writing English, Japanese students do not change their way of argument; they tend to leave the most important point until the very end:

11) Kappa consists mainly of the narrative of a Japanese man who falls into Kappaland, and stays there before returning to this world to become a patient in a mental home. It is commonly accepted that this story is a satire which bears a similarity to Jonathan Swift's Gulliver's Travels (1726) and Samuel Butler's Erewhon (1879). Therefore (RC) various European aspects in Kappa have been pointed out.

In (11), the generalization is introduced after examples such as Gulliver's Travels and Erewhon are cited. If the last sentence was inserted before the sentence starting "It is commonly accepted", there would be no need to use therefore.

It is also common to repeat the topic sentence at the end of the paragraph, introducing it with a causal connective:

12) A poet symbolizes reality by his language.

13) Therefore, a poet symbolizes the nature in the sense of reality by his language as art.

The last sentence of a paragraph (13) is the repetition of the first sentence (12). Of course, this is a common technique used in English rhetoric: when a paragraph becomes substantially long, the repetition of the topic sentence at the end helps the reader grasp the main point of the paragraph. The point is, however, many Japanese conclude a paragraph by generalization whether or not it is already introduced at the beginning of the paragraph or no matter how short the paragraph may be.

Another possible explanation of MC errors is that the Japanese have a tendency to simply "throw in" facts which they perceive to have logical connections without explicitly verbalizing the connection; they expect readers to look for it for themselves. In writing English, however, it is the writer's responsibility to guide the reader along the course of the argument; when using a causal connective, the writer must demonstrate the logical connection explicitly:

14) Pearce does not speak much about herself; for instance, when a publishing company, Fukuinkan Shoten, asked her for an interview, she replied that the best way to know her is to read her stories. That is why the flow of time is emphasized in her books.

What the writer intends to say is that "Pearce considers the influence of time to be enormous and believes that it is capable of changing everything". When the first sentence in (14) is replaced with this sentence, cohesion is created and the use of that is why is justified.

Since causal connectives mainly used to emphasize the main points, the causal connection marginal to the central argument

often does not receive a connective (DC errors in Table 3):

15) After his brother's trading company went bankrupt, Irving, being the youngest and owing much to his brother, went into business to help. [Thus] forced to face the world of business, the vulgar and annoying realities of life threatened to invade his own imagination.

Irving's facing the world of business obviously results from his going into business, calling for a causal connective. However, this part of the text is not the main point of the paragraph, and it may be for this reason that the connective is omitted.

Temporal connectives do not show any definite pattern in their behavior: there is no noticeable error except for the the slight overuse of then, which can probably be explained by, again, the influence of colloquialism;

16) Soon after this, in the United States a magazine was published with the title Fantasy and Science Fiction (1930-). This gave yet a new meaning to the word. Fantasy was a name given to a set of works. It was a definition born in the twentieth century.
Then at the beginning of this century, research on books for children became popular.

Then often appears in conversation, indicating succession in time. It is probably this influence that Japanese students are apt to use this connective excessively.

A closer look at each subcategory throws light on other points, some of which will be mentioned here.

The WC errors in enumerative connection suggest that the students found it difficult to list items of a catalog clearly. They are often not certain of the number of the items they are listing:

17) In the seventh drawing for the poem, "The Cave of Spleen", more foetuses appear: at the bottom left of the drawing, two foetuses can be found. The left one is a pregnant male. . . .The next one [The other] is on the thigh of one of the "living Teapots". And the last [A third] and hidden foetus is at the centre of the drawing close by a turbaned man with sunken cheeks.

The writer first indicates that there are two items to be listed, but in fact includes three. This kind of confusion of the number of elements to be listed is very common.

In two out of the three PMC errors in the summative category (Table 3), summative connectives were used where appositive connectives are appropriate:

18) Julia's pursuit of Proteus provides a model for Helena in The Midsummer Night's Dream and for Portia and Nerissa in The Merchant of Venice. After Julia, women took a leading roles in Shakespeare's plays, especially in his comedies. In summary [In other words], the heroines of Shakespeare's late comedies were developed from Julia.

The writer presumably intended the third sentence as a summary of both the first and the second sentence, but in fact, it is only a reformulation of the second and thus should be introduced by an appositive connective.

Out of the six **RC** errors in appositive connection, four are instances of that is:

19) This poor dog [Fanny] is nearly hanged by Heathcliff when Isabella runs away from Thrushcross Grange, and Catherine is struck down by her fatal illness. The hanging and the collapse of Thrushcross Grange occur at the same time. That is, Fanny symbolizes the tragedy of Thrushcross Grange.

Transitional connectives tend to be used excessively, as can be seen from the number of **RC** errors in Table 3. They appear typically at the beginning of a new paragraph:

20) By the way, Sōseki was influenced by Millais's "Ophelia", but why did Millais paint Ophelia's death?

Transition can be signaled by changing paragraphs, and thus any further signal is normally unnecessary. Japanese students may not be fully aware of the function of the paragraph, and this may explain the redundant use of transitional connectives. Also, the students may transfer transitional devices normally limited to oral discourse: a change of subject in speech generally requires a transitional connective.

Referential connectives come in very "handy" for Japanese learners of English, whose mother tongue is a topic-comment language; again, this is an example of the first language transfer:

21) Boston was born in Lancashire, Southport. Her family was rigidly puritanical, so she was taught that art, drama and dancing were wicked. When she was eleven, her family moved into the country for her mother's health. This is the period from which the children's adventures in the Green Knowe series are taken. As for education, she and her sister were sent to school in the south, to correct their accents.

The writer first indicates the topic of the sentence, and then, supplies new information.

A very conspicuous error in corrective connection is the connective on the contrary being used instead of a contrastive connective; out of six instances of this expression, none is used correctly, and five are treated as a contrastive connective.

22) Dimmesdale had kept her sin hidden. Hester, on the contrary [on the other hand], could not hide her sin since she had been forced to stand on a scaffold and to wear the scarlet letter, which was the symbol of committing adultery, all her life.

On the contrary indicates that the statement of the previous sentence is false. Most Japanese students, however, never use the connective in this sense; they assume that it is as multipurpose as on the other hand, the reason for which I do not know.

6. Conclusion

Each connective type is thus subject to certain kinds of error. Additive connectives tend to be overused possibly because of the influence of oral discourse. In contrast, adversative connectives tend to be omitted; this may be explained by the Japanese students' lack of awareness that the the adversative connection is usually marked and requires a connective. Causal connectives are the most difficult for Japanese writers of English: typical cases of causal connection may be left "bare", while connections totally unrelated to cause and effect may be marked with a causal connective. This can be attributed to the first language transfer. On the other hand, there is no conspicuous error in temporal connection.

Out of many possible directions in which research on the use of connectives can be pursued, two show particular promise. The first would be an attempt to determine which errors are peculiar to the Japanese and which are also found in native speakers' writing. The second would be an analysis of the uses of conjunctions, such as and, but, because, and although, and a comparison with the uses of connectives. Connectives and conjunctions both serve to link propositions; the only difference between them is that connectives operate between sentences whereas conjunctions operate within sentences. Thus, it is expected that the same pattern of errors would be observed in the use of conjunctions. In these ways it will be possible to clarify difficulties Japanese writers might face when projecting their thought on their writing.

Table 3 The Use of Connectives

Connection	AC	MC	WC	RC	DC	M
Additive	111	9	12	29	8	1
Enumerative	27	3	7	2	1	0
Summative	10	3	4	0	0	0
Appositive	7	1	1	6	0	3
Example	35	3	1	1	5	0
Manner	3	0	0	1	0	0
Transitional	3	1	1	4	1	1
Referential	4	1	5	11	0	0
Additive (Total)	**200**	**21**	**31**	**54**	**15**	**5**
Corroborative	15	1	0	2	5	4
Concessive	117	8	7	2	17	6
Contrastive	16	2	2	1	3	1
Corrective	3	8	1	1	0	0
Adversative (Total)	**151**	**19**	**10**	**6**	**25**	**11**
Causal/Consequential	78	19	4	8	12	9
Inferential	9	1	0	5	1	0
Causal (Total)	**87**	**20**	**4**	**13**	**13**	**9**
Temporal	29	4	6	6	1	1
Local	18	1	1	3	0	1
Temporal (Total)	**47**	**5**	**7**	**9**	**1**	**2**

Notes

[1] Cohesion is defined by Halliday and Hasan (1976) as "relation of meaning that exist within the text, and that define it as a text."

[2] Different names are used by different linguists and rhetoricians: "conjunctions" (Halliday and Hasan 1976), "proleptic words" (Hirsch 1977), and "link words" (Ball 1986). Each has a slightly different definition, but what is common to all of them is that they serve to link parts of the text and help the reader to keep track of the writer's argument. Here, the term "connectives", first introduced by van Dijk (1977), will be used, since it reflects the device's function most explicitly.

[3] A connective can appear not only at the beginning of a sentence but also in the middle, after the subject, and at the end.

[4] Strings of words before and after a semicolon and a colon are counted as two sentences rather than two clauses in a sentence. As far as the use of connectives are concerned, they are more similar to sentences than clauses: several connectives can link strings of words which appear before and after a semicolon or a colon, but not two clauses within a sentence.

[5] Here, each connective is listed separately, but in the text, normally a few connectives are used together to indicate a catalog, such as "first, second, third" and "first of all, next, last". A sequence of connectives, such as those above, is counted as one in Table 3. Similarly, temporal a set of connectives indicating succession in time is counted as one.

[6] All the examples were taken from the papers written by the students. Grammatical mistakes and unusual expressions have been corrected to draw the reader's attention only to the problem of the connective in question. The connective used by the student is underlined; the correction is in square brackets.

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A NOTE ON ENGLISH AS-CLAUSES*

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ABSTRACT

The aim of this paper is to propose a comprehensive analysis of English as-clauses in terms both of their distribution and interpretation.

It is hypothesized that *as* must be a complementizer that can relativize a manner adverb or a manner noun phrase, and as-clauses have been shown to behave differently from wh-relative clauses. As-clauses can be considered as serving to add a supplementary explanation or subjective comment to the head noun (adnominal as-clauses) and the propositional content of the main clauses (sentential as-clauses).

