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DEDICATION

This issue of Calgary Working Papers in Linguistics is dedicated to the memory of our colleague and friend, Ewa Iwanicka (1950-1986), who taught us all a great deal about courage, love, and living life.

FOREWORD

This is the twelfth in the series of working papers published by LOGOS, the Student Linguistics Society at the University of Calgary. These papers represent the current research in progress of students and faculty members and as such should not be considered in any way final or definitive. Appearance of papers in this volume does not preclude their publication in another form elsewhere.

We extend our thanks to the contributors to this volume and encourage readers to submit articles for inclusion in the next issue. Thanks as well to the Graduate Students' Association and to the Department of Linguistics for their financial assistance. The editors of this volume were Joyce Hildebrand and Gary Byma.

We wish to extend special thanks to Joyce Hildebrand for her tireless efforts in bringing this issue of CWPL to publication and to Kathy Officer for her assistance in typing and preparing the graphics.

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SCOPE AMBIGUITY IN HUNGARIAN

Gary Byma

INTRODUCTION

The study of semantics seeks to determine, among other things, the meaning of logical words such as connectives, quantifiers and negatives. The introduction of more than one quantifier into a sentence results in a phenomenon in most languages called scope ambiguity. This means that the sentence can have more than one interpretation with respect to the scope of the quantifiers, i.e. the range of the effect of the quantifiers. Fodor (1977:185) notes that a quantifier can have more than one interpretation when it co-occurs with another quantifier. Thus in the English sentence (1), the quantifier some can have two interpretations.

(1) & Everyone likes someone.¹

The two readings of (1) are given in (2).

- (2) a. There is a specific someone, such that everyone likes that someone.
- b. Everyone likes someone, but not necessarily the same someone.

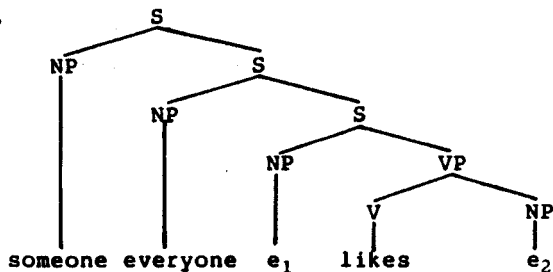
May (1977) attempts to account for this apparent ambiguity using syntactic notions applied at a grammatically determined level of representation called Logical Form (LF). In his treatment of sentences such as (1), ambiguity arises out of differences in the scope of one quantifier with respect to another. In interpretation (2a), the existential quantifier some has "broad scope" with respect to the universal quantifier every, whereas in (2b) every has "broad scope". Scope is defined by May in syntactic terms making use of the notion of c-command,² as defined in (3).

- (3) A is in the scope of B if A is c-commanded by B in Logical Form (LF).

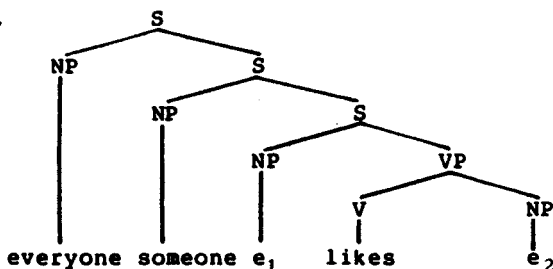
May proposes a movement rule between Surface Structure and Logical Form called Quantifier Raising (QR) which raises a quantifier from its position in the surface structure and adjoins it to the S node in LF. In this way he is able to account for

differences in the "scope" of two quantifiers in terms of their relative positioning in LF. Thus the two interpretations for sentence (1) are accounted for by QR application resulting in the LFs given in (4).

(4) a.



b.



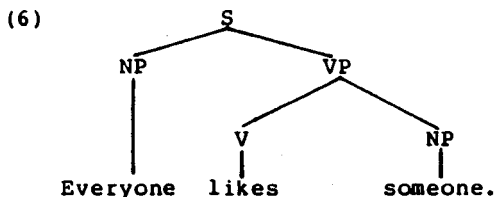
The LF structure in (4a) corresponds to the meaning in (2a) and that in (4b) to (2b). It is useful to refer to "broad scope" and "narrow scope" when considering the interpretations of sentences involving two quantifiers. Using May's definition given above, we see that in (4a) some has broad scope with respect to every since it c-commands it in LF, whereas in (4b) it has narrow scope because it is now c-commanded by every.

May's rule of Quantifier Raising is proposed as a universal rule that determines the interpretations of sentences containing more than one quantifier. Huang (1982), in his examination of Mandarin Chinese notes that May's thesis does not account for the observed facts in this language. While the sentence Everyone likes someone has two possible interpretations in English, it has only one interpretation in Mandarin, one where some has narrow scope. In an effort to redeem the theory of Quantifier Raising in Logical Form and account for the apparent anomaly in Mandarin, he postulates a Hierarchical Condition (5).

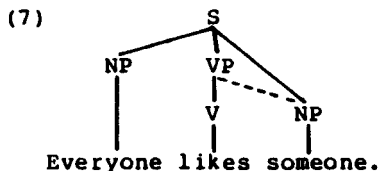
(5) Hierarchical Condition

If a Quantified NP, A, c-commands a Q-NP, B, in S-Structure, then it must c-command it in LF.

It follows that if a Q-NP does not c-command another Q-NP in S-Structure, it cannot do so in LF. Thus for sentences like (1), presented in (6), only one interpretation is possible.



Note that everyone c-commands someone but not vice versa, so only the narrow scope interpretation for someone is available. In order to account for the fact that in English (1) is ambiguous, Huang proposes a semantic readjustment rule, Restructure-alpha, which adjoins the lower NP someone to S from its position within VP, as in (7).



Now we see that everyone and someone c-command each other so that two interpretations are possible in LF.

The phenomenon of scope ambiguity has also been observed in Korean (Cho 1983). In (8), we see two interpretations are possible in Korean, analogous to the English sentence (1).

- (8) % Motun salam-i etten paywu-lul coahanta.
 all person Nom some actor Acc like
 (Everyone likes some actor.)

The two interpretations for (8) are represented in (9).

- (9) a. Everyone likes an actor but not necessarily the same actor.
 ($\forall x, \exists y$ x likes y)
 b. There is an actor that everyone likes.
 ($\exists y, \forall x$ x likes y)

The interpretations in (9) make use of a representation of meaning found in philosophical logic. The symbol \forall indicates the universal quantifier represented in English by every (or all) and the symbol \exists indicates the existential quantifier represented in English by some (or a/an). The ordering of quantifiers in (9) is

analogous to the notion presented earlier in (4) using May's representation of Logical Form. Thus, if \forall precedes \exists then it has broad scope with respect to \exists and conversely if it follows \exists it has narrow scope. Throughout this paper I will use this definition of scope.

If we change the order of the subject and object in sentence (8), as in (10), the sentence is no longer ambiguous and has only the interpretation in (9b).

- (10) Etten paywu-lul motun salam-i coahanta.
 some actor Acc all person Nom like
 (Some actor, everyone likes.)

The only apparent difference between (8) and (10) is that in (8) the subject precedes the object and in (10) the object precedes the subject. As Cho notes, although Korean is a free word order language, the observable difference between (8) and (10) leads us to conclude that word order may have semantic consequences when interpreting the relative scope of quantifiers. In (11), we observe a case in which all is part of the object and some part of the subject.

- (11) a. Etten salam-i motun paywu-lul coahanta.
 some person Nom all actor Acc like
 (Someone likes all actors.)
 b. Motun paywu-lul etten salam-i coahanta.
 (All actors, someone likes.)

Both of the sentences in (11) are unambiguous and they both have the same interpretation, represented in (12).

- (12) There exists a person such that that person likes
 all actors.
 ($\exists x, \forall y$ x likes y)

Cho observes that when the universal quantifier all is part of an object (in this case the direct object), the quantifier is not given broad scope regardless of whether it precedes or follows some. Comparison of (8), (10) and (11) reveals that the broad scope interpretation of the quantifier all (every) is dependent on two things: whether it is the subject or object and whether or not it precedes the quantifier some. To account for this, Cho proposes that there is a hierarchical ordering of the grammatical relations such that a quantified subject shows a greater tendency towards broad scope than a direct object.

The Korean examples of scope ambiguity call into question the theories forwarded by May and Huang. In a non-configuration-al language such as Korean, there is no VP, so that both subject and object NP's hang from S and hence c-command each other. If Huang's Hierarchical Condition holds and May's Quantifier Raising is a universal semantic rule, we would expect two interpretations

for the sentences in (10) and (11a,b). This is clearly not the case.

SCOPE AND WORD ORDER IN HUNGARIAN

The results obtained in Cho's work on scope ambiguity in Korean led me to question whether like phenomena might also occur in other non-configurational languages. I chose Hungarian, which, like Korean, has free word order, as the test case. According to Katalin Kiss (1981), Hungarian grammar has the following phrase structure rules:

- (13) a. $S^* \rightarrow X^{n*} S'$
b. $S' \rightarrow X^n S$
c. $S \rightarrow V X^{n*}$
(where X^{n*} means an arbitrary number of maximal major categories)

In addition, Kiss proposes two optional substitution transformations for Hungarian: Topicalization and Focusing. The positions of Hungarian sentences are thus filled in two steps; the nodes under S are filled by lexical insertion and the nodes under S' and S* are filled in the transformational component by the rules of focusing and topicalization, respectively.

The hypothesis I am seeking to test involves whether or not there is a hierarchical relationship of the grammatical relations of subject, direct object, indirect object and oblique relations in Hungarian when these are quantified NP's. In addition, I want to test the interaction of the quantifiers some and every in Hungarian sentences to see if word order or precedence affects the possible interpretations.

The definition of scope as presented by May requires some revision for the principle I wish to test. Note that for the Korean sentences (10) and (11a,b) above, there is only one interpretation for each of these sentences, one where some has broad scope, i.e. some c-commands every in LF. However, according to May and Huang, every should also be able to c-command some in LF since it does so in S-Structure.

If we wish to state the hierarchical ordering of grammatical relations in Korean and the fact that surface word order affects the possible interpretations in a principle making use of scope relations, we might propose the following:

- (14) A can have broad scope with respect to B
if and only if:
i) $A \geq B$ in the hierarchy of grammatical relations, and
ii) A precedes B in the surface word order of the sentence.

This principle does not account for the ambiguity of sentence (8) in Korean since some can have broad scope and yet neither precedes every nor is the object position higher in the hierarchy than the subject.

Since neither scope nor the notion of c-command can account for the interpretations of Q-NPs in Korean, we need an alternate solution. O'Grady (class lectures) proposes a notion of interpretive dependency to account for the phenomenon of scope ambiguity, which does not rely on c-command. In this treatment, "broad scope" and "narrow scope" are defined as in (15).

- (15) a. "narrow scope" for some: some depends on all for its interpretation.
- b. "broad scope" for some: some does not depend on all for its interpretation.

In the dependent interpretation for some, the value of the variable bound by λ (some) is determined with respect to the set of elements over which \forall (all) ranges, whereas in the independent interpretation, the variable bound by λ is not determined with respect to the set over which \forall (all) ranges. The proposal, at least for Korean and Hungarian, is that the independent reading should always be available for some.

Making use of this notion of interpretive dependency, we can restate the principle given in (14) as follows (O'Grady, class lectures).

- (16) A can depend on B for its interpretation if and only if:
 - i) $B \geq A$ in the hierarchy of grammatical relations, and
 - ii) B precedes A in surface structure.

Note that A in (16) refers to the quantifier some. The quantifier all does not depend on some for its interpretation in this theory since it is assumed that a more inclusive element never relies on a less inclusive element for its interpretation (Ioup 1975). This principle is able to account for the observed facts in Korean because it allows the two interpretations demonstrated by sentence (8) and predicts that only the independent reading is available for the examples in (10) and (11).

Given the principle defined above in (16), based on Korean data, let us examine the nature of quantifier ambiguity in Hungarian. In Hungarian, the introduction of two quantifiers in a sentence does result in ambiguity, as shown in (17).

- (17) * Mindegyik fiú szeret egy leány-t.
 every boy Nom likes a girl Acc
 (Every boy likes a girl.)

The two possible interpretations for (17) are represented in (18).

- (18) a. There is a girl that every boy likes.
($\exists y, \forall x, x \text{ likes } y$)
- b. Every boy likes a girl but not necessarily the same girl.
($\forall x, \exists y, x \text{ likes } y$)

Further examination of quantifier ambiguity in Hungarian involving some and every shows that the relative ordering of the quantifiers in the sentence makes a difference as to whether some has the independent reading.

- (19) a. * Szeret mindenki valaki-t.
likes everyone Nom someone Acc
(Everyone likes someone.)
- b. Szeret valaki-t mindenki.
(Someone, everyone likes.)

The two interpretations in (19a) are given in (20), the interpretation of (19b) is represented in (20b).

- (20) a. Everyone likes someone, not necessarily the same someone.
($\forall x, \exists y, x \text{ likes } y$)
- b. There is a specific someone that everyone likes.
($\exists y, \forall x, x \text{ likes } y$)

Note that in (19), the independent reading is available for some in either order but the dependent reading is only available when every precedes some (19a). It is also important to note that (19) represents sentences generated by the phrase-structure rule in (13c). Neither focusing or topicalization has occurred. My Hungarian consultants inform me that the sentences in (19) sound unnatural, perhaps reflecting the speech of someone just learning Hungarian. They are not necessarily ungrammatical since, according to Kiss, topicalization and focusing are optional, but they are not the preferred order of a mature native speaker. The sentences in (21) represent the sentences in (19) after focusing of the post-verbal NPs. In (22), Topicalization has been applied to the sentences in (19).

- (21) a. * Mindenki szeret valaki-t.
everyone Nom likes someone Acc
(Everyone likes someone.)
- b. ? Valaki-t szeret mindenki.
(Someone, everyone likes.)

- (22) a. Mindenki valaki-t szeret.
(Everyone someone likes.)
- b. Valaki-t mindenki szeret.
(Someone, everyone likes.)

Sentence (21b) is of questionable grammaticality according to my speakers perhaps for independent reasons which may restrict the movement to focus position of an NP lower in the hierarchy of grammatical relations (the ACC-NP) when an NP higher in the hierarchy is available (the NOM-NP). The sentence in (22b) has only an independent reading for some. It is interesting to note that, at least in the case of (21) and (22), focusing and topicalization do not seem to affect the ambiguity of the sentences. On the assumption that focusing and topicalization do not affect the scope judgements, subsequent examples will reflect a more natural word order for a mature native speaker of Hungarian, that is, after focussing and/or topicalization have been applied.

In the sentences (19), (21) and (22) above, ever one was the subject of the sentences and someone was object. If we change the grammatical relations of these two quantifiers we obtain the sentences in (23).

- (23) a. Valaki szeret mindenki-t.
someone Nom like everyone Acc
(someone likes everyone.)
- b. Mindenki-t szeret valaki.
(Everyone, someone likes.)

These sentences are unambiguous, having only an interpretation where someone is not dependent on everyone for its interpretation. It is important to note that in all the sentences (19), (21), (22) and (23) the independent reading for someone is available regardless of whether it occurs in subject (23) or object (19,21 &22) position, as predicted by the theory of interpretive dependency. The quantifier every assigns the dependent reading to some only if it is subject and it precedes some in the sentence. This observation is consistent with Cho's observation concerning some and every in Korean. A consideration of the relative grammatical functions of subject and object shows that these are also hierarchically ordered. Comparing sentence (21a) and (23b), repeated below, we see that surface subject is ordered higher than the object (subject>object) and hence assigns the dependent reading to some.

- (21a) Mindenki szeret valaki - t.
everyone-NOM likes someone-ACC
(Everyone likes someone.)

- (23b) Mindenki-t szeret valaki.
everyone Acc likes someone Nom
(Everyone, someone likes.)

In addition to the interaction of these two quantifiers in subject and object position, I compared them in the direct and indirect object positions. In English expressions, such as (24), the sentence is ambiguous in that some has both an independent and a dependent reading.

- (24) * John gave some books to every child.

Likewise in Hungarian, some and every in the direct and indirect object positions can be ambiguous.

- (25) a. * János odot minden gyerek-nek könyv-ek-et.
John gave every child Dat book Pl Acc
(John gave every child (some) books.)
b. János odot könyv-ek-et minden gyerek-nek.
(John gave (some) books to every child.)

The two interpretations for (25a) are represented in (26).

- (26) a. John gave every child some books but not
necessarily the same books.
b. John gave the same books to every child.

The only available reading for (25b) is (26b) where some has an independent interpretation, while (25a) is ambiguous between both interpretations of (26). In short, the only time when a dependent interpretation is assigned by every is when it precedes some. The same principle holds regardless of which quantifier is associated with the indirect object, as shown in (27).

- (27) a. * János minden könyv-et odot egyik gyerek-nek.
John every book Acc gave a child Dat
(John every book gave to a child.)
b. János egyik gyerek-nek odot minden könyv-et.
(John to a child gave every book.)

Again, we see that a (some) can always have an independent interpretation, as the meaning of (27b) implies that one particular child received every book which John gave.

Comparison of the results of the sentences in (25) and (27) shows that the grammatical functions of direct object and indirect object are not ordered hierarchically with respect to each other, since only the linear order of the quantifiers (see (16ii)) is relevant to assigning the dependent reading for some.

Hungarian does not have any prepositions, using case inflections where languages like English use prepositional phrases. In order to determine whether or not a hierarchical relationship exists between the direct object and oblique cases in Hungarian, the following sentences contain Q-NPs in these two grammatical relations.

The sentences in (28) use the instrumental case interacting with the direct object (accusative).

- (28) a. % Béla kinyitott minden ajtó-t kulcs-al.
 William opened every door Acc key Instr
 (William opened every door with a key.)
- b. Béla kinyitott kulcs-al minden ajtó-t.
 (William opened with a key, every door.)

In (28b) the interpretation is one where a (some) is independent of every as in (29b), while (28a) is ambiguous between both interpretations.

- (29) a. Bill opened every door with a key but not necessarily the same key.
- b. Bill opened every door with the same key.

With every associated with the oblique case, and a (some) with the direct object, we obtain the sentences in (30).

- (30) a. % Béla mindegyik kulcs-al kinyitott egy ajtó-t.
 (William with every key opened a door.)
- b. Béla egy ajtó-t kinyitott mindegyik kulcs-al.
 (William a door opened with every key.)

The independent interpretation for some prevails such that both sentences in (30) have the interpretation represented in (31b) but only in (30a) is the dependent reading in (31a) available.

- (31) a. Bill used every key to open a door, not necessarily the same door.
- b. Bill used every key to open one particular door.

These examples demonstrate that with the instrumental case and the direct object represented by Q-NPs, some only has the dependent reading when it is preceded by every. Furthermore, sentences (28) and (30) suggest that the instrumental oblique case and the direct object are not hierarchically ordered with respect to one another. If we regard the dative as an oblique as suggested above, we can make a tentative proposal that the oblique cases and direct object cases are equal in the hierarchy (32).

- (32) Hierarchy of Grammatical Relations in Hungarian
 i) subject
 ii) direct object, oblique relations

The prediction that this statement makes, in conjunction with the hierarchical ordering of subject>direct object, is that we would expect subject>oblique cases as well. This prediction is tested in (33) where subject and the instrumental case interact.

- (33) a. % Az ajtó-t mindenki egy kalápacs-al ütötte meg.
 the door Acc everyone Nom a hammer Inst hit
 (Everyone hit the door with a hammer.)
 b. Az ajtó-t egy kalápacs-al mindenki megütötte.
 (With a hammer, everyone hit the door.)

The sentence in (33a) is ambiguous between the two readings in (34) below, (33b) has only an independent reading for the existentially quantified NP.

- (34) a. Everyone hit the door with hammer, but not necessarily the same hammer.
 b. Everyone used the same hammer to hit the door.

Notice that some is only dependent on every for its interpretation in (33a). In (33b), even though every is subject, only the independent reading is available for some. As stated in (16), being higher in the hierarchy of grammatical relations is a necessary but not sufficient condition for interpretative dependency and since some precedes every in linear order, it is not dependent on it for its interpretation. In addition, the instrumental phrase 'with a hammer' is topicalized and may affect the interpretation of the sentence.

In the following examples (35) some is the subject and every is in the oblique case (Instrumental).

- (35) a. Az ajtó-t valaki mindegyik kalápacs-al megütötte.
 the door Acc someone Nom every hammer Instr hit
 (Someone hit the door with every hammer.)
 b. Az ajtó-t mindegyik kalápacs-al valaki megütötte.
 (With every hammer, someone hit the door.)

It is clear that in (35a) neither condition of the principle in (16) is met since someone is both subject and ordered before every in the sentence. In (34b), every precedes someone satisfying the condition in (16ii) but (16i) is not met since some is subject and higher in the hierarchy of grammatical relations. As a result, both (35a,b) are unambiguous.

The interaction of subject and oblique grammatical relations was also tested using the allative case inflection (36).

- (36) a. % Közel ült mindenki valaki-hez.
near sat everyone Nom someone All
(Everyone sat near someone.)

- b. Közel ült valaki-hez mindenki.
(Near someone, everyone sat.)

The two interpretations for (36a) are represented in (37).

- (37) a. Everyone sat near a different person.
b. There is a specific someone who everyone sat near.

Note that the independent reading for some, represented in (37b) is the only reading for (36b). If some occurs in subject position, again, only the independent interpretation is possible, as in (38).

- (38) a. Közel ült valaki mindenki-hez.
near sat someone Nom everyone All
(Someone sat near everyone.)
b. Közel ült mindenki-hez valaki.
(Near everyone, someone sat.)

It is important to note that in Hungarian syntax, the verbal post-position közel (near) is obligatorily focused (Kiss 1981). Thus, the focus position is occupied and only topicalization is possible. Application of topicalization to either of the quantified elements in (36) and (38) does not alter the ambiguity of the sentences, as shown in (39) and (40).

- (39) a. % Mindenki közel ült valaki-hez.
everyone Nom near sat someone All
(Everyone sat near someone.)
b. Valaki-hez közel ült mindenki.
(Someone, everyone sat near.)
(40) a. Valaki közel ült mindenki-hez.
(Someone sat near everyone.)
b. Mindenki-hez közel ült valaki.
(Everyone, someone sat near.)

In all the above sentences, some has the independent interpretation; only in (39a) can it be dependent on every for its interpretation. These observations support the ordering of subject>oblique.

CONCLUSION

The observations from Hungarian regarding ambiguity involving quantifiers lends support to the notion of interpretive dependency. Alternate theories involving Quantifier Raising and rules like Restructure Alpha at the level of Logical Form do not account for the facts obtained in this study.

In addition, Hungarian, with Korean, requires a hierarchical ordering of grammatical relations. The tentative hierarchy for Hungarian is presented in (41).

(41) subject > object and oblique relations

A preliminary observation concerning the interaction of topicalization, focusing and scope ambiguity seems to indicate that these transformations, in general, do not affect the interpretation of the quantifiers. It may be that focusing (and topicalization) are involved in pragmatic biases and preferences for certain word orders. In addition, they may remove pragmatic biases against difficult or unnatural interpretations. Judgements from some speakers indicate that sentential stress, determined in part by topicalization and focusing, affects the interpretation of sentences in Hungarian (cf. Kiss 1981). These are topics for future study.

THEORETICAL IMPLICATIONS

In May's treatment of scope ambiguity, the quantified NPs are moved out of their position in the surface structure and are adjoined to S by Quantifier Raising (QR) to generate the Logical Form. His proposal accounts for the ambiguous readings of English sentences involving more than one quantifier. However, for May's thesis to be explanatorily adequate for English, QR must be obligatory. Therefore, May proposes a number of conditions that ensure that a Q-NP will be raised. The condition of interest here, is his Condition on Quantifier Binding which states that every quantified phrase must properly bind a variable (a properly bound variable is co-indexed with a c-commanding NP).

The prediction that May's theory makes about Hungarian, is that any surface structure with more than one Q-NP would have more than one interpretation. This is clearly not the case. In order to account for those phenomena in which some sentences have only the "broad scope" (independent) interpretation for some, he would have to impose a special marked rule. As it stands, however, the notion of Quantifier Raising is inadequate to explain scope ambiguity in Hungarian.

Huang (1982), in treating quantified NPs in Mandarin Chinese, noted that May's thesis did not account for the observed facts in this language. His Hierarchy Condition, however, makes incorrect predictions concerning Korean and Hungarian. In non-

configurational languages such as these, there is not a VP, hence both Q-NP's in sentences with some and every would hang from the S-node and would c-command each other. Thus, as with May's thesis, there should be two interpretations, contrary to the observed facts.

The notion of interpretive dependency accounts for the observed facts in Hungarian. In every example sentence examined, the independent (i.e. "broad scope") interpretation for some was available. The hierarchy of subject>direct object and oblique cases accounts for the fact that some is dependent on all for its interpretation only when all is in the subject position.

In addition, judgements from some speakers seem to indicate that every assigns the dependent role to some if only one of the conditions in principle (16) are met. Speakers of Korean and Hungarian require both conditions of precedence and greater or equal hierarchy of grammatical relations as necessary and sufficient conditions for the dependent reading of some.

An exciting consequence of the results noted here for Hungarian relates to their similarity to those obtained for Korean. Since these two languages both make use of similar mechanisms to determine interpretations of quantified elements, it is more certain to be a universal principle. To be able to verify QR for various Indo-European languages is less intriguing since they stem from a common origin. The results for these two non-configurational languages however, suggest that the notion of interpretive dependency is a universal linguistic principle.

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FOOTNOTES

¹By convention, we use the symbol ' λ ' to indicate a sentence with more than one interpretation.

²C-command is defined as follows:

A c-commands B iff the first node dominating A dominates (is higher in the phrase structure tree than) B, and A does not dominate B, nor B, A.

I wish to gratefully acknowledge Mr. & Mrs. Joo, natives of Hungary, for their patience and assistance in the interpretations of scope in Hungarian.

THE PRODUCTION AND PERCEPTION OF ENGLISH, FRENCH AND GERMAN INTONATION

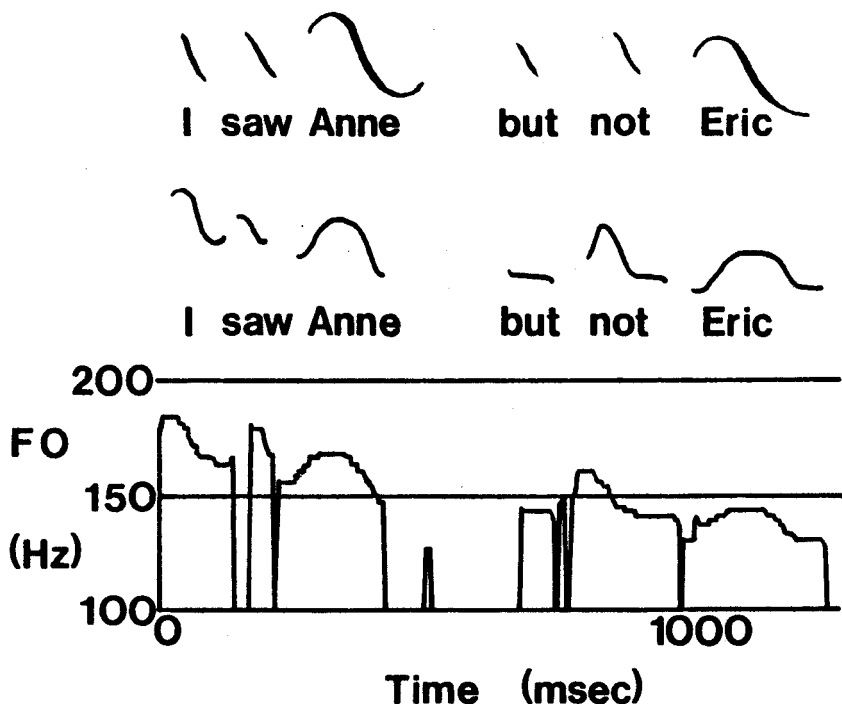
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'Foreign accent' has generally been equated with non-native pronunciation and much research has focused on the area of non-native pronunciation (for example, Briere 1966, Flege 1980). We were interested in other components of non-native speech which create or add to the listener's impression of 'foreign accent'. Specifically, we were interested in the role intonation plays in identifying a non-native speaker. It is not known how widely intonation is used to identify speakers of a different language or dialect. This unanswered question forms the central inquiry of this paper.

It is known that syllables, words and phrases are characterized by language-specific pitch (fundamental frequency, or F_0) patterns (Delattre 1963) and that there are differences in the manifestation of the same intonation functions across languages (Hadding-Koch and Studdert-Kennedy 1964, Cruttenden 1981, Delattre 1972). For example, Figure 1 shows the characteristic English reverse S shaped pitch patterns (generally falling pitch ending with a small pitch rise) over most of the words in the sentence. Also evident is the large fall in pitch indicating that the sentence will continue. This pattern for the continuative function is particular to English.

Figure 1. Native English Intonation Pattern.

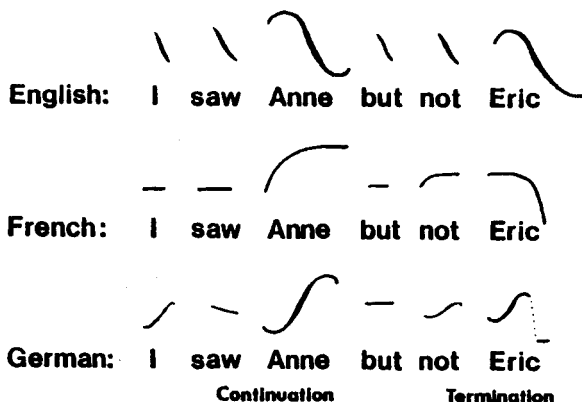
The height of the curved lines above words indicates pitch movement and the thickness of the lines represents intensity. The uppermost example is theoretical (adapted from Delattre 1963:194), while the middle example is based on a sample of real speech whose pitch has been analyzed, as represented by the graph at the bottom.



Since languages differ in their intonation patterns, a speaker may be identified as a member of a certain linguistic group by his intonation (Delattre 1963, Cruttenden 1981). Delattre (1963) further claims that speakers tend to impose their native intonation patterns on their second language. This is called intonational interference and, according to Delattre, contributes to the perception of non-native accent. One would then expect a French native speaking English to carry his native French intonation patterns over into his spoken English (as shown in Figure 2).

Figure 2. Interference of Native French and German Intonation Patterns with English Intonation (adapted from Delattre 1963:194).

The native English intonation pattern (top) is not used by non-native English speakers, who use intonation patterns typical of their native language when speaking English. The intonation patterns for a French speaker and a German speaker speaking English are given (middle and bottom, respectively).



Since French syllables, words and phrases are characterized by steep pitch rises and falls to and from plateaus, and continuation is expressed by a pitch rise instead of a pitch fall, one would expect that an English listener might decide on the basis of these intonation cues that the speaker was not a native speaker of English.

Interference by one's native language in one's second language is an acknowledged stumbling block in the acquisition of a second language (Dulay and Burt 1972, Taylor 1975), although there is some debate as to its pervasiveness at all age levels or in all areas of second language acquisition (Cook 1973, Palermo and Howe 1970).

The experiments presented here attempt to determine whether the intonation of a speaker's native language contributes to his perception and production of a non-native accent. Intonation is used here to mean pitch movement in speech as it reflects linguistic functions. Two linguistic functions, continuation and termination, served as the basis for an investigation of this question.

Continuation is that property of an intonation which shows that a speaker's utterance has not yet ended and that more will be said (Bolinger 1958, Bolinger 1970, Delattre 1963, Delattre 1972). Another such pattern is terminal intonation. Termination is conveyed by an intonation pattern which mainly indicates that the utterance has finished.

Delattre (1963) predicts that continuation and termination will both be conveyed by pitch falls in English. In French, continuation would be conveyed by a pitch rise and termination by a pitch fall. In German, continuation would be characterized by pitch rising to a high level pitch and termination would be conveyed by a rise before an abrupt fall to a level pitch.

Among the problems associated with the question of cross-language differences in intonation is convergence of function. A speaker's emotional state, his language background and linguistic information may all be conveyed by one intonation. Often, the intonation patterns used by speakers of an unfamiliar dialect will be misinterpreted as signalling an emotion or an attitude (Cruttenden 1981), rather than simply marking the speaker as non-native.

Work by some researchers sheds light on the possibility of identifying non-native speakers by their intonation. Tests of subjects' mimicry or identification of foreign intonation patterns suggest that subjects can perceive the differences between the intonation patterns of different languages (Neufeld and Schneiderman 1980, Tahta, Wood and Loewenthal 1981, Gilbert 1980). It is then possible that these perceived differences could be used to identify a non-native speaker. A methodological problem is that second language learners' intonation is judged in the presence of their second language pronunciation, which may influence the native speaker judges. The Neufeld and Schneiderman (1980) and the Tahta et al (1981) studies may both be faulted on this ground. A method of analysis was sought which would not be susceptible to this criticism.

We decided to conduct a computer pitch analysis using the intonational component slope (Delattre 1963). It was assumed that a physical analysis of pitch would not be influenced by the non-native accent of the subjects. It was expected that cross-language differences in the continuative and terminal intonation patterns could be represented as differences in pitch slope.

The slope is the steepness of the rise or fall in pitch over time. Our expectation was that pitch rises and falls in French would be steeper than those in English. We expected that the slopes associated with continuative intonation would be positive for French and German, indicating rising pitch, and that they would be negative for English, indicating falling pitch (Delattre 1963).

Slope may be measured as the maximum change in pitch over time, that is, maximum change in F_0 (fundamental frequency) divided by maximum time. Delattre (1972) contended that continuative and terminal functions are manifested minimally over syllables, usually over words, and sometimes even over phrases. For consistency's sake, we measured the slope only over words. We measured the slope over words before a phrase or clause boundary since linguistic functions such as continuation and termination are known to be manifested chiefly at these points in a sentence (Bolinger 1970, Dobrovolsky 1980).