In conclusion, as-clauses, whether they seem to function as adnominal or sentential, should be regarded as adverbial clauses.

ON ADNOMINAL AS-CLAUSES

Adnominal as-clauses refer to the following examples, where they seem to modify their head nouns and constitute complex noun phrases:

(1)All languages as we know them have both semantic and pragmatic meanings at all periods.

(2)These subject clitics as we shall call them share all the significant characteristic behavior of the object clitics.

The as-clauses seem to modify the head nouns *all languages, these subject clitics*. What is significant is that these as-clauses, though they seem to modify their head nouns, behave differently from ordinary wh-relative clauses and the other type of as-clauses:

(3)The accident which Mary saw appeared in the newspaper the next day.
(4)the clusters that Hockett, *ibid.* calls "interludes."
(5)Such girls as he knew were teachers.

In (1), the head noun phrase "all languages" and the pronoun inside the as-clause, "them" are coreferential, whereas in (3), (4), (5), no coreferential pronouns appear inside the relative clauses. As for (2) and (4), notice that the verb *call* can subcategorize for two NPs:

(6)call [+V] [+ NP_1 NP_2]

In (2), NP2 seems to be relativized and in (4), NP1 seems to be involved in relativization. Notice also that some adnominal as-clauses can be detached from head noun phrases. This is considered as a process that is strictly prohibited in the wh-relative construction:

(7)The problem,...which phonetic differences are significant in the language in question in that they determine nonrepetition, or as

we call it, phonemic distinctness.

This type of construction will remind readers of the so-called "free" relative clause:

(8)Is this what you call a roundabout?

In both examples, gaps are found inside the clauses. What is crucial is that there is a great difference of the nature of each gap.

ON SENTENTIAL AS-CLAUSES

Sentential as-clauses are the following types of as-clauses, where gaps inside the clauses seem to refer to the propositional content of the main clauses:

(9)**Verb + that S Construction**
Fortunately, as we shall see, methods are available for assessing the degree of confidence we may have in the reliability of such estimates.
(cf. We shall see that methods are available for assessing the degree of confidence...)

(10)**It + Verb + that S Construction**
As often happens in the application of statistical methods of real problems, practical considerations frequently outweigh the concerns of the theoretical purist...
(cf. It often happens that in the application of statistical methods to real problems that practical considerations frequently outweigh the concerns of theoretical purist...)

(11)**It + be + past participle or adjective + that S Construction**
As was mentioned in section 1.3., the raw data from an investigation usually require classification before patterns can readily be observed in them.
(cf. It was mentioned in section 1.3., that the raw data from an investigation usually require classification...)

Another sentential as-clause seems to require a pronoun *it* inside the clause that seems to refer to the propositional content of the main clause:

(12)Hite is not alone in observing the demise of the notions that love "'tis woman's whole existence," as Byron once put it.

This type of as-clause is problematic because it does not have corresponding constructions as we have found in the examples (9) through (11):

(13)?Byron put it that love is woman's whole existence.

And the other kind of sentential as-clause has a proform *do*, (or *does* or *did* or *have done* and so on, as the case may be):

(14)We cut the nib as we have done, from a sheet of gold.
(15)First (7) entails, as its supposed paraphrase does not, that few congressmen admire Kennedy, period.
(16)This is not to imply, as pot propagandists do, that marijuana should be legalized.

In these examples, gaps do not necessarily refer to the propositional content of the main clause; rather they seem to correspond to a verb phrase of the main clause. Therefore, it may not be correct if we regard them as purely "sentential" as-clauses.

SUMMARY

Observational characteristics of the as-clauses are summarized below:

Adnominal As-Clauses

1. Pronouns or nouns coreferential to head noun phrases are present inside the clauses.
2. The nature of the gaps inside the as-clauses and wh-relative clauses seem different from each other.
3. Some adnominal as-clauses can be detached from the head nouns, unlike wh-relative clauses.

Sentential As-Clauses

1. This type of construction has a gap or pronoun *it* that corresponds to the propositional content of the main clause.
2. In one type, verbs, past participles, or adjectives in the as-clauses seem to take *that S* complements.
3. In another type, a pronoun *it* seems to appear obligatorily, but the verb does not usually take *that S* complement.
4. In the other type, a proform *do* can appear inside the clause and the proform seems to refer to a VP of the main clause.

TOWARD A COMPREHENSIVE ANALYSIS OF AS-CLAUSES

Differences between As-Clauses and Wh-relative Clauses

On the Nature of Gaps between the Two Clauses

Wh-relative pronouns relativize what are termed as NPs:

(17)The accident that$_i$ Mary saw [$_{NP}$ t_i]

(18)the clusters that$_i$ Hockett calls [$_{NP}$ t_i] "interludes"

In the case of adnominal as-clauses, however, I hypothesize that the relativized elements are not "pure" NPs, but noun or adverb phrases that denote manner:

(19)language as$_i$ we know it [$_{MANNER\ ADV.}$ t_i]

(20)Miss Joy, as$_i$ the family calls her [$_{MANNER\ ADV.}$ t_i]

Sentence (19) should be derived in the following way:

(21)language
(22)We know it(=language) *the same way.*

A manner adverb or noun phrase *the same way* is considered as being "relaitvized" by a complementizer *as* and we would have a derived structure (19). Sentence (20) should be derived in the same manner:

(23)Miss Joy
(24)The family calls her Miss Joy

Miss Joy is relativized and we will have (20).

In the case of a sentential as-clause, the gap inside the clause might be regarded as refering to a manner adverb, and it may be relativized by the complementizer *as*:

(25)John is honest.

(26)We know (it) in the same way: John is honest.

In the same way is relativized and will have:

(27)John is honest as$_i$ we know [$_{ADV.}$ t_i] John is honest.

And John is honest in the as-clause is deleted, and we will have (28):

(28)John is honest, as we know.

Sentential wh-relative clauses can be derived like the following way. Consider (29) and (30):

(29)John is honest.
(30)We know the fact that John is honest.

By following Yamanaka 1985, 1986, we may say that wh-relative clauses are assumed to refer to the propositional content in the form of a complex noun phrase (*the fact that John is honest*), and this complex noun phrase is relativized so that we will have (31):

(31)John is honest, which we know.

What can be drawn from this line of analysis is that as-clauses, whether they are adnominal or sentential, the complementizer *as* is assumed to refer to a manner adverb or noun phrase. Whereas in wh-relative clauses, the wh-complementizers are considered as relativizing "pure" noun phrases.

Detachment of As-Clauses from Head Noun Phrases

Adnominal as-clauses can be "detached" from their head noun phrases:

(32)The problem,...which phonetic differences are significant in the language in question in that they determine nonrepetition, or as we call it, phonemic distinctness. (=(7))

This seems to indicate that adnominal as-clauses may not be strictly adnominal. The following example seems to indicate that some adnominal as-clause might be regarded as adnominal in that the pronoun *it* is coreferential to the head noun *the new law* and as adverbial in the sense that this example might be paraphrased by (34):

(33)As I understand it, the new law is a reaction to an upsurge of nationwide vigorous protests against that serious accident.
(34)As far as I understand, the new law is a reaction to an upsurge of nationwide vigorous protests against that serious accident.

Differences between As-Clauses and Wh-relatives in Terms of Interpretation

In the wh-relative construction, the gap inside the clause functions as a bound variable. Consider the following expression and its representation at S-Structure and LF, with irrelevant details omitted from each representation.

(35)an accident which Mary saw
(36)an accident [$_{COMP}$ which$_i$] Mary saw t_i (S-Structure)
(37)x = accident, and Mary saw x. (Logical Form)

The value of x is dependent on which element the operator *which* might take from possible candidates in a set that satisfies a condition such that "Mary saw x." A wh-relative clause seems to serve to restrict an extension or referent of a head noun which might be able to have several candidates according to a situation in which a speaker utters that expression. On the other hand, a proper noun does not seem to have as many extensions as a common noun, because it is considered as a name used for a single particular thing or person. The proper noun could have a different referent according to a situation, but in that case, it is changed into a common noun and is restricted by a wh-relative clause:

(38)the Paris that Hemingway loved

What is crucial is that the as-clause does seem to behave differently:

(39)Paris as Hemingway loved it

Here, *Paris* remains to be a proper noun and it is not necessary to change it into a common noun by adding a definite article to it. The as-clause only serves to add a supplementary or subjective comment or attitude to a head noun, and does not seem to restrict the referent of the head noun, as the wh-relative clause does. This argument could be strengthened by the following observation. Head nouns of adnominal as-clauses, if they are common nouns, tend to take definite articles. Except for a "generic" use as in (40), indefinite articles seem less compatible with the adnominal as-clauses:

(40)I finally took a deferred pass, as they called it, and waited
a year and tried again.

This tendency seems quite natural, given that we could hardly give any subjective comment or explanation to the head noun, unless we had definite knowledge on what that head noun should denote.

A Derivation of As-Clauses

A Derivation of Adnominal As-Clauses

In adnominal as-clauses, verbs inside the clauses are considered as being able to take the following subcategorization frameworks:

(41)[+V] [+ NP, MANNER ADV.] or
[+ NP_1, (as)NP_2]

MANNER ADVERBS may refer to adverbs such as *so, likely,* or NP forms like *this way, the same way,* or an indirect question introduced by *how.* Verbs used in the adnominal as-clauses may include, but are not limited to the following:

know, see, use, have, speak, tell, understand, call, dub,
refer to, define, put

These verbs seem to take the subcategorization (41), like the following way:

(42)I know it **as a fact**.
(43)I see things **differently** now.
(44)Don't use your friends **ill**.
(45)In several chapters we have used traces **as an expository device**.
(46)He will have everything **his own way**.
(47)The actor speaks his part **badly**.
(48)I don't know **how** to tell this story to you.
(49)She understood my silence **as refusal**.
(50)We must understand the sentence **figuratively**.
(51)We would call it **differently** in the United States.
(52)We call him **Bill**.
(53)They dubbed him **Fatty** because he was so fat.
(54)We refer to this type of a car **as a vintage car**.
(55)What defines us **as human**?
(56)I don't know **how** to put it.

These examples seem to show that the verbs used in the as-clauses may take either [+ NP, MANNER ADV.] or [+ NP_1, (as)NP_2], or both. As for the [+ NP, MANNER ADV.] verb, a derivation would look like the following:

(57)the problem
(58)The Japanese see it [$_{\text{MANNER ADV.}}$the same way]

The manner adverb is relativied and we may have:

(59)the problem as$_i$ the Japanese see it [t_i]

And in the case of the [+ NP_1, (as)NP_2] construction, a derivation may look like the following:

(60)Miss Joy
(61)The family calls her Miss Joy
(62)Miss Joy, as$_i$ the family calls her [t_i]

This concludes a derivation of adnominal clauses.

A Derivation of Sentential As-Clauses

Verbs used in sentential as-clauses include, but are not limited to the following:

put, tell, happen, mention, make clear, bear out, say,
argue, suggest, see, call for

I hypothesize that verbs used in sentential as-clauses may take both [+ NP, MANNER ADV.] and [+ (NP) that S] subcategorization frameworks. Examples are shown below:

(63)I don't know **how** to put it.
(64)Some years ago General Omar Bradley put it **this way: "We are speeding inexorably toward a day when even the ingenuity of our scientists may be unable to save us from the consequences of a single rash act or a lone reckless hand upon the switch of un-interceptorable missile."**
(Fusion of the two subcategorization frameworks)
(65)I don't know **how** to tell this story to you.
(66)He told it to me **that new CD of Carlos Kleiber was released.**
(67)This is **how** it happened.
(68)It happened **that I was out then**.
(69)He didn't mention that **in detail**.
(70)I mentioned it in the last section **that R. Strauss' orchestral works are calssified as program music**.
(71)Why can't you make everything clear **in an easier way?**
(72)We must make it clear at first **that we have not yet collected enough evidence to prove him guilty**.
(73)His observations bear out the argument **explicitly**.
(74)He will bear me out **that I stayed home**.
(75)I don't like the way you say a thing **like that**.
(76)People say **that he is going to resign**.
(77)They only argued their positions **desperately**.
(78)The scientist argued **that his discovery had changed the course of history**.
(79)He hardly suggests his idea **formally**.
(80)Do you suggest **that he is lying**?
(81)I see things **differently** now.
(82)We have seen **that statistics has a descriptive and an inferential function**.
(83)They called for an increase of wage **loudly**.
(84)It was called for **that enduring peace would settle over the region.**

A derivation of a sentential as-clause would be like the following:

(85)Love is woman's whole existence.
(86)Byron put it this way: Love is woman's whole existence.

This way is relativized and we may have:

(87)Love is woman's whole existence as Byron put it: Love is woman's whole existence.

Love is woman's whole existence inside the as-clause is delelted, and we will have the following sentence:

(88)Love is woman's whole existence, as Byron put it.

This concludes a derivation of sentential clauses.

A Derivation of As-Clauses with a Proform *Do*

Consider the following:

(89)We cut the nib as we have done, from a sheet of gold.
(90)This is not to imply, as pot propagandists do, that marijuana should be legalized.

Verbs used in these examples seem to take the following subcategorization frameworks:

(91)He cut the cake **half**.
[+ NP, MANNER ADV.]
(92)He implied refusal **by his look**.
[+ NP, MANNER ADV.]
(93)Do you imply **that he is dishonest**?
[+ (NP) that S]

A derivation of (89) is assumed to be like the following:

(94)He cut the nib.
(95)We have cut the nib the same way.

The manner adverb is relativized and we would have (96):

(96)He cut the nib as we have cut the nib.

Cut the nib has been replaced by a proform of *do*, and we would have the sentence (97):

(97)He cut the nib as we have done.

A derivation of (90) would look like the following:

(98)This is not to imply that marijuana should be legalized.
(99)Pop propagandists imply (it) this way: Marijuana should be legalized.

Again, a manner adverb *this way* is relativized:

(100)This is not to imply, as pot propagandists imply: marijuana should be legalized.

The verb phrase *imply (that): marijuana should be legalized* is assumed to be replaced by a proform *do* and we could yield (101):

(101)This is not to imply, as pot propagandists do, that marijuana should be legalized.

This concludes a derivation of as-clauses with a proform *do* inside them.

Problems

Subcategorization Frameworks

It has been argued that both adnominal and sentential as-clauses may take particular subcategorization frameworks. It should be noted, however, that some of the verbs used in the as-clauses do not take

manner adverbs at all times, except for a few verbs (e.g. *put* as in *You put it. and *tell* as in ?She told.).

Negation and As-Clauses

As-clauses seem to function as supplying affirmative comment or supplementary explanation to the head noun or main clause. Therefore, negation seems to be incompatible with as-clauses. However, there are examples where negation seems to be involved inside the as-clauses:

(102)-Ah, the pain! Pain **as I had never known it**.
(103)First, (7) entails, **as its supposed paraphrase does not**, that few congressmen admire Kennedy, period.

This remains to be explained under this analysis.

Further Problematic Examples

The following examples are also unsolved:

(104)Franny had grabbed the tin cup in his jock strap and twisted its edges into his private parts, which we called them in those days.
(105)"What does she think is going to happen to her over there?" "Over there" was what we called it.

These examples seem to be counterexamples to an assumption that the relativized elements are different between as-clauses and wh-relative clauses:

(106)call [+V][+ NP_1 NP_2]
(107)the clusters that$_i$ Hockett calls [$_{NP1}$ t_i] "interludes"
(108)Miss Joy, as$_i$ the family calls her [$_{NP2}$ t_i]

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*This is a condensed version of my paper "A Generative Study of English As-Clauses." I wish to thank Professor M. Kajita, Professor T. Kono, Professor Y. Nagahara, Professor Y. Otsu, and Professor Yagi, for their invaluable comments on my research.

MITAWPP 2 (1989), 65-77

Structure-Dependence in Second Language Acquisition*

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1. Introduction

One of the central problems in a theory of language acquisition is how to fill the gap between the linguistic input children receive and the grammar they eventually attain, observed as adult grammar. While the linguistic competence of an adult is 'extremely intricate, complex, and subtle (White (in press)),' the input received by children is of rather poor quality and its nature is characterized in terms of 'poverty of the stimulus.' This question forms 'a logical problem of language acquisition,' summarized by White (*ibid.*) as follows:

> ... three problems with the input are often discussed: (i) input underdetermines the final grammar, (ii) it is often degenerate, (iii) it does not contain negative evidence. For such reasons, language acquisition is often described in terms of a projection problem, or a logical problem, or a learnability problem; that is, there is a mismatch between primary linguistic input and the system actually attained.

Given this problem, a theory of language acquisition must then account for how children are at all able to reach the target grammar, and why they do so the way they do. A solution offered by generative grammar states that children are endowed with Universal Grammar (UG) which constrains the form of grammar and that they eventually attain the adult grammar with the aid of UG and through interaction with the linguistic input.

The present study takes up structure-dependence as one such UG principle, and explores how and why children are able to attain the target grammar, in this case, the subject-auxiliary inversion rule.

What makes it particularly intriguing is the claim we make that learners of English as their second language (L2), as well as children acquiring it as their first language (L1) follow the same path; UG plays a role in acquiring the rule of grammar. This leads us to claim that there is virtually no difference between L1 and L2 as far as structure-dependency is concerned.

2. Structure-dependence and L1 acquisition

2.1. Structure-dependence

Structure-dependence (or -dependency) is sometimes referred to in the literature to account for the constraints of UG for mediating language acquisition (*e.g.* Chomsky (1986); Rutherford (1987); Cook (1988)).[1] Consider the following pairs of simple sentences and their corresponding questions (yes/no questions).

(1) John is happy.
(2) Is John happy?
(3) The girl can swim.
(4) Can the girl swim?

How can one state the rule that relates (1) to (2), and (3) to (4)? As

far as these pairs are concerned, we have three possibilities R1-3 apparently compatible with these examples.

[R(ule) 1] Interchange the first and second words of the sentence.
[R2] Prepose the first verbal element (elements like *is* , *can*) to the front of the sentence.
[R3] Prepose the first verbal element following the subject noun phrase to the front of the sentence.

How well do Rules 1-3 work with the examples above? R1, applied to (3), produces an ungrammatical sentence (5) and so fails to qualify as the rule governing this transformation.

(5) *Girl the can swim?[2]

Since the remaining two (R2 and R3) cannot be differentiated with the examples (1) to (4), let us take up somewhat more 'complex' examples. A 'complex' example here means one with an embedded clause. Consider

(6) The boy who is tall can swim fast.

where *who is tall* is an embedded clause, and one can find two occurrences of 'verbal elements (auxiliaries).' On (6), R2 produces (7), which is ungrammatical, and thus this tentative rule is judged to be a false generalization dealing with question formation.

(7) *Is the boy who tall can swim fast?

R3 on the other hand produces a grammatical question (8), and one is led to see that this rule consistently produces the correct questions whether the given sentence is simple or complex.

(8) Can the boy who is tall swim fast?

The question now to ask is: What differentiates R3 from the other foregoing rules? The crucial difference is that R3 alone refers to a syntactic concept, a subject noun phrase (a subject NP) or a main clause incorporating the subordinate relative clause, but that the other rules (R1 and R2) do not. Given (9) as the structural description of a sentence (8), one can conceive a subject as the NP immediately governed by sentence (S).

(9) S -> NP AUX VP, NP -> NP S'

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[ [the boy [who is tall]][{can}[swim fast]]]
S  NP       S'            AUX  VP
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On the other hand, Rules 1-2 refer to the linear order of the elements involved (as seen in 'the first or second words') or to a syntactic category (as observed in 'the verbal element'), and do not employ any syntactic concept. To always produce the right question from the declarative, whether simple or complex, it is thus necessary to know not only the syntactic category of the words involved, but also their structural relationships within the sentence.

R3 then is structure-dependent in the sense that the rule refers to the

structure of the sentence on which it operates, and the property of the rule is described as structure-dependence, whereas Rules 1-2 are characterized as being structure-independent.