There is some disagreement about proposed intonation patterns. Pierrehumbert (1981) and Bolinger (1958 and 1970) suggest that the continuative intonation pattern rises in pitch in English, while Delattre (1963) states that it falls.

There is also disagreement about the importance of the parameters used to represent intonation patterns. Delattre's 'shape' is considered circumstantial within English by Pierrehumbert, thus implying that slope is an irrelevant characteristic of an English intonation. Whether slope is unimportant when comparing intonations across languages remains to be seen. It is entirely possible that an element which is not used distinctively within a language might well be employed by native speakers comparing their own language intonation patterns to those of other languages.

Another difficulty is that there appear to be a wide variety of acceptable intonations for the same function. Although speakers recognize a given intonation pattern as native, they may use a somewhat different pattern for the same function in their own speech. Sag and Liberman (1975) note that all that can be said with assurance is that speakers always use intonation patterns which are acceptable to other native speakers.

A set of hypotheses about non-native intonation perception and production can be formulated from reported results and theoretical proposals in the literature.

1. Each language may employ different intonation patterns to show continuation and termination (Delattre 1963 and 1966).
2. A speaker imposes his native intonation patterns upon a second language which he has not mastered (Delattre 1963 and 1966).

3. A native listener will realize that his interlocutor is non native by attending to his non-native intonation. Thus intonation provides one sufficient cue to the perception of a non-native accent (implied by Tahta, Wood and Loewenthal 1981 and Neufeld and Schneiderman 1980).

It is necessary to first consider the following hypothesis about the measurement of cross-linguistic intonation, so as to have a basis for investigating the three hypotheses listed above.

4. Slope is significantly different across English, German and French intonations for both the continuative and the terminal functions (Delattre 1963 and 1966). If this is so, then slope might potentially serve as one intonational parameter speakers could use to identify non-native speakers.

EXPERIMENT 1

Our first aim was to confirm that the postulated language-specific intonation patterns existed. In particular, we expected the slope of the continuative and terminal intonation patterns to differ across English, French and German.

Materials

A set of 48 sentences was created with similar semantic and syntactic patterns for all three languages. It was assumed that any declarative sentence would end with a terminal intonation, indicating that the speaker had finished his message. Continuative intonation patterns were elicited by using bi-clausal or bi-phrasal sentences housing a pair of semantically linked propositions. The sentences are presented in the appendix.

The same continuative or terminal function was performed by the intonation at approximately the same place in the sentence in each language. For example, the continuative intonation would be expressed on Anne and the terminal intonation on Eric in the following sentence.

English: I saw Anne but not Eric.

French: J'ai vu Anne mais pas Eric.

German: Du spielst oft mit Anne aber nie mit Erik.

Sentences were typed individually on 12 cm by 20 cm index cards. The speakers while seated in a sound-attenuated chamber read each sentence aloud once. They were instructed to speak with normal intonation at a normal, but relaxed conversational speaking rate. All audio recording for the analysis was carried out with an AKG condenser microphone located approximately 13 cm in front of the speaker's mouth. The microphone output was

amplified by an AMCRON D-75 amplifier prior to being recorded on a Revox B710 audio cassette recorder with Dolby C-type filtering.

Subjects

Three adult males, one French, one German and one English native speaker, read aloud the set of 48 sentences for recording and pitch analysis.

Analysis

The analysis is based on a corpus of 72 sentences (22 French, 24 English and 26 German) with continuative intonation and 65 sentences (21 French, 22 English and 22 German) with terminal intonation. All sentences which sounded natural to the experimenter and which had at least 150 msec of voicing over the word of interest were used in the analysis. The taped sentences were replayed on a Revox B710 audio tape deck and then digitalized using the ILS software package (Signal Technology, 1983) on a VAX 11/730 computer.

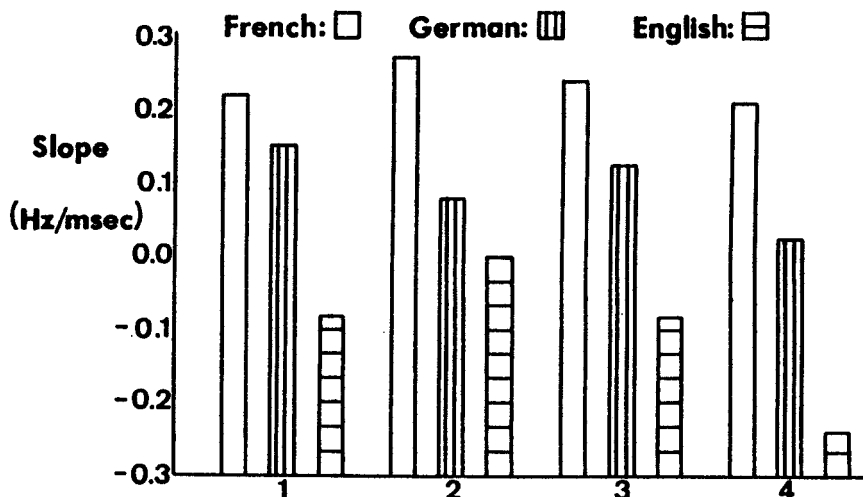
Words with lexical stress in clause- or phrase-final position were analysed using the auto-correlational method with pitch extraction (Signal Technology, 1983). The first and last 10 msec of voicing over the words was not included in the pitch analysis because the pitch algorithm is most reliable over stretches of continuous voicing. The change in F_0 on the clause- and phrase-final words was used to calculate that slope for each sentence pattern for each language. Slope was calculated as the maximum change in F_0 divided by the minimum time (in msec) over which this change in F_0 occurred.

Results

It was assumed that speakers were making any intonational differences on a language-specific basis. The slopes for major continuation differed significantly across all three languages ($X^2(10)=51.5$, $p<.05$). This supports Delattre's claim that the slope of the continuative intonation may distinguish speakers of some languages. The mean continuative slope values for each language were: $-.1$ Hertz/msec for English; $.09$ Hz/msec for German; and $.25$ Hz/msec for French (see Figure 3), where a negative value indicates falling pitch (negative slope), while a positive value indicates rising pitch (positive slope).

Figure 3. The Sentence Patterns Used as a Basis for Eliciting Continuative Intonation in English, French and German.

The slope of F_0 on the word before the conjunction is given for each sentence type in each language.



Sentence Type

- Type: 1. X V X and/or X
 2. X V(X) and V X
 3. X V(X) and then (V) X
 4. X V X but (V) X

Legend: X: Verb, noun phrase, prepositional phrase,
 adverbial phrase or pronoun

V: Main verb

The terminal intonation patterns of the three languages did not differ statistically from each other on the basis of slope. Chi square tests failed to reach or even approach significance on this measure ($\chi^2(10)=10.34, p<.05$). Consequently, only the continuation patterns were used as the foundation for further experiments.

The slope of the pitch was shown to distinguish between the continuative intonations of English, French and German and so was used in further experiments. Whether slope is a significant intonational component in its own right, or whether slope's significance is only an artefact of its dependence on a change in F_0 remains to be established by research addressed specifically to this question.

EXPERIMENT 2

Experiment 1 established that the maximum slope of F_0 in intonation patterns is significantly different for the performance of the same functions, continuation and termination, across English, French and German. Experiment 2 was conducted to see the extent to which speakers impose their native intonation patterns upon their second language. In particular, it was of interest to determine the differences between the intonation of English children learning French in the French immersion programs in Calgary (the immersion students henceforth) and that of monolingual French and English students.

Materials

To elicit sentences with a continuative intonation pattern, five simple two-part pictures were drafted in which a sequence of events was depicted. Immersion students were asked to describe these pictures in French; English and French subjects described them in their native language.

The pictures were designed so that the words occurring under the continuative intonation differed as little as possible in the two languages, thus reducing the likelihood of segmental quality differences causing pitch perturbations which would confound pitch analysis results. Among the most common words analysed were: plante 'plant' and branche 'branch', for example.

Subjects

A total of 83 subjects were obtained from three language groups: English monolingual, French monolingual and immersion students at each of the four age levels: 6 to 7, 10 to 11, 14 to 15 and 16 to 24 years. While we attempted to obtain eight subjects in each age by language group, one group had just four members and one had ten. There were approximately equal numbers of males and females in each age group except in the case of the oldest age group, which contained five males and 14 females.

The monolingual speakers of English and French could speak only their native language. The immersion students were English children who had entered the French immersion programs in the schools at age 5 to 6. These children are taught entirely in French from age 6 to age 11 and they continue to be taught partly in French throughout their school career. At age 15 approximately half of their instruction is still in French. This decreases to a third of their instruction by the end of high school (age 18).

Procedure

Interviews were conducted in English for the English subjects and in French for the French and the immersion students. In half the interviews the cassette was played first, and in half the pictures were presented first. Subjects' descriptions of pictures were recorded using a Song TCM-838 or a General Electric 3-5254A cassette player. The entire interview took less than twenty minutes for each subject.

Analysis

Sentences showing any of the syntactic patterns used in Experiment 1 were accepted for analysis. Sentences were rejected because a) the child used interrogative intonation and waited for the experimenter to indicate that the description was adequate, b) the subject spoke too softly, c) the level of background noise was excessive and d) an immersion subject used English words instead of French ones. Altogether, fewer than 5% of the sentences were rejected. The rejections mean, however, that subjects are represented unequally in the production data. In total, 315 samples were used in the analysis.

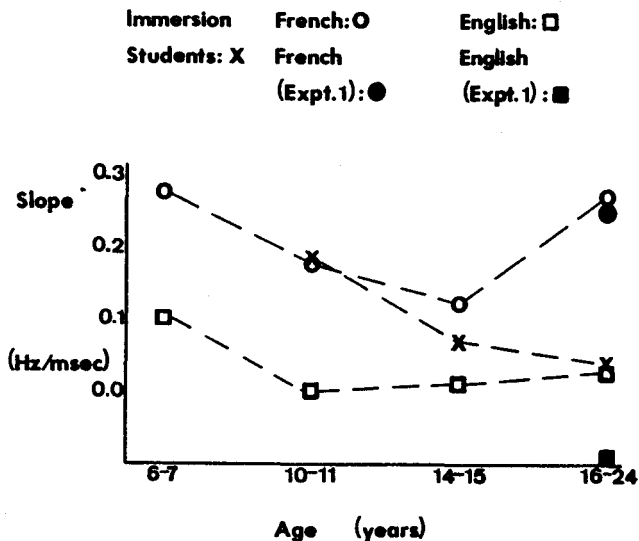
The pitch over the word before a clause or phrase boundary was submitted to a pitch analysis as described for Experiment 1. The values for the maximum slope of $F\theta$ were calculated and then coded according to the subjects' language group, age and sex, and submitted to analyses of variance.

Results

Slopes were more strongly positive for the French and immersion students than for the English ($F(2,312)=13.87, p<.01$). The immersion students did not differ significantly from the native French speakers in the slope of their productions of $F\theta$. While this overall analysis suggests that the non-native speakers do not impose their native intonation patterns upon their second language, more detailed analyses show a more complex pattern. At 10 years, immersion students have an excellent command of the French continuative pattern and are not significantly different from the native French speakers at 10 years. However, with increasing age, the slope of the second language continuative intonation gradually drifts toward English values so that at age 16 the immersion students' French continuative intonation is not

different from the pattern shown by English 16-year-olds (Figure 4).

Figure 4. English, French and Immersion Students' Production of the Slope of F_0 for Continuative Intonation.



Discussion

A number of extra-linguistic factors may account for the apparent deterioration in the performance of the older immersion students. Plann (1977) suggests that native speakers of the culturally dominant language are prone to develop a classroom interlanguage when they become immersed in a less prestigious language, to which they are exposed only in school. She claims that the development and persistence of this interlanguage is due to the large amount of incorrect peer input from classmates and to (adolescent) peer group pressure. While it is possible that an interlanguage (Selinker 1972, Selinker, Swain and Dumas 1975) has developed among the immersion students, there is no precedent for the appearance of second language errors after an error-free acquisition, as is apparently the case here. Production data from young immersion students are needed to show whether any errors at all characterized acquisition before age 10.

Even if an interlanguage has developed, it is not clear whether the older immersion students have lost the ability to produce French continuative slopes, or whether their English

slopes could be classified as temporary errors in performance, rather than competence. This question would require further research.

It is also possible that older students were less often exposed to native French teachers in class and so had less chance to acquire French intonation patterns in the course of their education. The Calgary schools now employ far more native French teachers than was the case even 15 years ago. Also, as immersion students grow older they are offered fewer hours of French per day, although they remain in the immersion program. If this has affected results, then it will be necessary to accept that continued, but reduced, exposure to a second language is insufficient to maintain aspects of it which have already been acquired. It has always been assumed that once a child achieved native-like control of an aspect of his second language, he did not then regress with further exposure to the language. The fact that this appears to happen demands further research into what must be very powerful factors and causes.

A comparison of the results presented here with longitudinal study results from immersion programs offering consistent quality and amount of exposure to French over time is necessary to firmly establish the existence of this apparent deterioration.

The concepts of interference and approximation as used in the literature on second language learning do not appear to be a factor here. The problem is one of apparent deterioration in performance in the acquired second language, and not one of initial acquisition.

EXPERIMENT 3

Experiment 2 showed that the monolingual English and French speakers produced significantly different continuative intonation patterns. Experiment 3 sought to discover whether listeners would decide that their interlocutor was not a native speaker by attending to his intonation. Therefore, it was necessary to have listeners judge speech with native and non-native intonation patterns.

Materials

Two versions of a speech sample were prepared, identical in every respect except intonation pattern. Native speakers were expected to prefer the version with the original, unchanged intonation to the version with the altered intonation.

Eight English, eight French and seven German sentences were selected from the corpus gathered in Experiment 1 to provide a range of slope differences (Table 1). Each French and English sentence was submitted to a pitch analysis and then resynthesized (Signal Technology, 1983).

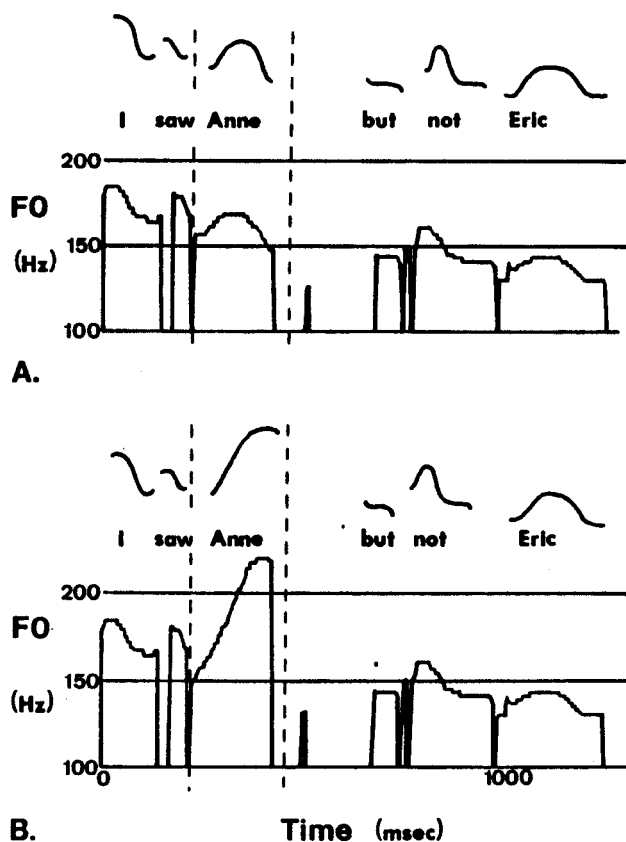
Table 1. Sentences on the Perception Test

Sentence	Slope (original version)	Slope (new)
1. I saw Anne but not Eric.	-0.17	0.39 F
2. The dog chased Marie and frightened Christina.	0.0	0.21 F
3. I played hockey with Karl but didn't enjoy it.	-0.19	0.21 F
4. It was hot in Panama and the insects were ferocious.	-0.08	0.55 F
5. I used to live in Calgary and then I moved to Toronto.	-0.02	0.15 G
6. They saw a film and then they went to dinner.	-0.28	0.08 G
7. I bought a telephone and then I took it home.	-0.17	-0.11 G
8. First they toured Canada and then they visited Alaska.	-0.13	0.10 G
1. J'ai acheté un téléphone puis je l'ai apporté chez moi.	0.13	-0.11 E
2. D'abord ils ont fait le tour du Canada puis ils sont allés en Alaska.	0.41	-0.10 E
3. J'habitais à Calgary mais maintenant j'habite à Toronto.	0.21	-0.01 E
4. Donna aime bien la clarinette mais elle déteste le violon.	0.22	-0.08 E
5. Le chien a chassé Marie et a fait peur à Christine.	0.21	0.15 G
6. Le chien jouait d'abord avec Marie et puis avec Louise.	0.16	0.04 G
7. C'était chaud à Panama et les mouches étaient féroces.	0.53	0.02 G
8. J'ai vu Anne mais pas Eric.	0.35	0.10 G

The pitch was then altered in the analysed versions of these English and French sentences with the help of a pitch modification and transfer program (Esau 1985) in such a way that it assumed a continuative pattern typical of one of the other two languages. For example, in the sentence I saw Anne, but not Eric, the English continuative pattern on Anne was replaced by the French continuative pattern on Anne from the sentence J'ai vu Anne, mais pas Eric (see Figure 5).