2.2. Struture-dependence in L1 acquisition

Which rule do children acquire in the course of language acquisition? Do they go piecemeal from one rule to another among R1-3 above? Or do they employ only one specific rule to the exclusion of all others right from the outset? The theory of UG states that the property of structure-dependence need not be learned; it is innately given. After being exposed to data including a simple pair of examples such as (1) and (2), and after once thereby learning the correspondence between a declarative sentence and its question, children directly acquire R3, and not through R1 or R2. What matters in manipulating yes/no question formation with examples like (6) is whether or not children have acquired the relative clause structure. Once they have, they are now ready to deal unerringly with (6) turning it into (8); they assign to (6) the structure (9) thereby making an appropriate question (8) in just the same manner as they did with simple examples like (1-2) and (3-4). To summarize, given a UG principle (10 i), what children need to have is a simple set of data (10 ii) and knowledge of the relative clause structure (10 iii).[3]

(10) i. a UG principle: grammar formation be in systactic terms
ii. data on question formation: correspondence between a declarative and its question (*e.g.* (1) & (2))
iii. knowledge of the relative clause structure: NP -> NP S'

(10 i) guides children to select the correct rule R3 without ever attempting to apply R1 or R2 in dealing with (6), converting it to (8).

2.3. Crain and Nakayama (1987)

Crain and Nakayama (1987, C&N for reference, henceforth) put this issue to an empirical test in an experiment with English-speaking children and tested the acquisition scenario offered by generative grammar and the UG-based language acquisition theory.

Since their study is the closest in format and design to ours, we shall note the points made by C&N in some detail. They created a situation that made it natural to describe and ask about characters (dolls) and designed a way to elicit questions from the original declarative using a schema like (11) yielding an eliciting device (12).

(11) Ask Jabba if _____.
(12) Ask Jabba if *the boy who is watching Mickey Mouse is happy* .

The experiment included a pretest to ensure that children could handle the task of question formation itself with simple sentences (13a-c). Each of the test sentences (14a-f) had a relative clause, which made another occurrence of an auxiliary within each sentence.

(13) a. The girl is tall.
b. The man is tired.
c. The pig next to the tree is red.

(14) a. The dog that is sleeping is on the blue bench.

(14) b. The ball that the girl is sitting on is big.
c. The boy who is watching Mickey Mouse is happy.
d. The boy who is unhappy is watching Mickey Mouse.
e. The boy who is being kissed by his mother is happy.
f. The boy who was holding the plate is crying.

The subjects participating in the experiment were children of the mean age 4;7 divided into two age groups: Group I (mean age 4;3), and II (5;3). Tables 1-2 summarize their results.

		GRAMMATICAL	UNGRAMMATICAL
G(roup) I	81	31(38%)	50(62%)
G II	87	70(80%)	17(20%)
Total	168	101(60%)	67(40%)

TABLE 1. Correct and incorrect responses by group.
(C&N, *op.cit.* :529)

SENTENCE	GI	GII	TOTAL
(14)a.	.62	.93	.78
b.	.50	.73	.62
c.	.20	.87	.53
d.	.67	.93	.81
e.	.20	.73	.47
f.	.17	.64	.42

TABLE 2. Proportion correct by sentence.
(C&N, *op.cit.* :530)

From the results which showed that there were some sentences that children, especially in GI, found it difficult to process, Crain and Nakayama judged the subjects of this experiment 'appropriate subjects for investigating the prediction that grammar formation is limited to structure-dependent rules, by examining the nature of their errors (C&N:529).'

Errors predicted and/or observed were classified into three types (15-17).

(15) *Is the boy who is being kissed by his mother is happy?
(16) *Is the boy that is watching Mickey Mouse, is he happy?
(17) *Is the boy that watching Mickey Mouse is happy?

(15) contains an extra occurrence of an auxiliary, referred to as a TYPE I or 'prefix' error. (16) is begun with a well-formed fragment of a question followed by another question with a PRO form, and this is termed a TYPE II or 'restarting' error. A TYPE II error has 'a look of a typical performance error by adults (C&N:530).' And (17), termed TYPE III, is predicted if children adopt a structure-independent rule R2 above. The distribution of the errors made by the children is shown in TABLE 3.

	TOTAL	TYPE I	TYPE II	TYPE III
G I	50(62%)	30(60%)	10(20%)	0
G II	17(20%)	9(53%)	5(29%)	0
TOTAL	67(40%)	39(58%)	15(22%)	0

TABLE 3. Types of errors by group.
(C&N, *op. cit.* : 530)

The absence of TYPE III errors strongly suggests that children did not adopt R1 or R2 in forming yes/no questions, but rather that they invariably adopted R3 which refers to the structural relationship of the elements within the sentence.[4]

3. Otsu and Naoi (1986): Structure-dependence in L2 acquisition

3.1. Hypothesis of the present study

As we have seen, the yes/no question formation rule is acquired by children with a UG constraint to the effect that grammar be learned with reference to syntactic knowledge of any sentences under analysis. Children are guided by principles of UG in acquiring rules of grammar, and the rules of grammar they adopt must be dependent on the structure of language. Faced with 'the logical problem of language acquisition,' children must attain grammars of a language, and in so doing, they have to choose one grammar to the exclusion of other possible grammars. The foregoing sections saw the children's adherence to the structure-dependent rule R3, right from the outset. Structure-independent candidates R1-2, do not have a place even though they appear computationally simpler.

Is this also the case with L2 learners? Do they also adopt the rule dependent on structure of language as in L1 acquisition? Or do they have their own learning strategies, such that deal specifically with the facts about English yes/no question formation?[5] This question leads to a specific hypothesis (18).

(18) **HYPOTHESIS**
L2 acquisition is guided by UG, *i.e.*, L2 learners also adopt the structure-dependent yes/no question formation rule as is the case with L1 acquisition.

3.2. Logic at work in the hypothesis

The hypothesis stated above involves three aspects of logic. The first assumption is that L2 acquisition does not differ from L1 acquisition. Second, L1 acquisition is mediated by a principle of UG, sturture-dependence (as shown by C&N). It follows as the third that L2 acquisition is also guided by structure-dependence as is the case with L1 acquisition. We could summarize these three aspects in (19 i-iii).

(19) i. L2 acquisition eqaul to L1 acquisition
ii. L1 acquisition guided by a UG principle, sturucture-dependence
iii. L2 acquisition also guided by a UG principle, sturucture-dependence as in L1

3.3. Experimental design

3.3.1. The training session and two kinds of Tests

An experiment was designed to see the empirical consequences of our hypothesis (18). Three steps were prepared. Step 1 was a training session intended to give the L2 learners knowledge of the relative clause structure itself. Step 2 was designed to test if the subjects were actually able to recognize and make use of the relative clause they were just introduced to. Step 3 was to see whether the subjects adopt structure-dependent version of the question formation rule (R3) or they adopt structure-independent versions (R1-R2). The design is represented as (20 i-iii).

(20) i. Step 1: Training session to introduce the subjects to the

relative clause structure

ii. Step 2: Test 1 (Syntax Test) to see if the subjects have gained knowledge of the relative clause structure

iii. Step 3: Test 2 (Question Formation Test) to see whether the subjects adopt R1-2 or R3 in dealing with question formation

As one can conceive from (10 i-iii) above, this experiment should include the data on a declarative and its corresponding question, and knowledge of the relative clause structure; the rest (the principle of structure-dependence) is innately given by UG. With those L2 learners as subjects who have some knowledge of English yes/no question formation rule but no knowledge of the relative clause structure, we could test the hypothesis above by first giving the subjects knowledge of the relative clause structure (Steps 1-2), and then testing which rule they adopt in dealing with the task of making questions from the original declarative sentences (Step 3).

The training session was intended to give knowledge of relatives to the subjects who are assumed not to have learned it before. Two specific points should be noted here. First, we tried to avoid any use of 'grammatical terms' such as 'noun phrase' or 'subject of sentence' *etc.*, in our introduction of relative clauses; using it could mean to enhance subjects' conscious working on the grammatical manipulation. Second, the type of sentences used in the introduction was different from that used in Test 2. Sentences were limited to the type (21-22) in which the relative clause was attached to the NP within VP, in contrast to the structure (23)(=(6)). In other words, the subjects did not encounter sentences of type (23) until Test 2.

(21) Can you see the boy that is standing on the stool?
(22) I know the girl that is skating over there.
(23) The boy who is tall can swim fast.

The double test (Steps 2 and 3) are necessary because each complex sentence at issue in the question formation has a relative clause as the subordinate clause attached to the subject NP. At the particular task of forming questions from complex declaratives, the subjects are assumed to beable to understand and make some use of the relative clause structure itself. If they do not, it does not make sense for them to work on question formation tasks involving relatives. Thus we need two separate kinds of tests. We call this first test (Step 2) Syntax Test, and the second (Step 3) Question Formation Test.

Our hypothesis predicts that once L2 learners have acquired knowledge of the relative clause structure they will unerringly give a correct response to each of the complex sentence stimuli; if they haven't they will not. Logic of our experiment is represented in Table 4.

		Syntax Test: Pass	Syntax Test: Fail
Q.F. Test	Pass	X	
	Fail		X

TABLE 4. Schematic representation of predicted results.

Thus the hypothesis predicts that subjects will fall into X in this schema should there be no noise caused by external factors.[6]

3.3.2. **Subjects**

Japanese learners of Enlgish as L2 were chosen for this experiment. As discussed in Linguistic background below, the rule of making questions from the declarative sentences differs considerably from that of Enlgish. This point motivates having the experiment on Japanese speakers in that rules governing L1 question formation does not affect the rule manipulation in L2, in this case, English. Another reason for choosing Japanese learners of English was that it was relatively easy for the experimentors to have access to them.

The subjects' experience in learning English is of importance in this experiment. We chose the students at the nineth grade as our subjects. At the time of this experiment (May, 1986), the subjects were assumed not to have learned the relative clause structure before. It was all possible because of the specification of learning items as shown in the official guideline of syllabus by the Ministry of Education, Culture, and Science. See Educational setting below.

3.4. **Linguistic background**

It is necessary to see how a question is formed in Japanese, the L1 of the subjects in our experiment. Question formation in Japanese differs from that of English in that in Japanese movement is not involved in making a question from the declarative sentence. The particle *-ka* attached to the end of a given declarative makes it a question. Thus, a declarative (24) is transformed into a question (25).

(24) Taro - wa eigo - wo hanashi-masu
Taro sub. part. English obj. part. speak polite suffix
(= Taro speaks English.)

(25) Taro - wa eigo - wo hanashi-masu ka
Taro sub. part. English obj. part. speak polite suff. ques. part.
(=Does Taro speak English?)

The Japanese question formation rule hence cannot invoke the English question formation rule at all, which is quite important in our investigation since the Japanese learners of English do not have access to relevant rules that could provide them with any hints or analogies in dealing with the English yes/no question formation.

3.5. **Educational setting**

Japanese learners of English formally start to learn English at 13 years of age. The syllabus adopted more or less depends on a grammatical basis as shown in the *Course Of Study* issued by the Ministry of Education, Science and Culture. According to this guideline, the learners begin with simple sentence patterns, gradually shifting to the more complicated ones. The question formation rule is one of the items learned at early stages, while the relative clause is supposed to be studied in the third grade of junior high school, when the learners are 14-15 years old. It is generally thought that the relative clause is a difficult structure to learn, and often given focus to and discussed by

school practitioners. Given that the learners do not begin to learn the relative clause until they are in the third grade, then it is expected that this experiment gives the subjects the very first encounter with this grammatical item.

3.6. Syntax Test

Four test sentences (26-29) were designed to test the subjects' mastery of the relative clause structure. The task itself is a translation exercise. The subjects were asked to give a written English equivalent for each Japanese sentence, using the relative clause. It is important that none of the relative clauses was attached to the subject NP in each sentence but rather to the NP within the VP.

(26) boku-wa niwa - de ason-deiru on'na-no-ko wo shitte-iru
I(male) sub.par. garden in play -ing girl obj. par. know
(= I know the girl that is playing in the garden.)

(27) watashi-wa steeji-de utat-teru otoko-no-ko wa suki-ja-nai
I(neut) sub. par. stage on sing -ing boy top. par. like not
(= I don't like the boy that is singing on the stage.)

(28) boku - niwa chuugoku-go wo hanase-ru tomodachi ga i-masu
I(male) top. par. China lang. obj. par. speak can friend top. part have polite
(= I have a friend that can speak Chinese.)

(29) tegami - wo kaite-iru otoko-no-ko wo shitte-imasu ka
letter obj. par. write-ing boy obj. par. know (polite) question part.
(= Do you know the boy that is writing a letter?)

A test of this sort is quite familiar to the subjects due to its frequent use at school. Any local errors or mistakes were not counted. The focus was on the relative clause itself, and the errors that would not seriously affect the content conveyed were taken as correct (*e.g.* errors in inflection or tense).

3.7. Question Formation Test

Twelve declarative sentences (30-41) were prepared. Four were simple sentences (31), (34), (37), (40), and all the rest complex sentences with relative clauses attached to the subject NP's.

The relative introduced in the training session and test sentences was *that* only. This is because it had been found in a pilot test that the use of *which* and *who* could cause the subject's confusion with interrogative *which* and *who* . The relative **that** of the subject case was used in order not to cause extra difficulties due to case differences.

(30) The girl that is smiling can jump high. (c)
(31) The boy can swim fast. (filler)
(32) The boy that can skate is running now. (c)
(33) The boy that can swim can jump high. (b)
(34) The girl in this picture is smiling. (filler)
(35) The girl that is cooking is smiling. (a)

(36) The boy that is skating is smiling. (a)
(37) The girl is skating now. (filler)
(38) The girl that can skate well is singing now. (c)
(39) The girl that is singing can swim fast. (c)
(40) The boy at the door is crying. (filler)
(41) The boy that can skate can swim fast. (b)

The auxiliaries included in the test sentences were carefully arranged. First, *is* and *can* are the two auxiliaries in focus. Second, three patterns were made, (a) the *is-is* pattern that has identical auxiliaries in a single sentence, (b) the *can-can* pattern in which two occurrences of *can* are included in a single sentence, and (c) *is-can* or *can-is* pattern where two different auxiliaries are found. The patterns (a) and (b) are also found in Experiment 1 of C&N. However, both of these patterns have a serious flaw; one cannot tell which *is* or *can* is moved as in the TYPE I error above. It could be either copied from the relative clause or from the main clause. This is why pattern (c) is necessary. The sentences and sentence types were randomized in order.

The directions for the test were given with two simple sentences: **"Make a question from each sentence as in the examples: John can swim. -> Can John swim?, Mary is singing. -> Is Mary singing? "** There was no explicit use of grammatical terms nor reference to the nature of the task. The test lasted for 15 minutes.

3.8. Procedure

A group of 11 middle school students (all female) participated in this experiment. First, a 50-minute training session was held, in which the instructor introduced to the participants the sentence that had a relative clause within it. A printed copy of a picture was given to each student. The instructor began to describe and ask about the characters through questions and answers using English. The students are called on to respond in English at times simply saying 'yes' or 'no,' and at other times repeating what the experimenter said. In so doing it was aimed to familiarize the learner with the relative clause structure. After a fair amount of practice, some of the sentences were written on the board so that the learners could see what they heard or said. The medium of instruction was English with some use of Japanese where necessary.

We then moved on to Syntax Test as an exercise on the relative they were just introduced to. This concluded the training session and a short break of 10 minutes and then the test session for Question Formation Test followed. All the participants showed interest in the task despite the foregoing regular classes and the training session.

3.9. Results

All the responses to Syntax Test were judged to be correct, although some mistakes were found in spelling, tense, inflection and so forth supposedly due to little attention paid to the items. The high rate of success in this task is probably due to the practice effect in the training session. The results of this test suggest that the subjects were now thought to have mastered the new structure.

The results of Question Formation Test are summarized in TABLE 5 below.

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Subjects	A	B	C	D	E	F	G	H	I	J	K
Q.No.											
(30)	o	o	+	o	o	o	o	+	+	+	-
(31)	o	o	o	o	o	o	o	o	o	o	o
(32)	o	x	+	o	o	o	o	+	+	+	+
(33)	o	o	+	o	o	o	o	+	+	+	+
(34)	o	o	o	o	o	o	o	+	o	o	o
(35)	o	x	+	o	o	o	o	I	+	+	+
(36)	o	x	+	o	o	o	o	+	+	+	+
(37)	o	o	o	o	o	o	o	+	o	o	o
(38)	o	x	+	o	o	o	o	+	+	+	+
(39)	o	o	+	o	o	o	o	+	+	+	+
(40)	o	o	o	o	o	o	o	o	o	o	o
(41)	o	x	+	o	o	o	o	+	+	+	+

o:correct, x:incorrect, +:not as expected but grammatical
-:no answer, I:TYPE I error, the test sentences with underlined numbers are simple sentences as fillers

TABLE 5. Individual results for the Question Formation Test.

3.10. **Observation**

Five subjects (A, D, E, F, and G) made the required questions out of the original sentences. One subject (C) gave the following question (42) to (30) and did likewise to the rest of the complex sentences.

(42) Can the girl jump that is smiling?

In this response, the relative clause is extraposed. This is by no means ungrammatical, and because there is no movement of auxiliaries from within the relative clause this subject should be added to the five who made perfect questions. Responses to (30) by H (43) also qualify as grammatical in the sense that the auxiliary within the VP is moved to the front of the sentence despite the absence of the relative clause itself in each question.

(43) Can the girl jump high?

Another response type is shown by one subject I, *i.e.*, conjoined questions (44) to (30).

(44) Is the girl smiling and can she jump high?

Two subjects (J and K) showed a similar pattern making juxtaposed questions as in (45), also a response to (30).

(45) Is the girl smiling? Can the girl jump high?

All the subjects above showed a consistent pattern of responding, whereas the subject B showed inconsistency in her responses. The result of structure-independent rule application was brought to (32), (35), (36), (38), and (41). To the rest of the complex sentence stimuli, (30), (33), (39) she made correct responses. TABLES 6-7 show the results of our tests.

	GRAMMATICAL	UNGRAMMATICAL	TOTAL
SIMPLE	44(100%)	0(0%)	44
COMPLEX	81(92%)	7(8%)	88
TOTAL	125(95%)	7(5%)	132

TABLE 6. Frequency of correct and incorrect response.

		Syntax Test: Pass	Syntax Test: Fail
Q.F. Test	Pass	10	0
	Fail	1	0

TABLE 7. Results

To summarize, five subjects of the eleven made correct responses to all the sentence stimuli. One subject deployed her own solution by extraposing the relative clause to the end of the question and this should be counted as correct. Thus six subjects were counted as making correct responses. Another subject gave her responses by only asking about the main clause. It is striking, however, that the rest (three subjects) did not move the auxiliary out of the relative clause in each complex sentence. They rather seemed to seek for some other solutions of their own to the given problem: conjoining the two questions, a pattern shown by one subject and juxtaposing two separate questions as shown by two subjects. One showed an inconsistent way of responding to the stimuli, and made five incorrect responses out of eight stimuli.

4. Discussion

More than half of the subjects (7 out of 11) are taken to have employed the structure-dependent rule. The three other subjects could also be put in the same category in that they did not make any strucure-independent errors. Thus the majority of our subjects (10 out of 11) employed the structure-dependent rule in forming yes/no questions from the original declarative.

The results strongly support the hypothesis that L2 learners are guided by a UG principle in dealing with the yes/no question formation. However, some response patterns pose problems in generalizing the results of this experiment. First, H's response pattern is to ask only about the main clause in each complex sentence. One reason for this pattern may be that she recognized two clauses in each complex sentences, namely, the main and the subordinate clause, and focused only on the former in asking about what is being said in each sentence. Her responses to the simple sentences are processed in the same fashion. To (46)(=(34)) she made (47), which is correct as it is but does not attach the prepositional

(46) The girl in this picture is smiling.
(47) Is the girl smiling?

phrase **in this picture** to the subject NP. The reason for this kind of omission cannot be deduced from this experiment alone. Taking this pattern as acceptable, we can say she made correct responses to all the sentence stimuli, except to (35), to which she made the TYPE I error (48) as decribed by C&N.

(48) *Is the girl that is cooking is smiling?

She did not make further TYPE I errors except (48). (48) could perhaps be an accidental mistake, and should be disregarded from consideration.