Figure 5. Pitch Patterns on Two Versions of the Same Sentence on Perception Test.

(A) shows the original English pitch pattern with a falling continuative slope (between the dotted lines). (B) shows the altered pitch pattern with rising French slope (between the dotted lines).



The sentences which contained these altered F \emptyset values became the 'non-native' sentences, once they too had been resynthesized. There were then two versions, one 'native' and one 'non-native', of each of the eight French and eight English sentences shown in Table 1.

In addition to the eight sentences synthesized without any F \emptyset changes (the 'native' versions), there were four in each language whose intonation had been altered to German values, and four whose intonation had been altered to the values of the other test language (English to French and French to English).

All the synthesized sentences in each language were recorded in pairs onto a Sony UCX-S 90 cassette. Each pair comprised an unchanged and an altered version of the same sentence. Sentences were recorded in two different orders of presentation. Order of presentation within pairs was also varied. To ensure that the synthesized sentences sounded natural, the unchanged versions were played to native speaker judges. Both the English and the French judge said that the quality of the speech was generally excellent, and that the sentences were comprehensible and sounded like the speech of a native.

Procedure

The perception test was recorded onto cassette tape for presentation to the subjects by the experimenter. Responses were recorded on cassette tape as well as manually. On each trial, subjects listened to a pair of sentences and then indicated whether the first or the second sentence in each pair was the more natural example. Immersion students and French speakers heard the eight French pairs, while English speakers heard the eight English pairs. Subjects were allowed to hear a pair of sentences as often as they liked before responding. In half of the interviews pairs of sentences were presented in one order, and in the other half a different order was used. The subjects from Experiment 2 were used.

Analysis

Subjects' judgements were considered to be correct if the sentence selected was the one with unchanged pitch. There were eight judgments from each subject, which were coded according to the subjects' age, language group, sex and the pair type (native language vs. German; and English vs. French or French vs. English) and submitted to an analysis of variance. Newman-Keuls studentized range tests were used to test interesting means.

Results

Neither the French nor the English control subjects discriminated non-native from native sentences at levels beyond chance and there were no main effects for age or language,

sentence type or sex. This means that French groups did no better than the immersion students, who had much less exposure to French than the native French speakers.

The one statistically significant interaction in this data was that the older immersion students identified native continuative intonation more successfully than did the younger immersion students. On the perception test, the 10-year-old, 14-year-old and 16-year-old immersion students all chose the sentences with the French continuative intonation significantly more often than did the 6-year-old immersion students. (For the 10-year-olds, $Q(2,52) = -3.133$; for the 14-year-olds, $Q(2,52) = -3.878$; and for the 16-year-olds, $Q(2,52) = -3.665$.) It is hardly surprising that at age 6 the immersion students did worse on the perception test than did the members of any other group, given that they could not speak French well enough to accomplish the production task.

Discussion

The results indicate that native listeners do not decide that their interlocutor is a non-native speaker by attending to his continuative intonation.

Subjects nonetheless perceive that the differences between the sentences are intonational. Seven out of the eight adult French speakers spontaneously declared after hearing the first two sentences on the perception test that the differences were entirely due to intonation. Numerous English adults pointed out that stress, intonation, tone or emphasis differences between the sentences accounted for their choices. Both native speaker groups said it was extremely hard to prefer one version of a sentence to another, for they could imagine acceptable contexts for both. This means that it is perhaps misleading to speak of a single 'continuative' pattern with respect to perception, as does Delattre (1963).

Although intonation could potentially serve as a cue to non-native speaker identification, it is not a sufficient cue in isolated sentences. A well-defined emotional, social and semantic context for the intonation patterns being investigated might lessen their ambiguity for subjects. This is one possible approach to the problem of convergence of intonational function in intonation patterns.

FOOTNOTES

¹The youngest immersion students (aged 6 years) had only been in the immersion program for one school year. They were unable to understand the instructions in French and so the interview was conducted in English. Their results from the perception test were included in the analysis, but they were unable to produce enough French for the production test and so no production results are available for the 6 year old immersion students.

APPENDIX

The following sentences were used in the first data collection. French and German sentences with similar semantic and syntactic content were used to collect French and German data.

Pattern 1: One verb; continuative intonation measured on the word before 'and/or' in an object clause.

1. The dog's playing with Jane or Anne.
2. She is visiting Anne or Robert.
3. I want the blue dress and the white skirt.
4. I like the flute and the clarinette.
5. I like apples and bananas.
6. Anne goes to school and to church.
7. I play the piano and the clarinette.
8. Paul reads some books and magazines.
9. Mark draws with crayons and pencils.
10. Janice draws with pens and markers.

Pattern 2: Two verbs; continuative intonation measured on the word before 'and'.

11. At night he eats and plays his records.
12. She drinks tea and eats sandwiches.
13. It was hot in Panama and the insects were ferocious.
14. He smashed his guitar and threw it at the audience.
15. The dog chased Marie and frightened Christina.

Pattern 3: Continuative intonation measured on the word before 'and then'.

16. Bob eats lunch and then goes for a walk.
17. Peter goes swimming and then goes home.
18. The kitten plays and then falls asleep.
19. Meg rides her bike and then comes in.
20. She plays and then she goes to sleep.
21. They saw a film and then they went to dinner.
22. I used to live in Calgary and then I moved to Toronto.
23. I bought a telephone and then I took it home.
24. He made a sauce and then poured wine into it.
25. First they toured Canada and then they visited Alaska.
26. The kitten played with Christina and then with Louisa.

Pattern 4: Continuative intonation measured on the word before 'but'.

27. Donna likes the clarinette but she hates the violin.
28. I went out with Anita but came home with Clara.
29. I played hockey with Karl but didn't enjoy it.
30. I danced with Louisa but didn't enjoy it.

31. I sent him a telegram but he hasn't replied to it.
32. Donna gave me her address but I haven't visited her.
33. I saw Eric but didn't talk to him.
34. I saw Anne but not Eric.
35. I spoke to Alice but not to Suzanna.

Terminal Patterns:

36. Jane should send him a telegram.
37. Marie fell into the canal at Panama.
38. She went shopping in Hong Kong.
39. We had steak with some kind of sauce.
40. I don't know his address.
41. I hate bananas and so does Mark.
42. Maria bought a telephone.
43. Yesterday Anne saw a very good film.
44. There aren't many trees in Calgary.
45. The kitten plays.
46. Peter goes swimming.
47. I want the blue dress.
48. The kitten drinks milk.

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A LEXICAL ANALYSIS OF THE [č] - [š] ALTERNATION IN LUISEÑO

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In attempting to analyze the phonology of a language within a standard generative framework, it is sometimes difficult to choose among competing analyses. New approaches to phonology sometimes offer possible solutions to such dilemmas. In this paper, I provide an analysis of a longstanding problem in Luiseño,¹ a Uto-Aztecan language spoken in California. The analysis is presented within the framework of Lexical Phonology. It will be shown that the Lexical approach enables us to resolve an issue which defies a straightforward analysis in the traditional generative framework.

The [č] to [š] alternation occurs whenever underlying /č/, as a result of vowel syncope, is positioned next to either a [-continuant] segment² or a [+lateral] segment. Consider the following data:³

- | | | | |
|-----|-----------|------------|------------------------------|
| (1) | čoḡaáyḡaš | nošḡaáyḡa | 'walking stick' |
| | čoróḡḡiḡš | nošróḡḡiḡa | 'measuring instrument' |
| | čulúppi | pošlúppila | 'entrance' |
| | čapáḡniḡš | nošpáḡna | 'mending of several objects' |
| | čoriípiš | nošriípi | 'wood to be cut' |

The affixation of the vowel-final possessive prefixes *no-* (1st person sing.) and *po-* (3rd person sing.) results in vowel syncope in stems with second syllable stress. This process may be represented by the following rule.

- (2) Syncope: $V \rightarrow \emptyset / V + C __ CV(V)$

The environment for the alternation of [č] to [š] is thus present in such forms, as shown in the rule below:

[-continuant] segment, an environment where we would expect to see the [č] to [ʃ] alternation. This is shown in (7).

(7)	něči	'to pay'	něčkixa	causative
	kiíčo	'to build house'	kiíčkixa	causative
	měči	'to chew'	měčkawut	'chewer'
	miíči	'to choke someone'	miíčkawut	'one who chokes another'

As we can see, the addition of the suffixes -kixa (causative) and -kawut (verb to noun; propensitive) results in the deletion of the stem-final vowel, thus positioning [č] before the [-continuant] segment 'k'. Yet the alternation we would expect does not occur.

These data can be accounted for by positing a rule of vowel deletion which is ordered after the Frication Rule. Notationally, this rule is as follows.

- (8) V-Deletion: V --> Ø/C ____ + C
[-stress]

The following derivation shows the interaction of these rules.

(9)	UR	# miíči + kawut #
	Frication	-----
	V-Deletion	miíč + kawut
	PR	[miíčkawut]

An alternative analysis, however, presents itself if we view the data within the framework of Lexical Phonology. In a theory of Lexical Phonology such as that proposed in Mohanan (1982), the output of the syntactic component does not form the input to the phonological component. Rather, morphological operations and the phonological rules associated with them (called lexical phonological rules) are grouped together and executed on successive levels or strata. A given phonological rule may occur on one or more strata. When all morphological rules and associated lexical phonological rules have applied, a level of representation called the lexical level has been reached. Phonological rules, usually of an exception-free nature, then operate on the lexical representation to produce the phonetic form. Brackets mark the internal structure of forms and may form part of the environment of lexical phonological rules. At the end of each stratum, internal brackets are erased. In Lexical Phonology derivation usually precedes inflection.

The data presented thus far suggest that the forms which are subject to the Frication Rule are all inflected forms, while the

'exceptions' to this rule are all derived forms. I thus submit that the [č] to [š] alternation only occurs in inflected forms; that is, the Frication Rule operates only on the level of inflection (Level 2 in my analysis), and not on the level of derivation (Level 1).

We would expect to find the alternation only in inflected forms and never in derived forms. The available data do indeed seem to support this analysis. As well as the lack of alternation in forms like pěčkixa 'to pay' (causative), we see no frication in other verbs with derivational affixes, nor in some types of verb reduplication (shown in (17) below) -- all instances where [č] is in the environment for the change to [š] (that is, before a [-continuant] or [+lateral] segment). Conversely, the alternation does occur in inflected forms: the prefixed forms expressing possession, for example, as well as verb reduplication which expresses past punctual tense (shown in (19) below).

The following derivations of pěčkixa 'to pay' (causative) and poškaayla 'my walking stick' will illustrate the difference between derived and inflected forms in terms of the environment for the [č] to [š] alternation. In the lexical framework the Syncope, Frication and V-Deletion rules are rewritten as follows.

(10) Syncope: $V \rightarrow \emptyset / [C \text{ ____ } C\acute{V}(V)]$

(11) Frication: $C \rightarrow [+cont] / \left[\begin{array}{c} \text{---} \\ \left[\begin{array}{c} -ant \\ +cor \\ +hi \\ -cont \end{array} \right] \end{array} \right\} \begin{array}{c} C \\ \{-cont\} \\ \{[+lat]\} \end{array}$

(12) V-Deletion: $V \rightarrow \emptyset / [C \text{ ____ }] C$

(13)

LEVEL 1	[<u>ṇéč</u> i]	[čokaáy _ɭ la]
Derivation		
Morphology	[[<u>ṇéč</u> i] _v kixa] _v	-----
Phonology		
V-Deletion	[[<u>ṇéč</u>] kixa]	-----
LEVEL 2	[<u>ṇéč</u> kixa]	
Inflection		
Morphology	-----	[<u>ṇo</u> [čokaáy _ɭ la] _N] POSS
Phonology		
Syncope	-----	[<u>ṇo</u> [čkaáy _ɭ la]]
Frication	-----	[<u>ṇo</u> [škaáy _ɭ la]]
LEXICAL		
REPRESENTATION	/ṇéčkixa/	/ṇoškaáy _ɭ la/

The derivation above shows why there is no alternation in the derived form ṇéčkixa (where we would expect a change from [č] to [š] because of the position of [č] next to [k], the environment stipulated in the Frication Rule); namely, because the new rule stipulates an environment not present in this form. Since the brackets are erased after each level in Lexical Phonology, the environment for the Frication Rule is not present. Conversely, the change does occur in the inflected form ṇoškaáy_ɭla precisely because this environment is present. This lexical analysis offers an advantage over the previous analysis in that it precludes the need to extrinsically order the Frication Rule before the V-Deletion Rule, for such forms as ṇéčkixa are simply not subject to the Frication Rule.

The assumption here is that forms such as ṇéčkixa 'to pay' (causative) are derived while forms such as ṇoškaáy_ɭla 'my walking stick' are inflected. To determine the validity of this assumption, one must understand the difference between derivational and inflectional affixes. According to Kenstowicz and Kisseberth (1979:410), derivational affixes are typically associated with such categories as causative, benefactive, reciprocal, as well as marking the derivation of one part of speech to another, whereas inflectional affixes tend to mark such categories as person, number, case, and tense. Although the affixes -kixa (causative) and ṇo- (possessive) conform to this (general) definition, further evidence is needed to confirm their respective status as derivational and inflectional.

One way to obtain such evidence is to see how these affixes combine with various root forms, since roots can generally be

combined with all inflectional affixes of a particular type to form a paradigm, but it is normally not possible to group derivational affixes into sets all members of which can combine with a root. Derivational affixes, then, have a 'limited distribution'. In Luiseño, the causative suffix -kixa combines only with verbs of Conjugations 1 and 2.⁴ Further, this suffix may not be combined with all the verbs in these conjugations, but only a subset of them. Other causative suffixes also exist and it is not predictable which suffix is affixed to which stem. In fact, the causative suffix -xami only occurs with the verbs néci 'to pay' and páči 'to wash'.

The possessive prefixes, on the other hand, can be affixed to all noun forms (derived or otherwise) without exception, and all such stems can be combined with all the possessive prefixes.⁵ Thus we see paradigms such as that in (14).

(14)	piḱát	'stone knife'
	ṇopḱáki	'my stone knife'
	opḱáki	'thy stone knife'
	popḱáki	'his/her/its stone knife'
	čampikáki	'our stone knife'
	ompiḱáki	'your stone knife'
	pompikáki	'their stone knife'
	apḱáki	indefinite

(-t on the stem is an absolutive suffix. The suffix -ki here means possession acquired, not inherent.)

Having established that the forms néčkixa and poškaáyla are respectively derivational and inflectional (that is, that causative suffixes are derivational and possessive prefixes inflectional), let us look at some further evidence for the assumption made in the analysis proposed that the [č] to [š] alternation only occurs on Level 2, that of inflection.

Consider the following forms.

(15)	miščkawut	'one who chokes another'
		<mišči 'to choke someone'
	mečkawut	'chewer' <meči 'to chew'

(where -kawut changes verb to noun; propensitive, and is thus a derivational suffix). Again we see [č] positioned before a [-continuant] segment, an environment in which, under the previous analysis, we would expect to see a change to [š]. In the lexical analysis, however, with its revision of the Frication

Rule, we see that the environment is not present, and therefore no alternation occurs, as shown in the following derivations.

(16)

LEVEL 1	[mič̌i]	[méč̌i]
Derivation		
Morphology	[[mič̌il] _v ɣawut] _{prop.}	[[méč̌il] _v ɣawut] _{prop.}
Phonology		
V-Deletion	[[mič̌] ɣawut]	[[méč̌] ɣawut]
LEVEL 2	[mič̌ɣawut]	[méč̌ɣawut]
Inflection		
Morphology	-----	-----
Phonology		
Frication	-----	-----
LEXICAL		
REPRESENTATION	/mič̌ɣawut/	/méč̌ɣawut/

The lexical analysis proposed again precludes the need to mark such forms as exceptions to the [č̌] to [š̌] alternation rule, for the Level 2 rule will not apply. And indeed, we do not expect to see the alternation in derived forms.

Further, there is a process of verb reduplication⁶ in Luiseño in which [č̌] is positioned next to a [-continuant] segment, the environment we would expect to 'trigger' the alternation to [š̌]. Yet no change occurs because this type of reduplication marks a change from one part of speech to another (verb to adjective or verb to noun) and is therefore a derivational process.

The processes which occur here may be verbally stated as follows.

- (a) reduplication of the entire stem;
- (b) shift of stress from third syllable (originally first syllable of stem) to second syllable of reduplicated form;
- (c) vowel syncope of third syllable (now unstressed);

that is, (c) V --> β/ ʋ [C ____

The following forms exemplify the three processes just outlined.

(17)	xalaxlaš	'loose'	xáli	'to loosen'
	koŋóknoš	'green'	kóŋo	'to become green'
	ličiľčiš	'slippery'	liči	'to slide'
	čawačwas	'uncombed, tousled, having spare foliage'		
		<čáwa	'to be unproductive (of plants)'	
	čuḡáčḡaš	'limping'	čoča	'to limp'
	čakučḡuš	'crest, topknot'	čáku ⁷	
	čaŋíčŋiš	'having supernatural power'		
		<čáŋi ⁷		
	čuḡáčḡaš	'grave, serious'	čuḡa ⁷	

(The final [š] in these forms marks verb to adjective or verb to noun.) It is the latter four forms which interest us here, for we see the position of [č] next to the [-continuant] segments [k] and [ŋ]. Although this is the environment in which we might expect a change to [š], no frication occurs. I submit that the reason for this is the fact that the [č] to [š] rule only operates on Level 2, that of inflection; and since these are derived forms, they are not subject to the rule. The following derivations exemplify this.

(18)

LEVEL 1	[čáku]	[čúqa]
Derivation		
Morphology	[[čáku [čáku] _v] š] _N	[[čúqá [čúqa] _v] š]
Phonology		
Stress Shift	[[čáku [čáku]] š]	[[čúqá [čúqa]] š]
Third Syllable V-Deletion	[[čáku [čku]] š]	[[čúqá [čqa]] š]
LEVEL 2	[čákučkuš]	[čúqáčqaš]
Inflection		
Morphology	----	----
Phonology		
Frication	----	----
LEXICAL		
REPRESENTATION	/čákučkuš/	/čúqáčqaš/

On Level 1, we can see that the environment for [č] to become [š] is present as stated in the revised Frication Rule (11). Because the brackets are erased after each level, the environment is not present in these forms in Level 2; that is, the level in which the rule operates. Therefore, the frication process does not occur. Thus, under this analysis, such forms are not exceptions to the Frication Rule, as they would have been marked in the previous analysis, and again, because this is a derived form we do not expect to see the [č] to [š] alternation.

Conversely, we do expect to see the change of [č] to [š] in inflected forms; recall the alternations in the forms with possessive prefixes. Although these forms are all prefixed nouns, we see a syllable reduplication process and vowel syncope occurring in another type of verb reduplication, which expresses past punctual tense. Consider the data in (19).

(19)	kołáw	kołáw	'to gather firewood'
	qeɣvé?	qevé?	'to be inside'
	ʂoʂwó?	ʂowó?	'to be afraid'
	člšluúy	člšluúy	'to speak Spanish'

The processes involved here are reduplication of the first syllable, followed by vowel syncope. In the last form in (19) this results in the position of [č] next to a [+lateral] segment, the environment stipulated in the Frication Rule as 'triggering'

the change to [š]; and indeed, we see that the alternation occurs in this form. The following derivation illustrates.

(20)

LEVEL 1	[č̣ịluúy]
Derivation	
Morphology	----
Phonology	----
LEVEL 2	[č̣ịluúy]
Inflection	
Morphology	[č̣ị [č̣ịluúy] _v] Past Punctual
Phonology	
Syncope	[č̣ị [č̣luúy]]
Frication	[č̣ị [ṣ̌luúy]]
LEXICAL	
REPRESENTATION	/č̣ịṣ̌luúy/

The data reveals, however, some apparent exceptions to the Frication Rule as proposed in the lexical analysis presented thus far. We see, for example, the form wašpiš 'seed beater' <wač̣i 'to beat seeds from plants' (where -pi indicates change from verb to noun and is therefore derivational, and final -š marks the absolutive case and is therefore inflectional). Although the rule as originally stated would not mark this as an exception, it does pose a problem for the revised rule which generates an incorrect phonetic form, as is seen in (21).

(21)

LEVEL 1	[wáčɪ]
Derivation	
Morphology	[[wáčɪ] _V pi] _N
Phonology	
V-Deletion	[[wáč] pi]
LEVEL 2	[wáčpi]
Inflection	
Morphology	[[wáčpi] _N š] _{Abs}
Phonology	
Frication	----
LEXICAL REPRESENTATION	*/wáčpiš/

There are two possible ways to account for this form. First, this may be a process of assimilation, whereby the [č] assimilates (at a distance) to the absolutive suffix -š via a post-lexical rule. This rule would apply to the lexical form wáčpiš to generate the form wáčpiš which is indeed the correct phonetic form. If this rule in fact represents the process occurring here, we would expect to see no instances of [č] in a word with a [š] in the final position. There are, however, many forms such as the following.

- (22) tamuučěš 'the hard part of acorns which is not easily ground'
- haḱʷačiš 'the hurrying' haḱʷáci 'to hurry'
- púluučiš 'calculation' púluuči 'to calculate'

In these forms we would expect to see an assimilation of [č] to [š], since the final segment [š] presumably conditions the change. To see if this is indeed the case, we would need to see the form wáčpiš in the construct, as opposed to the absolute, form, which does not contain the suffix -š.⁸ Unfortunately, the data does not reveal the word wáčpiš 'seed beater' in any other form but the absolutive, so the assumption that [š] as final segment conditions the alternation of the preceding [č] in this form is purely speculation. Indeed, in the face of such forms as those given in (22), I maintain that the final [š] does not condition this change.

An alternative analysis here is that the underlying segment in the root form wáci is /š/, which becomes [č] before a vowel (recall the Affrication Rule in (5)). The underlying /š/ does

not become [č] in wášpiš because the environment that would trigger the change is bled off at Level 1. The derivation of this form under this analysis is as follows.

(23)

LEVEL 1	[wáš]
Derivation	
Morphology	[[wáš] _V pi] _N
Phonology	
V-Deletion	[[wáš] pi]
LEVEL 2	[wášpi]
Inflection	
Morphology	[[wášpi] _N s] _{Abs}
Phonology	
Frication	----
LEXICAL	
REPRESENTATION	/wášpiš/

As we can see, the correct phonetic form is generated in this analysis, allowing us to maintain the rules as presented in the lexical analysis so far.

The postulation of underlying /š/ in other forms that would otherwise be marked as exceptions lends support to this analysis. We see, for example, forms such as mošk^vapiš 'granary basket' formed from moči 'to put on a belt; to weave (twined baskets or mats)'; and k^vapi.⁹ Final -š here marks the change from verb to noun.

Clearly, this is a derived form, since the resulting word mošk^vapiš is a noun derived from a verb. As such, it belongs to Level 1, that of derivation, where the [č] to [š] alternation does not apply. Yet we see here [š] before a [-continuant] segment, suggesting that an alternation has occurred. The position, however, that /š/ is underlying here will preclude the need to mark this form as an exception. Compare the following derivations.

(24)

LEVEL 1	[móči]	[móši]
Derivation		
Morphology	[[[móči] _V kʷaɲi] š] _N	[[[móši] _V kʷaɲi] š] _N
Phonology		
V-Deletion	[[[móč] kʷaɲi] š]	[[[móš] kʷaɲi] š]
LEVEL 2	[móčkʷaɲiš]	[móškʷaɲiš]
Inflection		
Morphology	-----	-----
Phonology		
Frication	-----	-----
LEXICAL		
REPRESENTATION	*/móčkʷaɲiš/	/móškʷaɲiš/

We can see here that the postulation of underlying /š/ in the verb móši (which subsequently becomes [č] before a vowel as shown in the Affrication Rule (5)), will generate the correct output while allowing us to maintain the general analysis.

The position that /š/ is the underlying segment in forms which would otherwise need to be marked exceptions is not entirely an *ad hoc* solution. Although [č] and [š] are in near complementary distribution, the assertion that [č] is always the underlying segment claims that all instances of [š] are derived from underlying /č/. But recall that both segments are found before [+continuant] consonants in forms like pečvaš 'left hand' and tukšišval 'mica'. These are both absolutive nouns (indicated by the suffixes -š and -l), and thus inflected forms. The environment, however, for the [č] to [š] alternation is not present in either form, for the following segment is not a [-continuant] consonant. Thus, if /č/ were the underlying segment here, we could not account for the change to [š] in the second form and not in the first. Conversely, postulation of underlying /š/ would not account for the change to [č] in pečvaš, and the lack of alternation in tukšišval, for the environments are virtually the same. I thus maintain that /č/ and /š/ are separate phonemes in the language, and therefore that both the Affrication and the Frication Rules are necessary to account for the data present here.

The question of the status of the [š] to [č] alternation rule (Affrication) as a lexical or a post-lexical rule arises. To determine this, we must examine the domain of applicability of the rule in terms of the criteria for lexical and post-lexical rules. It is certainly exceptionless -- one of the criteria for

the latter -- in that the alternation from [š] to [č] always occurs before a vowel, as shown in (25).

- (25) yaáš 'man'
yaáčĭ 'man' (obj)
paápaviš 'thirsty'
paápavičum plural

waxaámkawiš partitive of waxaám 'yesterday'
waxaámkawičumpum 'they are of yesterday'

(where -kawiš marks change from noun
to adjective, 'of, belonging to')

tarátraš 'stiff, hard to bend'
tarátřič-up nókkuṭapi póŋeemiław 'my bow is hard
to bend'

(where -up is enclitic)

hákmawiš 'hungry'
hákmawič-up om 'you are hungry'

The alternations in these forms occurs in inflected forms (the first two forms), in derivational forms (the third form, where -kawiš marks the change of noun to adjective), and between words and syntactic enclitics. The rule, then, is obviously not limited to certain strata as are lexical rules; and on the basis of such forms as those above and the fact that [š] becomes [č] before a vowel, I submit that the Affrication Rule (5) is indeed a post-lexical rule.¹⁰

Via this rule, the verbs presented in this data exhibit a process of neutralization, whereby two different underlying segments (here /č/ and /š/) always appear as the same segment in the phonetic form in a particular environment (that is, as [č] before a vowel). In forms like peči 'to pay' and wači 'to beat seeds from plants', the underlying segment may only be determined by examining the behaviour of such forms through derivations in the Lexical Phonology framework presented here. That is, the lexical forms generated by the rules in this analysis may help us to determine which segment is underlying in which form. The following derivations illustrate this.

(26)

LEVEL 1	[<u>n</u> éčɪ]	[wáʃɪ]
Derivation		
Morphology	[[<u>n</u> éčɪ] _V kɪxɐ] _{Caus}	[[wáʃɪ] _V pɪ] _N
Phonology		
V-Deletion	[[<u>n</u> éč] kɪxɐ]	[[wáʃ] pɪ]
LEVEL 2	[<u>n</u> éčkɪxɐ]	[wáʃpɪ]
Inflection		
Morphology	----	[[wáʃpɪ] _N ʃ] _{Abs}
Phonology		
Frication	----	----
LEXICAL		
REPRESENTATION	/ <u>n</u> éčkɪxɐ/	/wáʃpɪʃ/

We see here that the postulation of underlying /č/ and underlying /š/ respectively in the forms on the left and right allows us to maintain the present lexical analysis while generating the correct output. If, however, we assume underlying /č/ in wáči, we could not explain the lexical form wáʃpiš, for the environment for the alternation is not present in this form, and therefore, no alternation should occur. I thus maintain that /š/ is indeed underlying in wáči, a conclusion reached on the basis of the generated form wáʃpiš.

There is one form which presents a problem for the lexical analysis proposed here; namely, čošíř, past-punctual tense of čoríř 'to cut much wood'. Recall that the process involved here is reduplication of the first syllable followed by vowel syncope of the second syllable vowel. The following derivation illustrates.

(27)

LEVEL 1	[čoríí]
Derivation	
Morphology	---
Phonology	---
LEVEL 2	[čoríí]
Inflection	
Morphology	[čo [čoríí] _v] Past-Punctual
Phonology	
Syncope	[čo [čríí]]
Frication	[čo [šríí]]
LEXICAL REPRESENTATION	/čošríí/

The vowel syncope here results in the position of [č] next to a [-continuant] segment, the environment for the alternation to [š]; and indeed, this is what we see in the lexical form.

This form, however, is also pronounced as čočríí, where the alternation does not occur. I suggest that in this second form the [r] may actually be a [+continuant] segment, for the flapped [r] of Luiseño ([-continuant]) is in free variation with a retroflex [r] ([+continuant]) intervocalically. If for some speakers the [r] in čočríí is retroflex, then the [č] to [š] alternation will not occur in čočríí because the environment in this instance is not present. That is, the vowel syncope which occurs in the process of this type of reduplication positions the [č] next to a [+continuant] consonant for such speakers. Since [č] becomes [š] only before [-continuant] or [+lateral] segments, no alternation takes place.

This form is the only one recorded in the data which exhibits both the segments [č] and [š] in this environment. To determine the validity of the assumption made above, we would need to see if other forms with [r] in this position (that is, after a [č]) also have alternant pronunciations, where [č] does not become [š]. In the data available, however, čošríí/čočríí is the only form with alternate forms, and thus we may only speculate on the possibility of [r] behaving as [+continuant] for some speakers here, and as [-continuant] for others.

In summary, the Lexical Phonology analysis I have proposed here with the two levels and the morphological and phonological rules which operate on each one is as follows.

(28) LEVEL 1 - Derivation

Morphology - suffixation of derivational affixes
(causative, propensitive, verb to
adjective, verb to noun)

- Type 4 verb reduplication

Phonology - stress shift:

V --> [+stress]/ ____ [C[́]V]

V --> [-stress]/ [́]V [C ____]

- Third Syllable Syncope

- V-Deletion

LEVEL 2 - Inflection

Morphology - prefixation of possessive markers

- suffixation of case and plural
markers

- reduplication (past-punctual
tense)

Phonology - Syncope

- Frication

LEXICAL REPRESENTATION

POST-LEXICAL PHONOLOGY - Affrication

FOOTNOTES

¹ Although the major portion of this paper is based on the work of Kroeber and Grace (1960), supplementary data was obtained from Hyde (1971), Bright (1968) and Davis (1976).

² I consider both the nasals and the [r] (phonetically flapped) to be [-continuant] because of their patterning in the language.

³ All forms given in this paper are surface forms unless otherwise indicated.

⁴ Luiseño verbs are classed into four conjugation types based on the phonological structure of the stem. Verbs of conjugations 1 and 2 are CVCV, with the final vowel being either [i] or [a].

⁵ Although these prefixes are similar in form to the independent pronouns of Luiseño, shown in (i) below, Kroeber and Grace (1960:97) distinguish the two on the basis of the fact that the pronouns and possessive prefixes differ in their behaviour: the pronouns occur independently, the possessives only before noun forms; the pronouns are declined with a series of case endings, the possessives are not; and pronouns carry normal stress, whereas the possessives do not.

(i) 1st sg	nó
2nd sg	ó(m)
3rd sg	pó
1st pl	čaám
2nd pl	omóm
3rd pl	pomóm

As well, the fact that the affixation of the possessive prefixes results in vowel syncope of the first vowel of a noun when the stress falls on its second syllable "again suggests that they are prefixes, that is, part of the same word as the noun stem" (Kroeber and Grace 1960:44). Regarding this final point, however, the authors make no mention of the possibility of rapid speech affecting sequences of pronoun-noun in that the syncope rule may apply between words as well as between morphemes in this situation, thereby constituting a post-lexical rule as well as a lexical rule. But on the basis of differing behaviour of pronouns and possessive prefixes, I maintain that the latter are indeed prefixes and are inflectional.

⁶ Kroeber and Grace (1960) distinguish between four types of verb reduplication (although there are in fact more), all expressing intensity of duration of an action, or plurality. The type described here is Type 4 in their classification; however, since it is the only type relevant to the argument at this point, I shall not present the processes occurring in the other types.

There is one other type of reduplication not classified into one of these four types which I shall discuss below.

⁷Although there is no known stem from which these reduplicated forms are derived, I maintain that they do indeed belong to this class of forms, for Kroeber and Grace (1960:164) note other forms

showing the present type of syncopated duplication that are without visible relation to a determined verb stem... We must therefore assume a class of...stems that occur only in the duplicated form (with the nominal suffix -š) of the present stress-shifting, vowel-dropping type.

The original stems may have become obsolete during historical development; but on the basis of the visible processes in the other reduplicated forms, I assume reconstructed stems for the latter three forms: respectively, čáku, čáqi, čúqa (following Kroeber and Grace 1960 for similar forms).

⁸This form is used when the stem enters into any combination other than with the objective -a and plural -um suffixes, whereas the absolutive suffix is used when the noun is isolated from context (that is, nominative) or when it is the subject of a sentence. The latter does combine with the aforementioned suffixes.

⁹This form was listed neither in Kroeber and Grace (1960) nor in Bright (1968), and thus I could not discern a meaning.

¹⁰Frication, on the other hand, is strictly a lexical rule, for it is certainly not exceptionless. That is, we see many instances of [č] next to a [-continuant] or [+lateral] segment (namely all the derived forms presented thus far), which never become [š] via a post-lexical rule. I maintain, therefore, that the [č] to [š] alternation applies only on Level 2.

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THE ACQUISITION OF CONTROL

Pauline Phillips

INTRODUCTION

This paper will report on some research that was undertaken to investigate the acquisition of control; that is, the way in which children formulate rules to interpret the subject of embedded infinitival clauses. The study had two major goals. One was to determine whether or not there are stages in the acquisition of control and to propose certain principles which would account for these stages. A second goal was to examine the acquisition of control in connection with the predictions made by the Theory of Markedness.