Second, the response pattern shown by the subject I could mean that the function and structural factors represented by the relative clause are

not yet fully comprehended by this subject. Although her Syntax Test did not show any problem in translation from Japanese into English, it could be that she was not yet able to use the relative clause yet. Incomplete mastery of the relative clause might have caused her to manipulate the given structure in terms of what she was well capable of. This might as well be the case with the subjects J and K, who did not conjoin two questions, but gave two separate questions to each sentence stimulus.

5. Conclusion

Children's acquisition of the English yes/no question formation rule is faced with a problem that is called 'a logical problem of language acquisition.' It cannot be deduced simply from data presented to the children alone. The theory of UG holds that the children acquiring language need not learn all the rules relevant to a certain structural manipulation, in this case, the question formation rule. The structure-dependence in gramnar formation and manipulation given to the children as innate knowledge guides them to rule out all the impossible grammars and turn them to select one possible grammar, in this case the rule R3 referring to the structural relationship among the elements of a given sentence.

Crain and Nakayama (1987) was the first attempt that put this issue to an empirical test, giving support to the account for the UG-based theory of language acquisition. Based on this study we also investigated L2 learners' learning of the question formation rule, and concluded that with some exception they are also guided by UG in acquiring and manipulating the question formation rule.

NOTES

* This is a slightly modified version of a paper originally read at the JACET convention at Keio University in September 1986. I am grateful to Yukio Otsu for his collaboration in the experiment undertaken and for his invaluable comments on earlier drafts of this paper. I am grateful also to Tsuda English School and those students at the school who participated in our experiment.

Many thanks are due to Mr. D.L. Blanken and Mr. Harold Sims for reading and giving comments on earlier drafts of this paper. Needless to say, I solely remain responsible for errors should there be any.

1. Chomsky (1986:7-8) states:

   > A great many examples have been given over the years to illustrate what clearly is the fundamental problem: the problem of poverty of evidence. A familiar example is the structure-dependence of rules, the fact that without instruction or direct evidence, children unerringly use computationally complex structure-dependent rules rather than computationally simple rules that involve only the predicate "leftmost" in a linear sequence of words.

2. An asterisk placed before a sentence means that the sentence is ungrammatical.

3. Logic in this explanation is from Otsu (1989b).

4. Crain and Nakayama went on to examine an alternative theory for acquisition of the English yes/no question formation rule. They tested a semantically-based acquisition theory put forward by Stemmer (1981). The evidence disconfirmed Stemmer's theory and gave support to developmental autonomy of syntax. I have elsewhere argued inadequacy of Stemmer and another similar approach by Schlesinger(1982). For details, see C&N (*ibid.*) and Naoi (in press).

5. See for example Flynn and O'Neil(1988) and Gass and Schachter(1989) for the impetus that linguistic theory has given to the field ofsecond language acquisition over the last few years.

6. See Otsu (1981, 1989) for logic of the experiment made two-fold as in this present investigation.

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Units of processing in sentence production —evidence from speech errors—

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1.Introduction

In the study of language production, it is one of the most alluring questions to investigate the nature of the mental lexicon. Although previous researches uncovered interesting properties about how lexical items are stored (cf. Fay and Cutler, 1977), little work has been done about how words are accessed during the processing in sentence production. The present paper adopts the activation spreading theory to explore the dynamic aspect of the mental lexicon, that is, how lexical items are accessed and how far the units of processing cover, using speech error data as evidence.

2.Data

Speech error is here defined as "involuntary derivation in performance from the speaker's current phonological, grammatical, lexical intention" (Boomer and Laver, 1973). Since Fromkin's influential paper(cf. Fromkin,1971), speech errors that occur in everyday speech have drawn considerable attention as evidence for the analysis of sentence production mechanism. Due to the difficulty of an experimental approach, a lot of papers on language production use speech errors as crucial evidence for their discussion (cf. Garrett,1975, Stemberger,1985, Levelt,1989). There are, however, limitation on the scope of speech error data. The data used in these studies have been exclusively collected from English and German. In this paper, the author will use speech error data collected from Japanese, which is considered to have different syntactic/phonological structures from those of English[1].

The data used in this paper come from the corpus that the author has

lected over nine years. It consists of about 3300 errors both from public sources (e.g.TV programs, radio broadcasts,etc.) and from ordinary conversation. Errors were written down on the cards immediately after the author noticed them with as much context as possible. Six hundred and eighty errors of the corpus were tape-recorded. It can help to decrease the slips of the ear and perceptual bias of the observer that is inherent risk in speech error collection.

Now let us look at the example of a phonological error in Japanese:

(1) In: kabe o yabut-ta
%m: N¦wall OBJ V¦break-AUX
%e: kabe->yabe s={ya}but-ta
%g: broke the wall

In the first line, speaker's intention of the utterance is represented in Roman alphabet. The second line is a morphemic translation of the intended utterance (see the list of abbreviations in Appendix). The third line indicates the target element and the intruding element, the former is on the left side of " ->" symbol and the latter is on the right side. The line also indicates the source of the error, i.e.the origin of the intruding element("s=" in the line means "the source is..."). In this case, the intruding element is the first mora in yabut-ta, so that it is surrounded by curly brackets as shown in (1). The fourth line gives a whole translation of the Japanese sentence into its equivalent English sentence.

3.Word substitution error

Word substitution is a type of error in which one word is replaced by another. Let us observe some examples:

(2)a. In: anta tabako sute-ta
%m: N¦you N¦cigarette V¦throw-away -AUX
%e: tabako -> haizara "ashtray"

%g: you threw away a cigarette

b. In: piramiddo ni nobor-u
%m: N¦pyramid OBJ V¦climb-CGN
%e: piramiddo -> ejiputo "Egypt"
%g: climb the pyramid

c. In: soko no sennuki tot-te
%m: PRO¦there PTL N¦bottle-opener V¦pass-PTL
%e: sennuki->senhiki "ruler"
%g: pass me that bottle opener

Examples (2)a-c are called non-contextual word substitution where we cannot find the source in observed context. There are 346 instances in my corpus. This type of error is most plausibly interpreted as a selection error between words competing in the mental lexicon. and it is well known that the target word and the intruding word are related not only semantically. like (2)b. but also phonologically. like (2)c. Similarity between target word and intruding word are analyzed on the point of variables as follows:

Analysis of the target and the intruding word
in non-contextual word substitution:

Table 1.

Agreement of grammatical category

same	334 (97%)
different	12 (3%)

Table 2

Agreement of accent pattern

same	264 (76%)
different	84 (24%)

%m: N¦I TOP N¦dog OBJ V¦go-with-PTL N¦walk OBJ V¦go-CGN
%e: inu->sanpo s={sanpo}
%g: I take a walk with my dog

c.In: kootya o non-de keeki o tabe-te
%m: N¦tea OBJ V¦take-PTL N¦cake OBJ V¦have-PTL
%e: tabe-te -> non-de s={non]-de
%g: Let's have a tea and some cake

d.In: fensu ni yozinobot-ta sentaa no hirota
%m: N¦fence OBJ N¦climb-AUX N¦center-outfielder PTL PN¦Hirota
%e: fensu->sentaa s={sentaa}
%g: center outfielder Hirota jumped at the fence

In (3)a, sensoo, which should have appeared in the next NP, is interpreted as the source, and it replaced the target word sekai. (3)a-d are, in fact, word substitution errors. But are they also selectional errors? One plausible explanation is that they occur when words are given an ordering after all lexical items are selected, i.e. they are ordering errors. We cannot exclude such an explanation by strong evidence. However, the analysis of the contextual word substitution errors on the same stand points as Table 1-4 suggests that they are selectional errors. Let us look at Table 5:

Table 5
The target and the source in contextual word substitutions
Agreement on: (N=99)

grammatical category	accent pattern	number of morae	initial mora
98 (99%)	64 (65%)	84(85)%[2]	13 (13%)[3]

Table 3

Difference of the number of morae	
0	209 (60%)
1	103 (30%)
2	24 (7%)
3 or more	10 (3%)

Table 4

Agreement of initial mora	
same	145 (42%)
different	201 (58%)

It has been observed in the previous studies that the target word and the intruding word have semantic/pragmatic relations in some way (see Hotopf,1980). In addition, the results obtained in Table 1-4 suggest that two words are related both syntactically and phonologically. In other words, syntactic and phonological information as well as semantic information play an important role when lexical items are accessed in sentence processing.

It should be noted that there is another type of word substitution error:contextual word substitution. This is a type of word substitution in which we can find the source of the intruding word in surrounding context. Let us observe some examples:

(3)a. In: sekai no dokoka de sensoo ga
%m: N¦world PTL N¦somewhere PTL N¦war SUBJ
%e: sekai->sensoo s={sensoo}
%g: war (is taking place) somewhere in the world

b. In: boku wa inu o ture-te sanpo ni ik-u

What seems to be important in Table 5 is a high degree of agreement on grammatical category. It suggests that syntactic constraint on word selection is strong. In fact an error such as (4) rarely occur:

(4) In: siawase-na seikatu
%m: ADJN¦happy-CGN N¦life
%e: siawase-na -> seikatu-na s={seikatu}
%g: a happy life

In(4), noun replaced the stem of adjectival noun.

Now let us analyze contextual word substitution errors from a different point of view, which will be more crucial when we consider the unit of processing. It is interesting to examine the difference of structural environments in which errors occur. In (3)a, for example, it seems reasonable to assume that inu and sanpo, both of which are headnouns of adjacent NPs, were simultaneously accessed in some way. Types of structures in which contextual word substitutions occur are summarized in Table 6:

Table 6 Structures where contextual word substitutions occur

(N=99)

Within phrases	8[4]
Adjacent phrases	26
Between phrases	6
Adjacent basic clause[5]	51
Between basic clauses	8

Results obtained in Table 6 seem to suggest that the intruding word does not pay attention to a clause boundary. Many researches have tried to delineate the unit of processing, and some of them proposed the unit that is smaller than surface clause (Ford,1982, Garrett,1975). Although we must agree that there is no single unit in sentence production, we will assume

that one unit is larger than basic clause, at least as a planning unit.