In most languages of the world the indirect object of a transitive verb is the controller of the complement subject. The following English sentence illustrates the unmarked rule.

- (1) John_i gave Bill_j the book PRO_j to read.

In (1), in accordance with the Theory of Government and Binding (Chomsky 1981), PRO corresponds to a null or phonetically unrealized pronoun. Interpretive rules coindex PRO with the NP that is its antecedent, in this case Bill, the indirect object. Bill is called the controller of PRO.

In English the verb promise is considered marked because it represents an exception to the general rule that the indirect object is the controller of PRO, as is shown in (2).

- (2) John_i promised Bill PRO_j to go.

In (2) John, the subject, and not the indirect object, Bill, is the controller of PRO. Similarly, in order to clauses with an indirect object in the main clause also represent an exception.

- (3) John_i gave Bob a present in order PRO_j to please his friend.

In (3) John, the subject, is the controller of PRO rather than Bob, the indirect object. According to the theory of markedness (Chomsky 1982:8) the prediction is that control will be acquired later in sentences which contain the verb promise (followed by an

infinitival clause) and in order to clauses than in sentences in which the indirect object is the controller of PRO.

PREVIOUS STUDIES

Chomsky (1969)

There have been a number of studies on the child's comprehension of complement clauses. The earliest study was done by Carol Chomsky (1969), who examined sentences like (4) and (5).

(4) John told Bill_i [PRO_i to leave].

(5) John persuaded Bill_i [PRO_i to leave].

In both of these sentences Bill is the controller of PRO. Chomsky proposed that children initially use the general rule for English paraphrased in (6).

- (6) The Minimum Distance Principle (MDP)
The implicit subject of the complement verb (i.e. PRO) corresponds to the NP most closely preceding it.
(Chomsky 1969:10)

Sentences with the verb promise constitute a counterexample to the MDP since the closest NP is not the controller of PRO.

(7) John promised Bill_i [PRO_i to leave].

Chomsky hypothesized that sentences (4) and (5) would be learned first and (7) would be learned later. Her predictions were subsequently confirmed in her experiments.

Maratsos (1974)

Michael Maratsos (1974) also conducted an important study on how preschool children understand missing complement subjects. He proposed that rather than basing their responses on the MDP, children may be aware of the Semantic Role Principle (SRP).

- (8) The Semantic Role Principle
PRO is controlled by the goal NP in the matrix clause.
(Maratsos 1974:701)

Consider (9).

(9) John told Bill_i PRO_i to leave.

In (9) Bill is the goal of the order--that is, he is the person toward whom the order is directed. John is the source--the actor from whom the order originates. For most verbs of speaking, such as tell, advise, require, beg, order, command, persuade, it is

the goal of the speaking action that is the controller of PRO. Promise is the exception to this generalization--the source of the promise supplies the complement subject reference and not the goal.

Maratsos used passive sentences such as (10) to test the use of the SRP as opposed to the MDP.

(10) John_i was told by Bill PRO_i to leave.

In (10), the MDP would predict that Bill would be interpreted as the controller of PRO. In contrast, the SRP would predict John would be identified as the controller since it expresses the goal.

Maratsos concludes that the results from his experiment clearly favor the SRP rather than the MDP. Children appear to formulate rules to interpret PRO in terms of semantic relations such as goal rather than on a straight linear order principle which is the basis for the MDP.

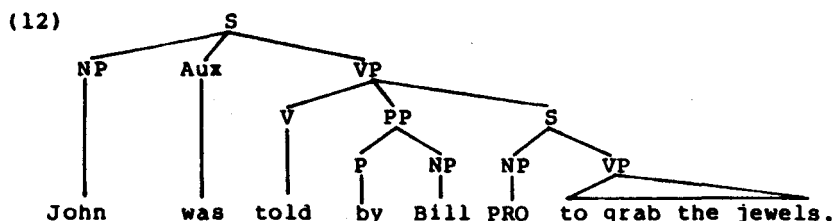
Goodluck (1981)

Helen Goodluck (1981) has suggested that there may be another explanation for Maratsos' results. She proposes that children know the C-Command Constraint on Control (see(11)) and that they do not base their interpretation on semantic roles such as goal.

(11) The C-Command Constraint on Control¹

A controller must c-command PRO.

The C-Command Constraint accounts for the fact that Bill is not a possible controller in the following example.



Bill does not c-command PRO since the first branching node (PP) above it does not dominate the complement clause.

Goodluck designed two experiments to investigate the presence of C-Command Constraint on Control in children's grammar. She included sentences which contain a passive by-phrase as in

(13) as well as sentences which included an in order to clause as in (14) and (15).

(13) John_i was told by Bill_j PRO_i to grab the jewels.

(14) Daisy_i hits Pluto PRO_i to put on the watch.

(15) Daisy_i stands near Pluto PRO_i to do a somersault.

Goodluck claims that her predictions are validated by the results. When there was a direct object in the matrix verb phrase as in (14), object control was overgeneralized but when the NP in the matrix VP was the object of a locative PP as in (15) or a passive by-phrase as in (13), the children opted for subject control.

Unfortunately for Goodluck's proposal, there are some well known counterexamples to the C-Command Constraint on Control. Sentences in which PRO is controlled by the indirect object represent one obvious exception as can be shown in (16).

(16) Bert gave a bike to Ernie PRO to ride.

In this sentence Ernie is the controller of PRO even though it is embedded in a PP and hence does not c-command the infinitival clause.

Another type of counterexample involves cases such as (17).

(17) He $\left\{ \begin{array}{l} \text{pleaded with} \\ \text{yelled at} \\ \text{shouted to} \\ \text{counted on} \end{array} \right\}$ the boys_i [PRO_i to leave].

Goodluck (1981:161) mentions a counterexample similar to the above (rely on), but unfortunately does not discuss how such forms fit into her theory.

The final counterexample has to do with the by-phrase in passive structures. O'Grady (1982) has noted that in the passives of in order to clauses the agentive phrase can be the controller of PRO. He gives the following examples.

(18) a. The mansion was built by John_i [(in order) PRO_i to impress the neighbors].

b. The money for the hospital was donated by John_i [(in order) [PRO_i to placate the local medical association]].

Thus there appear to be some serious problems with Goodluck's proposal.

Tavakolian (1978)

Susan Tavakolian (1978) also designed an experiment to test children's understanding of sentences with verbal complements. She proposed that when children are uncertain about the structure of a multiple clause sentence, they attempt to parse it as though it consisted of conjoined simple sentences. Under Tavakolian's explanation, a sentence such as (19) would be interpreted as (20).

(19) The lion tells the pig to stand on the horse.

(20) [The lion tells the pig] and [the lion stands on the horse].

This interpretation is a result of a strategy used by children called the Conjoined Clause Analysis which is defined in (21).

- (21) The Conjoined Clause Analysis
The missing subject of the second conjunct corresponds to the subject of the first conjunct.

Tavakolian designed an experiment in which she studied children's responses to the complements of tell and promise.

(22) The horse tells the pig_i PRO_i to bump into the sheep.

(23) The horse_i promises the pig PRO_i to bump into the sheep.

From her results, Tavakolian identifies three stages of development in the child's comprehension of verbal complements. In Stage I children use the Conjoined Clause Analysis in which the subject of the second clause is considered to be coreferential with the subject of the first clause. Children interpret promise sentences correctly because the Conjoined Clause Analysis provides the correct interpretation. In Stage II the child correctly interprets tell complements but incorrectly interprets promise complements. At this stage children identify a semantically based class of verbs whose members (including tell) have indirect object control. However, they do not identify promise, which is a member of this general semantic class of verbs of speaking, as an exception to the general control rule. In the final stage the child has an essentially adult grammar.

Though it appears that a linear principle such as the MDP is operating in the choice of the complement subject, especially at Stage II, Tavakolian proposes that children learn the lexical features of the verb which determines the complement subject chosen. If the MDP were a productive strategy, it would be expected that the child would overgeneralize from (24) to (25) at some stage.

(24) The lion tells the pig_i[PRO_i to stand on the horse].

(25) The lion_i jumps over the pig_i[PRO_i to stand on the horse]

If children do not overgeneralize the MDP to sentences such as (25), then it is possible that they are using a strategy which is the result of their knowledge of the properties of the individual lexical items. Thus it is possible that children come to know that some verbs (for example, tell but not jump) take infinitival complements, that the goal is the controller, and so on.

To test her hypothesis that children are using their knowledge of the lexical properties of the matrix verb instead of the MDP, Tavakolian designed an experiment which included in order to clauses with a PP in the matrix clause as in (25) above. An adult response would interpret the subject as the controller of the in order to clause and 89% of the sentences were interpreted in this way by the children. These results indicate that children do not overgeneralize the MDP to sentences containing an in order to clause. Children who gave an indirect object control response to the sentences in which tell was the matrix verb in Experiment 1, gave a subject control response to the sentences in Experiment 2.

In conclusion, Tavakolian proposes that her study has presented evidence to support the hypothesis that children initially analyze complex sentences as conjoined simple sentences and interpret the missing subject of the second sentence as coreferential with the subject of the first clause. Another important suggestion that has emerged from this study is that children may not be using the MDP to interpret complement subjects but instead may be accessing their knowledge of the lexical-semantic entries of the matrix verb.

SOME NEW EXPERIMENTS

One area in which there has been little or no research to this point involves the acquisition of control in different types of infinitival complement clauses. In this study I investigated the acquisition of control in three types of embedded clauses -- purpose clauses, in order to clauses and complement clauses. Before describing the experiment itself, I will outline the characteristics of these three types of infinitival clauses.

Purpose Clauses and In Order To Clauses

The syntax and semantics of English purpose clauses have been described by Robert Faraci (1974) and Emmon Bach (1982). An example of a sentence containing a purpose clause is given in (26).

- (26) I_i bought a book [PRO_i to give ____ to my children.]

The infinitival clause exhibits two gaps. There is a gap in the subject position of the infinitival clause which corresponds to PRO and there is a gap in the object position. The second gap does not have to occur in the direct object position. In (27), for example, it occurs after a preposition.

- (27) I bought Harry a hammer to hit nails with ____.

Purpose clauses can be distinguished from in order to clauses in a number of ways. Firstly, in order to clauses do not exhibit a 'non-subject' gap, as shown in the following sentences.

- (28) He bought a piano [(in order) PRO to please his grandmother].
(29) *He bought Mary a piano [(in order) PRO to please ____.]

Secondly, in order to clauses can be preposed while purpose clauses cannot.

- (30) [(In order) PRO to please his grandmother] he bought a piano.
(31) *[PRO to give to my children], I bought a book.

This contrast stems from the fact that in order to clauses are thought to be attached to the higher S whereas purpose clauses are generated as complements inside the VP. It has been argued that only phrases outside the VP can be preposed to the beginning of the sentence (Chomsky 1965:102).

Thirdly, purpose clauses are future oriented with respect to the time of the matrix clause. This is not necessarily the case with in order to clauses, as the following sentences illustrate.

- (32) I bought it [(in order) PRO to use up my money].
(33) I bought it [PRO to give ____ to my sister].

In (32) the time of buying and using up the money are identical. In (33) the time of giving occurs after the time of buying.

Faraci (1974:36) notes that the purpose clause is associated much more closely with the matrix VP than is the case with an in order to clause. A purpose clause defines the function of the matrix object whereas an in order to clause defines the reason for the subject's action. Thus in (32) the in order to clause defines the subject's reason for the purchase, while in (33) the purpose clause indicates what is going to be done with the object. When both an in order to clause and a purpose clause

occur in the same sentence, the purpose clause must always precede the in order to clause.

- (34) John bought a present[PRO to give to Bill][in order to please his friend].

A final syntactic property of purpose clauses which I would like to address relates to the restrictions on the choice of the matrix verb. Both Emmon Bach (1982:38) and Robert Faraci (1974:35) have identified five types of verbs that are compatible with purpose clauses. These include:

- I. Have, be (in the sense of 'in a place, on hand, available, at one's disposal'). For example:

(35) He is a hard person[PRO to talk to ____].
(36) I have a book[PRO to read ____].
- II. Transitive verbs involving continuance or change in the state of affairs.

(37) We keep a fire extinguisher[PRO to use ____ in case of fire].
- III. Verbs of choice and use.

(38) John chose an orange[PRO to eat ____].
- IV. Predicates of transaction such as give, buy, sell, take, steal, borrow and lend.
- V. Verbs of creation such as build, construct, devise, and make.

The next point which must be addressed relates to how PRO is interpreted in purpose clauses and in order to clauses. In purpose clauses, the controller corresponds to the matrix indirect object, if there is one, and to the matrix subject otherwise. In order to clauses are always subject controlled. This follows from the fact that in order to clauses are semantically much more closely related to the nature of the subject's action. This is evident in (39).

- (39) Ernie chose a chair near Bert in order[PRO to talk to his friend].

Complement Clauses

Another type of infinitival clause was included in the study, namely complements of argument verbs and complements of prepositional verbs, which I will call complement clauses. Control in complement clauses is determined by the properties of the matrix verb.

Argument verbs, sometimes called 'verbs of speaking' or 'communication verbs', are those which allow a subject or an indirect object to assign control. Thus verbs like tell and persuade assign the indirect object NP as the controller of PRO whereas a verb such as promise, in contrast, assigns the subject as controller.

Quite a different class of control verbs (which I will call prepositional verbs) are exemplified in (40).

- (40) He {pleaded with
shouted to
counted on
yelled at } the boys_i [PRO_i to leave].

In this example an NP embedded in a PP serves as the controller even though it is not a syntactic argument (subject or indirect object) or the verb.

O'Grady (1985) has made an interesting proposal to deal with the sentences in (40). He has noted that the controller for PRO must be a thematic dependent of the matrix verb. A thematic dependent is defined as follows:

- (41) An NP is a thematic dependent of the word which assigns it a thematic role (e.g. agent, patient, goal, etc.).

Subjects and objects are prototypical thematic dependents of a verb. Thus run assigns the agent role to its subject while hit would mark its subject as agent and the object as patient. NPs which appear as objects of a preposition are typically thematic dependents of that preposition. In the following sentence, near assigns a thematic role of 'location' to its object.

- (42) Harry sat near the window.

However, some prepositions do not determine the thematic role of the NP which they govern. Consider sentence (43).

- (43) Harry pleaded with the boys.

The NP the boys in (43) does not receive an instrumental role that is usually assigned by with but instead, the role of 'addressee', which must come from a verb of speaking. Thus O'Grady claims that it is the verb plead and not the preposition which assigns a thematic role to the NP the boys in (43). This proposal seems to apply to all of the sentences in (40) since the NP the boys receives its role from the verb. This, in turn, predicts that these NPs should be able to function as controller of PRO. This is just what happens in (40).

Prepositional verbs were included in my study to see whether or not the children subconsciously know that a thematic dependent

of the verb following a preposition is a possible controller of PRO.

CONTROL AND THE THEORY OF MARKEDNESS

In the introduction, I mentioned that in current linguistic theory there are some structures that are considered to be unmarked and some which are marked. Rules which conform to the general principles of the language are considered unmarked and rules which go against the general trend are considered marked and hence exceptional. There are two structures which appear to be marked in the sentences which will be used in this experiment. The first one was noted by Carol Chomsky (1969:4). She proposed that sentences with the verb promise represent an exception to the general pattern of the language in that, as opposed to the majority of verbs of speaking (such as tell) which take a subject and an indirect object, the subject is the controller of PRO.

Another structure which I consider marked is the following.

- (44) Ernie_i gave his robot to Bert [in order PRO_i to please his friend].

In (44) the matrix sentence has a subject and an indirect object, both of which are thematic dependents of the verb. In the unmarked case, the indirect object would be the controller of PRO as in the following purpose clause.

- (45) Ernie gave a book to Bert_i [PRO_i to read].

In (44), however, the subject is the controller. In the unmarked case (45), the goal is the controller of PRO while in (44) the source (Ernie) is the controller.

The prediction with respect to sentences with promise and in order to complements such as (44) is that since they represent the marked case, they will be acquired later.

THE EXPERIMENT

The Sentence Types

Five types of purpose clauses were used in the experiment, three of which required the subject of the matrix sentence to be the controller of PRO (I to III below) and two of which exhibited indirect object control (IV and V below).

- (46) Type I: Active matrix sentence with a post-verbal prepositional phrase.

Bert_i put a book near Grover [PRO_i to read
_____ later].

- (47) Type II: Active matrix sentence with a post-verbal genitive NP preceding the infinitival clause.

Grover_i grabbed Ernie's ball [PRO_i to play with ____].

- (48) Type III: Passive matrix sentence followed by a purpose clause.

Bert_i was given the robot by Grover [PRO_i to look at ____ later].

- (49) Type IV: Active matrix sentence that included a direct object and an external indirect object (an indirect object introduced by the preposition to).

Ernie gave Garfield to Bert_i [PRO_i to play with ____ later].

- (50) Type V: Active matrix sentence with an internal indirect object (an indirect object without the preposition to).

Mary gave Barbie_i Snoopy [PRO_i to play with ____ later].

Two types of subject control in order to clauses were also included among the test sentences.

- (51) Type VI: Active matrix sentence with an external indirect object.