4.Word and stem exchange error

Let us next consider another type of lexical speech error. Word exchange is a type of error in which two words in the utterance exchange their places. There are 22 word exchange errors in my corpus. Some typical examples of word exchange are:

(5)a. In: syokuba ni syokudoo ga na-i
%m: N¦place-to-work PTL N¦dining-hall SUBJ ADJ¦no-CGN
%e: syokuba->syokudoo syokudoo->syokuba
%g: there is no dining hall in my company

b. In: yubi ni mame ga deki-ta
%m: N¦finger PTL N¦corn SUBJ V¦have-AUX
%e: yubi->mame mame->yubi
%g: I had a corn on my finger

c. In: huro no ar-u apaato wa i-i
%m: N¦bath PTL V¦be-CGN N¦apartment TOP ADJ¦good-CGN
%e: huro->apaato apaato->huro
%g: an apartment with bathroom is good

d. In: genkan no doa o aker-u
%m: N¦entrance PTL N¦door OBJ V¦open-CGN
%e: genkan -> doa doa -> genkan
%g: open the front door

A similar type of error, stem exchange is an error in which two stems are misordered. There are 16 instances in my corpus. It should be noted that conjugated forms accomodated themselves to new environment in several

examples. Let us observe some examples as follows:

(7)a. In: kippu ka-u noni nara-n-de
%m: N¦ticket V¦buy-CGN PTL V¦form-a-line -CGN-PTL
%e: ka-u -> narabu nara-n-de -> kat-te
%g: form a line to buy tickets

b. In: nani ga okor-u ka wakar-i-mas-e-n
%m: WH¦what SUBJ V¦happen PTL V¦know-CGN-POL-CGN-NEG
%e: okor-u -> wakar-u wakar-u ->okor-i
%g: no one can tell what happens next

There are two exceptional stem exchange errors in my corpus shown in (8):

(8)a. In: kono sema-i heya
%m: ADN¦this ADJ¦small-CGN N¦room
%e: sema-i -> heya-i heya->sema
%g: this small room

b. In: atu-i natu
%m: ADJ¦hot-CGN N¦summer
%e: atu-i -> natu-i natu -> atu
%g: hot summer

In these errors, stem of adjective and the adjacent noun are misordered. Same-grammatical-category constraint is violated here. But it should be noted that two words involved in an error belong to the same NP and they are phonologically similar.

Now let us analyze word and stem exchange errors from the same stand point as we adopted in Table 5 and 6. Results obtained are shown in Table 7-10:

Table 7

Lexical properties of two words in word exchanges (N=22)

Agreement on:			
grammatical category	number of morae	accent pattern	initial mora
22(100%)	17(77%)	15(68%)	4(18%)

Table 8

Lexical properties of two words in stem exchanges (N=16)

Agreement on:			
grammatical category	number of morae	accent pattern	initial mora
13(81%)	15(94%)	11(69%)	1(0.6%)

Table 9

Structures in which word exchanges occur(N=22)

Within phrases	10
Adjacent phrases	9
Between phrases	0
Adjacent basic clause	3
Between basic clause	0

Table 10

Structures in which stem exchanges occur(N=16)

Within phrases	2
Adjacebt phrases	1
Between phrases	0
Adjacent basic clause	13
Between basic clause	0

The most striking difference between contextual word substitution and word

exchange is an environment in which two types of error occur. When word substitutions occur, the intruding word tend to pay no attention to the basic clause boundary. 59 out of 99 instances (60%) cross the boundary. Word exchanges, on the other hand, occur within a short range. "two adjacent phrases" seems to be the unit in which word exchanges occur, as shown in Table 9. An interesting observation can be made when we analyze the surface distance between the target and the source in two types of error. We measured the distance by the number of morae. For example, in (6)a, the intervening element is particle ni, so that the surface distance is counted as "1".

Table 11

The distance between the target and the source measured by the number of intervening morae

	mean number
contextual word substitutions	6.2
word exchanges	1.2[6]

Result in Table 11 seems to suggest that the differences of structures in which two types of error occur correspond to the size of processing unit. Thus, we may assume two types of processing unit: word substitutions occur within far-sighted span which contains two basic clauses. Word exchanges, on the other hand, occur within short-sighted span which contains two adjacent phrases at the most. When we consider the nature of sentence production model, these facts must be explained in some way.

5.Sound exchange error

Before considering sentence production model, let us see another type of exchange error called sound exchange. There are 104 instances of sound

exchanges in my corpus. Typical examples are given as follows:

(8)a. In: bootakatobi
%g: N¦pole-jump
%e: bootakatobi -> bootakabito

b. In: teisyukanpaku
%m: N¦domineering husband
%e: teisyukanpaku -> teisyupankaku
%g: domineering husband

c. In: daisan keihin
%m: N¦third N¦Tokyo-Yokohama
%e: keihin -> heikin
%g: the third Keihin highway

d. In: anzenunten
%m: N¦safe driving
%e: anzenunten -> unzenanten

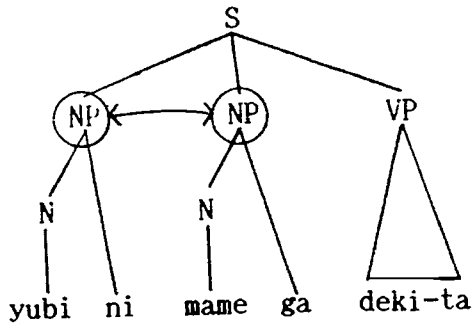
(8)a can be analyzed as a mora exchange error. (8)c and (8)d represent segment exchanges: consonant exchange and vowel exchange respectively. While (8)b, which is rather common, can be analyzed either as a mora exchange or a consonant exchange because two morae involved in the error have identical vowel. Previous researches of sound exchange error uncovered the major characteristics of Japanese sound exchanges (see Kamio and Terao,1986, Terao,1988). They are briefly summarized as follows: Japanese sound exchanges occur (i)in one and the same word (ii)between adjacent syllable (iii)in content word.[7] Among these, let us close look at (ii). Table 12 represents the environments in which sound exchanges occur:

Table 12

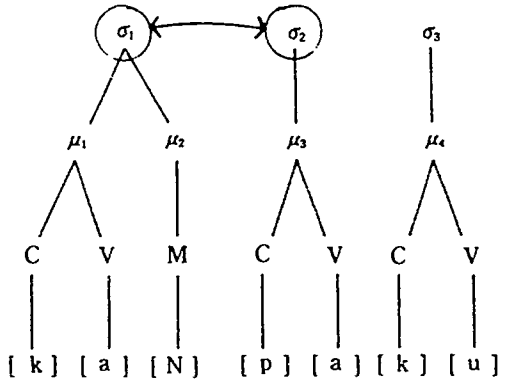
the number of intervening syllables between two exchanged elements	(N=104)
0	82 (77%)
1	15 (15%)
2	3 (5%)
3 or more	3 (3%)

Table 12 clearly shows that the most common structure in which sound exchanges occur is "between adjacent syllables". This reminds us the result obtained from the analysis of word exchange error. Although these two types of error occurred at the different level, they show an interesting parallelism in environment in which they occur. This parallelism is illustrated in Fig.1.

Fig. 1



syntactic structure in which word exchanges occur



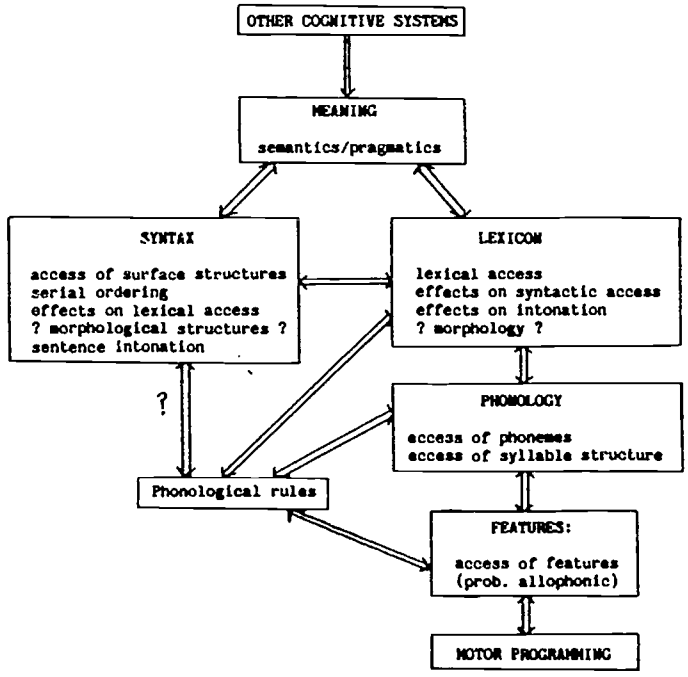
phonological structure in which sound exchanges occur

We cannot explain why this parallelism arises. But the analysis of sound exchanges again suggests that "adjacent element" may be the basic processing unit in sentence production.

6.Interactive Activation Model

We can now return to the problem of how lexical items are accessed. The present analysis of some types of speech error data so far has uncovered two problems that sentence production model must explain. They are summarized as follows: (i) the model must explain the similarity between the tareget and the source. As shown in Table 5 and 6, they are related phonologically, syntactically, as well as semantically.[8] (ii) the model must explain the difference between the structures in which contextual word substitutions and word exchanges occur. In order to explain these facts, the present paper adopts the Interactive Activation Model.[9] The general structure of the model is illustrated in Fig.2.