Bert_i gave his robot to Ernie [in order PRO_i to please his friend].

- (52) Type VII: Active matrix sentence with a post-verbal locative PP.

Ernie_i used a crayon beside Grover [in order PRO_i to draw a picture].

Type VI sentences contrast with Type IV purpose clauses in which the external indirect object is the controller of PRO. In Type VII sentences, the NP in the prepositional phrase is not a potential controller at all, presumably because it is not a thematic dependent of the verb.

Finally, the test sentences included complement clauses with two types of matrix verbs. Type VIII sentences had a prepositional verb in the matrix sentence.

- (53) Type VIII: Active matrix sentence with a prepositional verb.

In contrast Type IX sentences had an argument verb, with both a subject and an indirect object NP in the matrix clause. In these sentences, control is determined by the lexical properties of the matrix verb.

- (54) Type IX: Active matrix sentence with one of the following argument verbs.

Barbie persuaded Mary_i [PRO_i to come].

Ernie told Bert_i [PRO_i to run].

Ernie_i promised Grover [PRO_i to leave].

Interspersed throughout the comprehension task were four sentences such as (55) which tested the child's understanding of the simple passive.

- (55) The truck was pushed by the car.

In addition, there were three sentences with an internal indirect object construction as illustrated in (56).

- (56) Bert gave Ernie a ball.

One sentence had an external indirect object with the preposition to.

- (57) Bert gave a ball to Ernie.

Children were required to demonstrate their understanding of sentence types (55) to (57) by acting out their meaning. Sentences of this type were included not only to test the child's understanding of the relevant structures, but also to serve as distractors and break the monotony of the comprehension task. It was felt an act-out procedure was appropriate to test these sentences since they were made up of only one clause.

The Subjects and the Procedure

In all, 72 subjects were tested, including 60 children from ages three, four, six, eight and ten years and 12 adults ranging in age from 24 to 73 years. The mean age of the children completing the study was 5;3 and the range was 3;0 to 10;10. All the children were native speakers of English without known learning or language problems. The older children attended an elementary school in Calgary while the younger children were from four Calgary day care centres.

A question-answer format was used to study children's interpretation of PRO in complement sentences. In this task, the children were read a sentence and then asked a question which required identification of the subject of the complement clause. For example, the experimenter would read the following sentence.

(58) Ernie told Bert to run.

Then the following question was asked.

(59) Who will run?

The comprehension task consisted of three tokens of each of the nine sentence types plus four tokens each of the simple passive and the indirect object constructions. A total of 35 sentences, arranged in random order, were used. An attempt was made to select sentences which would provide a minimum of contextual or semantic clues to influence the child's interpretation. In this way, it was hoped that the children would have to rely on their knowledge of syntactic structure to interpret these sentences. The total time for each interview was 15 to 20 minutes.

THE RESULTS

The act-out task to determine if the children understood the internal and external indirect object sentences revealed that all of the children in each age group had acquired both constructions. In the next section I will give the results from the act-out task of the simple passive.

Purpose Clauses

There were five types of purpose clauses used in this study.

Type I: Bert_i put a book near Grover PRO_i to read later.

Type II: Grover_i grabbed Ernie's ball PRO_i to play with later.

Type III: Bert_i was given a robot by Grover PRO_i to look at later.

Type IV: Ernie gave Garfield to Bert_i PRO_i to look at later.

Type V: Mary gave Barbie_i Snoopy PRO_i to look at later.

An analysis of the results reveals that there are five stages of development in the acquisition of Purpose Clauses. The stages are based upon a criterion of 3/3 correct.

Stage I	Mixed Response	21 children Mean age: 4.8 yrs. Range: 3;5-8;11
Stage II	Subject Control (Type II)	5 children Mean age: 5.4 yrs. Range: 3;6-6;7
Stage III	Indirect Object Control (Type IV and V)	15 children Mean age: 5.9 yrs. Range: 3;6-10;10
Stage IV	Indirect Object Control (Type IV and V) and Subject Control (Type II and III)	17 children Mean age: 9.4 yrs. Range: 8;6-10;10
Stage V	All five types correct	0 children

In Stage I, none of the children attained criterion on any sentence type. Five children in Stage II recognized that a genitive NP is not eligible to act as controller of PRO. Some of the children in Stage III attained criterion in the sentences with the external indirect object (6 children), some on the internal indirect object (5 children) and some on both types (4 children). Children in Stage IV attained criterion in four out of the five sentence types. None of the children in the study reached Stage V in which they were able to interpret all of the Purpose Clauses correctly.

The following table gives the percentage of correct responses to the five types of Purpose Clauses as well as the Simple Passive. The act-out task of the Simple Passive was not given to the adults.

Table 1

Age	3	4	6	8	10	Adult
Type I	42	39	39	45	28	70
Type II	36	50	58	81	86	97
Type III	31	50	58	78	81	95
Simple Passive	52	58	88	96	98	-
Type IV	53	64	70	92	94	97
Type V	44	61	53	89	100	100

The results from the Type I and Type III sentences are very interesting. Both sentences require subject control and both include a PP in the main clause. Type I sentences contain a locative PP and Type III sentences contain a PP indicating the agent of the passive sentence. The responses to Type II sentences, however, contrast sharply with the responses to Type I sentences in which the average score does not rise above the 50% level in any of the children's age groups. In fact the percentage of subject control responses actually dropped to 28% at age 10. Adults only gave 70% subject control responses.

In the Type III sentences there is a gradual increase in the number of subject control responses to 81% at age 10 compared to 28% at age 10 for Type I sentences. In Type III sentences there is a period of confusion followed by a steady increase in the number of subject control responses as children learn the passive structure and how it relates to the infinitival complement. Some reasons for the difference in the acquisition of these two sentences may become clearer after a discussion of the principles which are required for the interpretation of Purpose Clauses.

What are the principles that can account for these stages of development? I propose that to get from Stage I to Stage II, children become aware that only thematic dependents of the verb are eligible as controllers of PRO. Before this, children are answering at random giving responses that include genitive NPs, thematic dependents of a preposition and thematic dependents of the verb. O'Grady (1985:12) has proposed the following principle which appears to be a minimal requirement for the interpretation of PRO.

- (60) The Thematic Dependency Requirement (TDR)
 The antecedent of PRO must be a thematic dependent of the verb.

Once the children are able to identify the thematic dependents of the matrix verb which are eligible as controllers of PRO, knowledge of the Semantic Role Principle (SRP) (cf. (8)) enables them to identify the specific thematic dependent (the goal) as controller. In Stage IV, Type III sentences can be interpreted by using the SRP but the children must have mastered the passive in order to identify the subject as goal. In the final stage children become aware of the fact that the source is the controller in the absence of a thematic dependent which is the goal.

Why are Type I and II sentences, which include subject control purpose clauses, acquired by most children after Type IV and V sentences? One reason for this may be related to the fact that these sentences do not contain a goal NP and to interpret them correctly, it is necessary to choose the source in the absence of a goal. This would explain the acquisition of Type II but why are Type I sentences the last to be acquired? The results are puzzling because children up to age ten sometimes give the NP in a locative PP as the controller of PRO. How can this be explained?

One explanation relates to the pragmatics of the sentence.

(61) Bert put a book near Grover PRO to read later.

It is possible that Bert put a book beside Grover so that he (Bert) could read the book later. It is also possible that Bert put a book beside Grover for Grover to read later. In this interpretation Grover is the goal of the action. Children at age ten seem to be focusing upon the pragmatics of the situation since three children chose this answer in 3/3 tokens and eight children in 2/3 tokens.

In Order To Clauses

The two types of in order to clauses include sentences such as the following:

- (62) Type VI: Ernie gave his robot to Grover in order PRO to please his friend.
- (63) Type VII: Ernie used a crayon beside Grover in order PRO to draw a picture.

An analysis of the responses to the sentences containing in order to clauses reveals the following developmental sequence.

Stage I	Mixed Responses	34 children Mean Age: 5;5 Range: 3;5-10;10
Stage II	a) Subject Control in Type VII	14 children Mean Age: 7;3 Range: 3;9-10;6
	b) Subject Control in Type VI	5 children Mean Age: 7;3 Range: 3;9-10;6
Stage III	Correct in both Type VI and VII	8 children Mean Age: 9;5 Range: 8;6-10;6

The following table shows the percentage of correct responses for Type VI and VII sentences.

Table 2

Age	3	4	6	8	10	Adult
Type VI	33	50	56	58	53	92
Type VII	53	56	67	83	86	92

The results of these two sentence types reveal that children are capable of making some important distinctions concerning the status of the NPs that are eligible to act as controller. In particular, the responses to Type VI and VII sentences show that children are able to distinguish between two types of NPs that are part of a prepositional phrase: those that are thematic dependents of a preposition and those which are thematic dependents of the verb. In Type VII sentences there is a steady increase in the number of responses in favour of the subject rather than the object of a preposition as controller or PRO. The responses in Type VI sentences which contain an indirect object remain at the 50% level up to age ten. It appears that children are unable to determine which thematic dependent, the subject or the indirect object, is the controller of PRO. This is not the case in Type VII sentences. Once the child has made the distinction between a thematic dependent and a non-thematic dependent of the verb, the choice of controller follows.

The acquisition of in order to clauses appears to require that children know two important principles. They must be aware of the Thematic Dependency Requirement (TDR) in order to determine which NPs are possible controllers of PRO. They must also know an additional principle, the Structural Subject Principle (SSP), which can be stated as follows.

- (64) Structural Subject Principle
PRO is controlled by the subject in sentences containing an in order to clause.

This principle follows from the fact that in order to clauses define the reason for the subject's action instead of the indirect object's action as is the case in the Type IV purpose clauses that include an indirect object.

Complement Clauses

- Type VIII sentences include a prepositional verb shown in (65).

- (65) Ernie shouted to Bert PRO to run.

The results of the Type VIII sentences are extremely interesting because the mean scores increase so rapidly. By age four, children are correctly identifying the controller of PRO 75% of the time. It is interesting to note that in other sentence types with a locative PP such as in order to sentences (Type VII), the NP governed by the preposition is not consistently interpreted as controller of PRO. Children appear to be differentiating between NPs which receive their thematic role from the verb and those which receive their thematic role from a preposition. There do not appear to be any particular stages in the acquisition of prepositional verbs.

The sentences with argument verbs include two types. The sentences with persuade and tell involve indirect object control whereas sentences with promise exhibit subject control. In these sentences control is determined by the lexical properties of the matrix verb. The results of the study essentially replicate the results of other studies that have been done on these verbs. An analysis of the data reveals the following stages.

Stage I	Mixed Responses	16 children Mean age: 4;7 Range: 3;5-6;0
Stage II	Tell/Persuade correct Promise incorrect	13 children Mean age: 5;9 Range: 3;0-6;3
Stage III	Tell/Persuade correct Promise correct	25 children Mean age: 8;8 Range: 3;0-10;8

As was the case in the other infinitival clauses, children need to become aware of the TDR to move from Stage I to Stage II. In addition, they require the lexical principle which specifies that in verbs of speaking, the indirect object is the controller. In Stage III, children interpret sentences with promise correctly

because they have acquired the idiosyncratic lexical information which specifies that the subject is the controller in this instance.

THIS STUDY'S RELATIONSHIP TO PREVIOUS STUDIES

The Minimum Distance Principle

According to the MDP, children assume that the implicit subject of the complement verb is the first NP preceding it. The results from the sentence types in this study reveal that the use of the MDP is inadequate to explain children's responses. First of all, as has been noted in the case of purpose clauses such as (66), some children correctly identified the internal indirect object as controller.

- (66) Bert gave Ernie_i Garfield PRO_i to play with ____.

These children would not be using the MDP since the direct object would be the closest NP. Secondly, if children were using the MDP, they would respond to sentences such as (67) by choosing the object of the preposition in the matrix clause as a possible controller.

- (67) Ernie_i chose a chair near Bert PRO_i to talk to his friend.

Though children sometimes chose this answer, they did not do it consistently as the MDP predicts. Instead, their answers were random until they established which NPs could serve as controllers. This strategy requires that the child has identified a principle that involves much more than just linear order.

Semantic Role Principle

Maratsos (1974) has proposed that children may base their responses on the SRP. The SRP states that PRO is controlled by the goal NP in the matrix clause. This proposal gives the correct results for both active and passive purpose clauses as in (68) and (69).

- (68) Mary gave a cupcake to Barbie_i PRO_i to eat.

- (69) Bert_i was given the robot by Grover PRO_i to look at.

It is also the case that when there is not a goal, the source is the controller as in (70).

- (70) Bert_i put a book near Grover PRO_i to read later.

In the adult grammar Bert is controller in (70). The problem is that some of the children seem to consider Grover to be the goal

in (70). This is interesting in the light of Maratsos' proposal since, if Grover names the goal, it would be the controller of PRO according to the SRP.

The goal is also the controller in sentences which contain a complement clause.

(71) Ernie told Bert_i PRO_i to run.

(72) Ernie shouted to Bert_i PRO_i to run.

The exception, of course, as noted by Maratsos, is promise. In this case, there is a goal but the source is the controller. In this study in order to clauses which contain an indirect object in the matrix clause represent another counterexample to the SRP. As is the case with promise, there is a goal but the source is the controller.

The SRP in this study has emerged as a very important principle, not only in the interpretation of PRO following a verb of speaking, but also in the interpretation of PRO in other types of infinitival clauses.

Conjoined Clause Analysis

The results of Tavakolian's (1978) study indicated that younger children's responses to complement clauses may be based upon a structural strategy called the Conjoined Clause Analysis in which children interpret the subject of the second conjunct as being coreferential with the subject in the first. In Tavakolian's study some of the 3-year-olds chose the matrix subject as controller more often than the matrix object. She proposes that this response type precedes the stage in which the children use the MDP and give more object than subject responses to interpret complement clauses.

The percentage of subject responses for the sentence types in my study for the 3-year-olds are as follows.

Type I: 42%	Type IV: 30%	Type VII: 53%
Type II: 36%	Type V: 41%	Type VIII: 39%
Type III: 31%	Type VI: 33%	Type IX: 42%

As the above figures show, none of the sentence types show a preference for subject control. Some of these results seem to indicate that the indirect object or the closest NP was chosen more often but this is not the case either since, at this age, about 10 to 15% of the responses involved the choice of an actor not named in the sentence or complete failures to respond. Thus, the results for the 3-year-olds in this study show no clear preference for the subject or indirect object as controller. Pinker (1984:242) has noted that Tavakolian's data do not even support her interpretation. Her 3-year-old children were simply

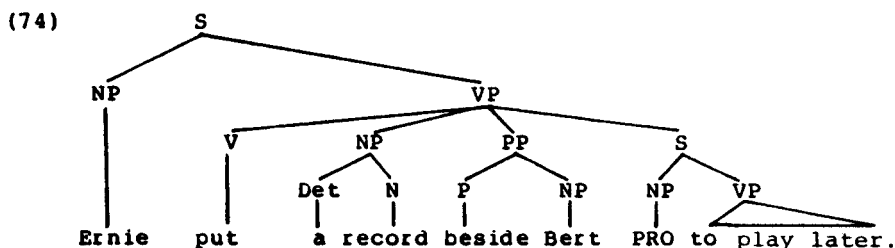
performing at a level near chance for both tell and promise sentences: They were not consistently choosing the matrix subject as controller.

C-Command Constraint on Control

Helen Goodluck (1981) has suggested that children know the C-Command Constraint on Control, repeated in (73).

- (73) A controller must c-command the missing subject position.

The C-Command Constraint on Control accounts for the fact that Bert is not the controller of the complement clause in the following example.



Since Bert is part of a prepositional phrase it does not c-command PRO and therefore cannot serve as controller according to (73).

In the present study, children in all age groups sometimes chose Bert as controller in the Type I purpose clauses exemplified by (74). The reason for this seems to be that the children are attending to the pragmatics of the sentence rather than the C-Command Constraint on Control.

Results from the other sentence types which contain a PP in the matrix clause, such as the passive and the in order to clauses, also undermine the C-Command Requirement. While the object of a preposition as controller is not the preferred response in these cases, it was found that until children have acquired the TDR, their responses are extremely varied. At the very least, this suggests that the C-Command Constraint is not present from birth as an inborn principle.

THE RELEVANCE OF THIS STUDY TO MARKEDNESS THEORY

A crucial component of most current theories of language acquisition is the theory of markedness. The unmarked rule is considered to be the one that will be more likely to occur in a language and the first to be hypothesized by the language

learner. A marked rule, in contrast, is harder to acquire and will only be posited in response to considerable evidence that it is necessary (White 1982:102).

In the present study, there were two structures which were identified as being in the marked category. These include (75) and (76).

(75) Ernie_i gave his robot to Bert in order PRO_i to please his friend. (Type VI)

(76) Bert_i promised Grover PRO_i to leave. (Type IX)

Both sentences exhibit subject control which is extremely rare in the world's languages when there is an indirect object in the matrix clause (Pinker 1984:242). The prediction that these structures belong to the marked category seems to be verified by the results since both of these structures were acquired later than those in the unmarked category.