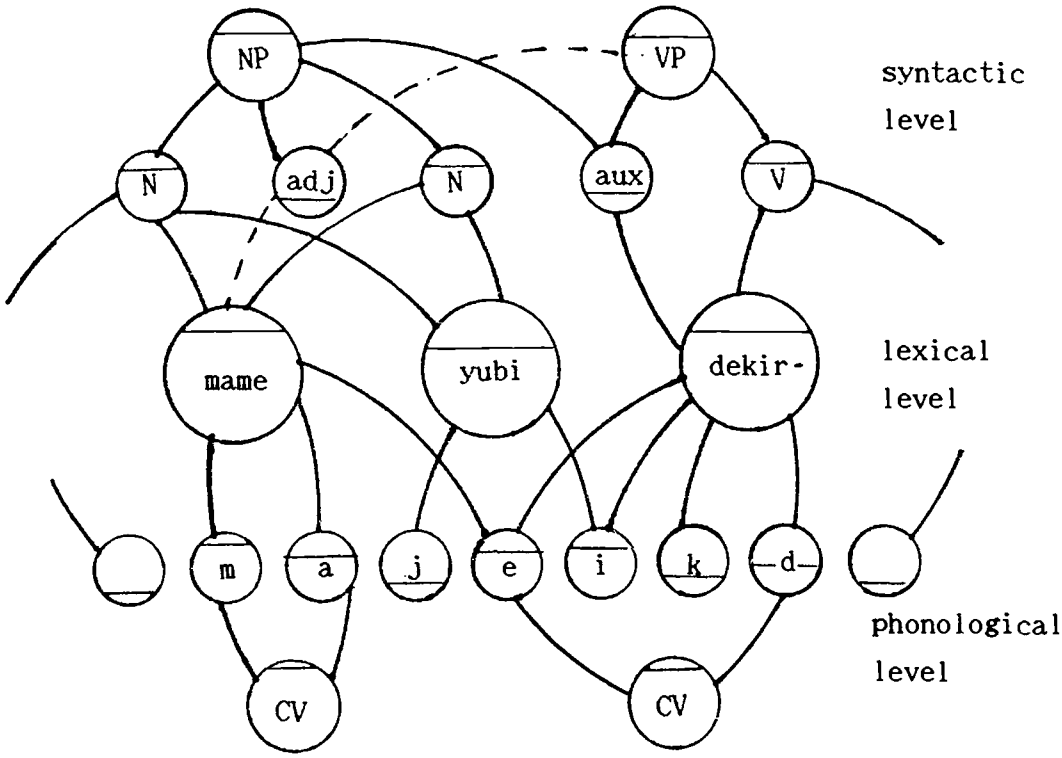
Fig 2. General structure of the model (from Stemberger,1985)



A lot of bi-directional arrows (" <=> " symbol in Fig.2) represent the major characteristics of this model. They guarantee that activation, a basic

driving force of the model, can spread not only to lower levels but also to higher levels. It is assumed that many processings on different levels are carried out in parallel fashion. Note that the influential models in previous studies have linear ordering between levels (See Garrett,1975, Levelt,1989). The advantages of bi-directional activation are discussed later. Let us look at the model in detail. The basic elements are units and links. Units in each level are linked each other like neural-network. Example of an interactive activation network of three levels(syntactic, lexical, phonological) is shown in Fig.3.

Fig. 3 Example of a neural-network



It should be noted that each unit has its characteristic level to which it returns when not being activated. Horizontal lines in the units represents its resting level. As Stemberger(1985) pointed out, the resting level

varies from very low level to very high level. The basic driving force of the system is activation. When the speaker intends to say something, relevant units in each level including targets are activated in parallel fashion. Activation spreads from one unit to another through the links. In normal case, the target unit is highly activated and "the rich gets richer" principle operates to win against competing units. After being accessed, the activation level returns to its resting level (The author calls this mechanism "cool down"). But when some noise arise, errors are supposed to occur. Stemberger(1985) argues three sources of noise:they are (i) random variation of resting level, (ii) frequency effect, (iii) feedback from other levels. Although discussion about causation of speech errors is interesting (See Levelt,1989), it is beyond the scope of this paper. Let us now examine how this model explain two problems mentioned earlier.

Interactive activation model can explain the relationship between the target and the source in non-contextual word substitution errors shown in Table 1-4. Since units in lexical level are linked with units in syntactic level and phonological level, they are reinforced syntactically and phonologically. As a result, the target and the competing units tend to have many properties in common. The model can also account for malapropisms, in which the target word is replaced by another existing word that is related phonologically but not semantically. Malapropisms are explained as a result of a strong feedback from the phonological level.

Now let us turn to the problem (ii). Taking the existence of contextual word substitutions into consideration, we can hardly assume that access of one lexical item proceed to the next only when the present target had gone to the next level.[10] It is natural to assume that the lexical level has several highly activated units at a time.d It is also reasonable to assume that the number of the highly activated units are limited, because the processing must proceed with very high speed. Here, we must remember the result obtained from Table 6. Table 6 shows that the environment in which contextual word substitutions occur is limited to two basic clause. So we can assume that the highly activated units which can take a "reserved seat"

must be the units that can appear within following two basic clauses. We may also assume that the scope of planning for the processing is two basic clauses. They are illustrated in Fig.4.

Fig.4 Highly activated units in the scope of processing.

└──┘ = basic clause

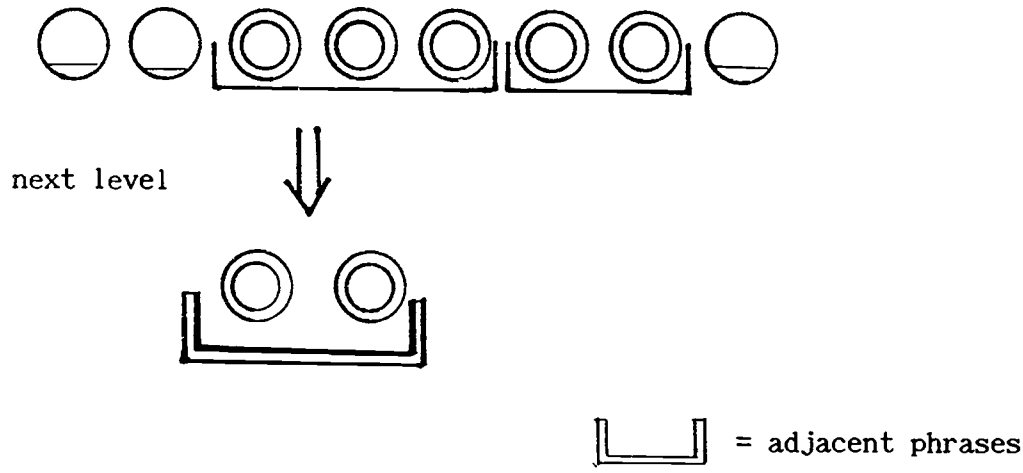
In Fig.4, " ◎ " symbol represents the highly activated unit. At this stage, syntactic feedback seems stronger than phonological one because selection of words in syntagmatic relation is more relevant than selection of words in paradigmatic relation.[11] Note that noun - verb intrusion rarely occur in contextual word substitutions. It is also interesting to note that exceptional word substitution errors, which Terao(1989) calls "semantic source error", can be taken as evidence for this stage. This is a type of error in which (semantic) rivals of unit A replaced unit B. Observe some instances:

(9)a. In: zyooban-sen no naka de tabako sut-te-ru hito ga i-ta
%m: N¦Zyoban-line PTL N¦inside PTL N¦cigarette V¦smoke-PTL-AUX N¦man SUBJ V¦be-AUX
%e: tabako -> densya "train" s={Zyooban line}
%g: (I) saw a man smoking in the train of Zyooban line

b. In: sugoku kiniit-teiru kyoku da
%m: ADV¦very V¦like-AUX N¦song-AUX
%e: kyoku -> suki "ADN¦like" s={kiniit-teiru}
%g: this is my favorite song

Let us next consider word exchanges. As we have seen in the previous chapter, word exchanges apparently occur in relatively small environment, that is, within adjacent phrases. We can explain the difference of environment without conflict, if we adopt the interactive activation model. We assume that word exchanges occur when the processing proceed from the access stage to the next stage. We also assume that this "adjacent phrase" structure is related to the "cool down" process. In other words, the highly activated units in lexical level is available, or still "hot" until the target in the adjacent phrase is accessed. Let us look at Fig.5:

Fig.5 "Hot" units in processing.



Suppose that the intended ordering was A-B-C-D, and B was mistakenly accessed first. Then A lost his "seat". But it is possible that A is accessed next and appear in the position B because A is still available even when adjacent phrase is processed. Thus the output would be B-A-C-D, a typical exchange error. If D was accessed first, then the output would be D-B-C-D because A is "cool" when proper D is accessed. In this case, D can appear twice because the distance between A and D is large enough for D to be activated again. In sum, contextual word substitutions occur when highly

activated words are represented in the lexical level, and the scope of this stage is two basic clauses. Word exchanges, on the other hand, occur when words are accessed and are sent to the next level, the scope of the processing at this stage is adjacent phrases.

7.Conclusion

The present study will be concluded by summarizing the major findings: (i) There are two types of environment in which contextual lexical errors occur. (ii) These two types of environment correspond to two types of processing units. And interactive activation model can explain difference of the unit of processing. (iii) "adjacent elements" may be a important processing unit both in syntactic and phonological level. This question should be explored in a future study.

NOTES

[1] It is widely agreed that Japanese is a non-configurational language syntactically, and moraic language phonologically.

[2] Differnce of one mora is included

[3] It should be noted that the agreement of initial morae was relatively low. But it does not seem to indicate that contextual word substitutions are ordering errors. If they were purely ordering errors, then the instance such as "*ik-u o sanpo ni ture-te", in which verb replaced noun,would be observed more frequently.

[4] Seven out of eight instances were errors between modifying word and a headnoun linked with particle no.

[5] Basic clause is here defined as the clause with one predicate

[6] Most of the intervening elements were one particle

[7] Garrett argues the characteristics of sound exchange in English. According to Garrett(1975), they occur (i)in adjacent words, (ii)within a phrase, and (iii)in content words. Apparently, sound exchanges in Japanese occur in relatively small unit. But the detailed analysis should be made in a future study.

[8] Semantic analysis is beyond the scope of this paper. But Terao(1989) argues that malapropisms, semantically unrelated word substitution, rarely occur in Japanese.

[9] The basic concept of the model is carried over from Stemberger(1985), and Dell(1988).

[10] The next level is assumed to be an execution level.

[11] The terms "syntagmatic" and "paradigmatic" are used in the sense of glossematics

Appendix: a list of abbreviations
(These abbreviations are used in CHAT sytem)

Main line
In: intended utterance

Sub-line
%m: morphemic translation

%e:	error line contains the target and the source
" "	translation of the intruding word
%g:	glosses

Grammatical category

N	noun
V	verb
AUX	auxiliary verb
ADJ	adjective
ADV	adverb
ADJN	adjectival noun
PTL	particle
CGN	conjugation
POL	polite form
NEG	negation
PN	proper noun

Grammatical relation

SUBJ	subject
OBJ	object

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