Why is it the case that these marked forms are acquired later than the unmarked forms? Pinker (1984) has proposed that the marked rules require specific evidence to be formulated. Once this evidence has been encountered, the marked rule will be chosen. This proposal implies that overgeneralization of indirect object control to promise constructions is due to the fact that the child has not heard a sentence with promise followed by an infinitival clause. In support of this proposal, Pinker notes that this construction is extremely rare in adult speech. In a study of parent-to-child speech (Pinker and Hochberg 1984), there was not a single instance of such a construction. Pinker (1984:235) also reports that evidence gathered from undergraduate university students by Tom Wasow (in personal communication to Pinker) indicates that adults may find such constructions ungrammatical.

A second interpretation of markedness is that the marked rule is harder to learn and a learner must encounter more evidence than for the unmarked rule. This proposal is interesting in connection with the in order to clauses. While it is likely that children have heard such structures before, they are rare. Bloom et al (1984) report only 12 instances of in order to sentences compared to 3,800 instances of other complement structures in their corpora of utterances for four children (Pinker 1984:389). Tom Roeper reports (in personal communication to Pinker 1984:389) that the in order to sentences used with children are of the following form.

(77) I drove home (in order) PRO to get my books.

Notice that in this sentence there is only one thematic dependent, the subject, which can serve as the controller of PRO.

In summary, then, it appears that marked forms are rare in everyday speech, but they also need to be heard more often to be acquired. This in turn helps to explain why they are acquired later.

CONCLUSION

In conclusion, I see the acquisition of control not as a result of the awareness of a specific principle as other studies have indicated but rather the understanding of a number of important principles. The Thematic Dependency Requirement appears to be the basic principle for the interpretation of PRO. This principle allows children to distinguish between those NPs which are eligible as controllers of PRO and which are not. Knowledge of the Semantic Role Principle enables children to identify the specific thematic dependent (the goal) as controller. The interpretation of in order to clauses which include an indirect object in the matrix clause requires an awareness of the Structural Subject Principle which designates the subject as controller of PRO. Finally, sentences which include an argument verb require the lexical principle which specifies that in verbs of speaking, the indirect object is the controller unless the matrix verb is promise in which the subject is the controller. Knowledge of these important principles enables the child to interpret PRO correctly.

FOOTNOTES

¹C-command is defined as:

x c-commands y iff the first branching node dominating x dominates y, and x does not dominate y, nor y, x. (Radford 1983:214)

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THE FUNCTION OF THE COPY PRONOUNS IN KAPAMPANGAN¹

Lorna Rowsell

INTRODUCTION

There exists in Kapampangan an obligatory set of enclitic pronouns which co-occur with and precede their nominal referents. If it is assumed that marking devices in natural language are minimally efficient, the existence of these copy pronouns may at first be perceived as redundant. In this paper, therefore, I will attempt to show that their presence is necessitated by two factors: the ergative morphology of the language and the Philippine focus construction. Following this analysis, I will present some examples of sentences in which the presence or absence of these pronouns provides syntactic information not otherwise apparent.

SYNTACTIC CHARACTERISTICS OF KAPAMPANGAN

Kapampangan (also known as Pampango) is one of the eight major languages of the Philippines. Its sentences consist of a predicate followed by its nominal dependents, each preceded by a case marker. The copy pronouns immediately follow the predicate and precede the nominal dependents. The case marking system can be analyzed as ergative according to the following pattern: an intransitive verb (Intr V) which is recognizable by its morphological marking is followed by a noun phrase (NP) marked absolutive (ABS). This is traditionally called the subject (Subj). A verb with transitive marking (Tr V) is followed by two NP dependents (traditionally the subject and the direct object) which are marked ergative (ERG) and ABS respectively. Each type of clause may or may not contain other NP dependents marked for different cases according to the system of the particular language

Intr V + NP (Subj)
ABS

Tr V + NP (Subj) NP (DO)
ERG ABS

The following examples show this case marking system in Kapampangan.

- (1) Kinaung la ring asu
 bark Intr c.p. c.m. dog (c.p. = copy pronoun
 past ABSpl ABSpl c.m. = case marker)
 'The dogs barked.'
- (2) Ikit nala ning anak ring asu
 see Tr c.p.+c.p. c.m. child c.m. dog
 past ERG+ABSpl ERG ABSpl
 'The child saw the dogs.'

Another kind of intransitive clause exists (usually characterized as antipassive in other ergative languages) in which the Intr V is followed by an ABS subject and another NP, * which is marked either genitive (GEN) or oblique (OBL).

- (3) Menakit ya-ng asu ing anak
 see Intr c.p.-c.m. dog c.m. child
 past ABS -GEN ABS
 'The child saw a dog.'

The Philippine Focus Construction

As in other Philippine languages, the nominals in Kapampangan sentences can each be 'focussed' (or selected as topic). The NP selected for focus is case marked ABS and its original case function (or thematic role) is indicated in the morphology of the verb. In the following examples the focussed nominal has been indicated in the gloss by underlining.

Transitive Examples

- (4) Direct Object Focus

Tatagalan ne ning asu ing pusa
 chase c.p.+c.p. c.m. dog c.m. cat
 pres ERG+ABS ERG ABS
 'The dog is chasing the cat.'

- (5) Indirect Object Focus

Dininan ne - ng butul ning babai ing asu
 give IO c.p.+c.p.-c.m. bone c.m. woman c.m. dog
 past ERG+ABS GEN ERG ABS
 'The woman gave a bone to the dog
 (the dog a bone).'

- (6) Instrumental Focus

Panyulat ne - ng poesia ning anak ing lapis
 write Ins c.p.+c.p. - c.m. poem c.m. child c.m. pencil
 pres ERG+ABS GEN ERG ABS
 'The child is writing the poem with the pencil.'

Intransitive Example (Antipassive)

(7) Subject Focus

Managal	ya	- ng	pusa	ing	asu
chase	Intr	c.p.-c.m.	cat	c.m.	dog
pres		ABS GEN		ABS	

'The dog is chasing a cat.'

Sentence (7) is another example of the construction illustrated in (3) above and is considered to be the antipassive paraphrase of (4), the only semantic difference being that the DO in the subject focus sentence is indefinite.

I will use the theoretical framework of Relational Grammar (RG)² which provides us with a diagrammatical format in which the focus construction can be seen represented on different levels. An RG network diagram consists of arcs representing the basic grammatical relations or terms of each sentence: P (predicate), 1 (Subj), 2 (DO), 3 (IO) and any other non-terms such as Instrumental, Benefactive, Locative, etc. Different levels of the grammar are depicted by horizontal lines or strata.

If the transitive (DO focus) clause is considered basic or underlying, as is customary in an ergative analysis, each of the other grammatical relations will be accounted for as an advancement to term 2,³ which receives ABS case marking on the final stratum, whereas the original term 2 from which the advancement took place becomes a chômeur (2̂) and receives GEN case marking.

Transitive Clauses

Figure 1. Basic Transitive Clause (DO Focus): 'The dog is chasing the cat'

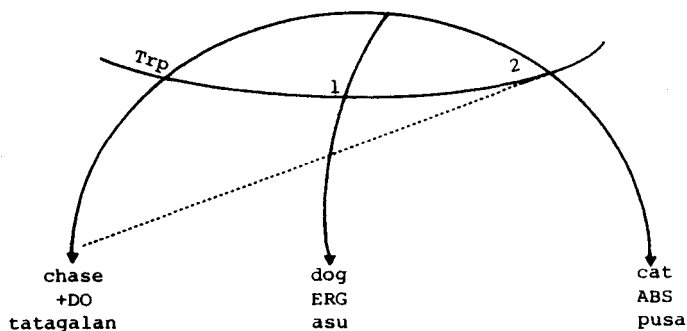


Figure 2. IO Focus (3 -2 Advancement): 'The woman is giving the dog a bone'

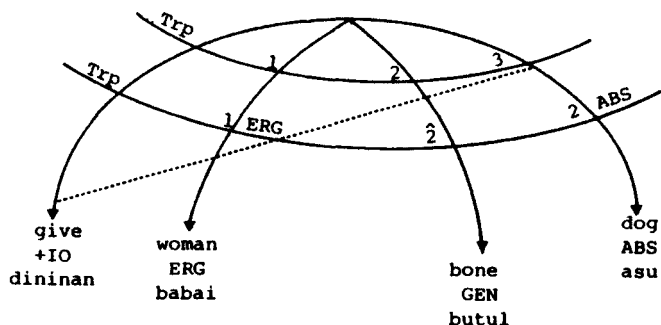
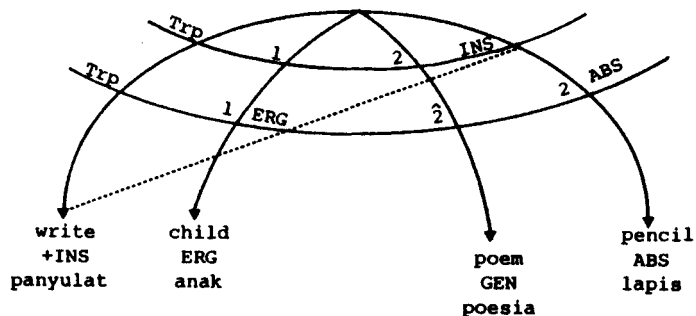


Figure 3. Instrumental Focus (Ins -2 Advancement): 'The child is writing a poem with the pencil'



It can be seen that the verb cross-references the initial grammatical relation of the final 2 arc. The dotted line connects the relation in the first stratum to the verb which is affixed to match this relation.

Intransitive Clauses

Whereas basic intransitive clauses have only one argument or term, subject focus (antipassive) clauses have two dependents in the initial stratum and the verb (P) is transitive. In the next stratum the verb becomes intransitive and the ERG term 1 becomes ABS term 2. The demoted term 2 or chômeur (2̂) is case marked GEN as seen in examples (5) - (7) above.

Figure 4. Basic Intransitive Clause: 'The dogs are barking'

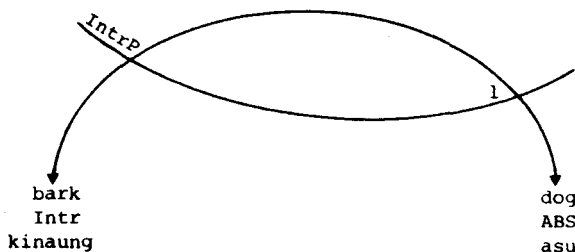
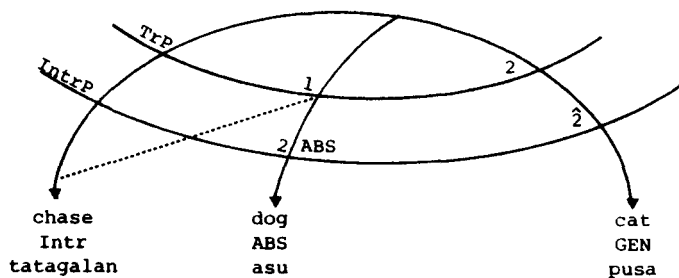


Figure 5. Subject Focus (Antipassive): 'The dog is chasing a cat'



PRONOUNS

The personal pronouns in Kapampangan are inflected for person, case and number, but not for gender. They can appear as ERG, ABS, or OBL, and the GEN possessive form is homophonous with the ERG. The following example shows third person pronouns in three different cases.

- (8) Binye na-la kaya
 give s/he-them him/her
 past ERG-ABSpl OBL
 'S/he gave them to him/her.'

The ERG+ABS combination which occurs in the transitive clause coalesces to form portmanteau pronouns, those containing a third person ABS showing the greatest amount of fusion. In this paper we will see only two forms, ERG singular, na, combined with ABS singular, ya, to form ne, and the ERG singular combined with the ABS plural, la to form nala.

Copy Pronouns

The copy pronouns are identical in form to the personal pronouns, but only exist in ERG and ABS cases. They appear in this order in transitive clauses and the ABS alone follows an intransitive verb. They can be found encliticized to, but separate from the first item in the sentence which may be the verb (9), a topicalized constituent in sentence initial position (10), or the negative particle e (11).

- (9) Tinoknang ya ing bus
arrive c.p. c.m.
past ABS ABS
'The bus arrived.'
- (10) King mula na-la tatagalan ning asu ring pusa
c.m. yard c.p. chase c.m. dog c.m. cat
OBL ERG+ABSpl pres ERG ABSpl
'In the yard, he them, the dog is chasing the cats.'
- (11) E - na balu ning hari...
not c.p. know c.m. king
ERG ERG
'The king doesn't know...'

Even in the antipassive intransitive clause, the ABS pronoun occurs alone reflecting the surface case marking of the subject of the sentence only.

- (12) Menakit ya - ng pusa ing asu
see Intr c.p. c.m.cat c.m. dog
past ABS GEN ABS
'The dog saw a cat.'

THE FUNCTION OF THE COPY PRONOUNS

It seems likely that the principal function of the copy pronouns is to flag the transitivity of the clause to which they belong. This is probable since the distinction between transitive and intransitive sentences is often observable through morphological marking in languages with ergative characteristics.

Transitive and Intransitive Clauses

Since we have described Kapampangan sentence structure within the framework of Relational Grammar, it may be useful to our discussion to consider the formal definition of a transitive and an intransitive clause according to this framework as outlined by Perlmutter (1982:336):

- i) A stratum, S_i , of a clause node is transitive if and only if (iff) it contains both a 1 arc and a 2 arc.

- ii) A stratum, S_i , of a clause node is intransitive iff it is not transitive.

Looking back at sentences (4) to (6), and Figures 1 to 3, which exemplify the focus construction, we will observe that all contain a final 1 and a final 2 arc, whereas the antipassive (7) (and Figure 5), contains no 1 arc and is consequently intransitive. The copy pronouns reflect the two arcs of the transitive clause and the single arc in the intransitive clause.

Marking of Transitivity

In languages with ergative morphology, "it is very common to index direct objects in the verb" (Trask 1978:385). This form of agreement marks the existence of an ABS DO in the sentence and ipso facto an ERG subject and a transitive verb. This kind of affix is often glossed as a transitive marker. The following examples show this type of agreement in two unrelated languages which are considered ergative:

Halkomelem (Gerdtz 1980:1):

- (13) ni q'wəl -ət -əs θə sténi? kwóə səplíl
 aux bake TR ERG det sténi? kwóə det bread
 'The woman baked the bread.' (TR = transitive)

Inuktitut (Kalmar 1979:118)

- (14) inu - up qimmiq - Ø taku - v - a - a
 person ERG dog ABS see indic 3rd P 3rdP
 Subj DO

 'A/the person saw the dog.'

In both these languages, the verb morphology shows agreement with the DO or ABS-marked dependent as well as with the ERG subject. Why, then, does Kapampangan need pronouns to perform this function, since we have seen already that there is a cross-referencing system in the verb morphology? One obvious reason is that because of the focus system the verb does cross-reference the ABS marked nominal, but this is not necessarily the DO. The particular function of this verbal indexing, which is variable in form, is to flag the initial case function of the nominal heading the final 2 arc, whereas the copy pronouns, which are invariable, show transitivity by reflecting the final case marking. If we continue to follow the definitions of transitivity outlined in a RG analysis of ergativity, we will see more clearly how copy pronouns show transitivity.

- (iii) An arc A , is ergative in stratum S_i , iff A is a 1 arc and S_i is transitive.

- (iv) An arc A, is an absolutive arc in stratum S_i , iff A is a nuclear term arc (i.e. either term 1 or 2) and A is not an ergative arc in S_i .

The Kapampangan copy pronouns only mark nuclear terms and almost invariably occur as [ABS 1 or 2] or [ERG 1 + ABS 2]. Given this information, it can be argued in reverse that:

- (iiia) If an arc A is ergative in stratum S_i , and A is a 1 arc, then S_i is transitive.

The presence of a nuclear term which is marked ERG can be seen quickly by observing the case of the pronoun encliticized to the first item in the sentence.

The Necessity of the Pronouns

It may still seem, at this stage of the description, as if these pronouns may serve no essential purpose and may overlap to some extent with the cross-indexing system of the verb. I hope to show in this section not only that they are not redundant, but that they can provide useful insights into the grammar not so clearly apparent in other Philippine languages.

In Place of Verbal Affixes

It should be pointed out that Kapampangan frequently omits cross-indexing morphemes on the verb, whereas the copy pronouns are obligatory. Thus transitivity is marked obligatorily but the case of the focussed NP optionally. Other languages such as Tagalog, Cebuano, Ilocano, etc. usually retain all verbal affixes, but do not have obligatory copy pronouns. The following sentences in Cebuano will illustrate this point (Bell 1976:46).⁴

DO Focus

- (17) Lutu'on sa babaye ang bugas sa lata
 cook DO ERG woman ABS rice OBL can
 'The woman is cooking rice in a can.'

LOC Focus

- (18) Lutu'an sa babaye ang lata ug bugas
 cook LOC ERG woman ABS can GEN rice
 'The woman is cooking rice in the can.'

Occurrence showing Clause Union

There are several kinds of sentences in which two underlying clauses appear to have joined under one predicate. In RG this is known as Clause Union, and the following sentence illustrates a

simple example of Equi-Subject Clause Union (ESU) (France 1981:38).

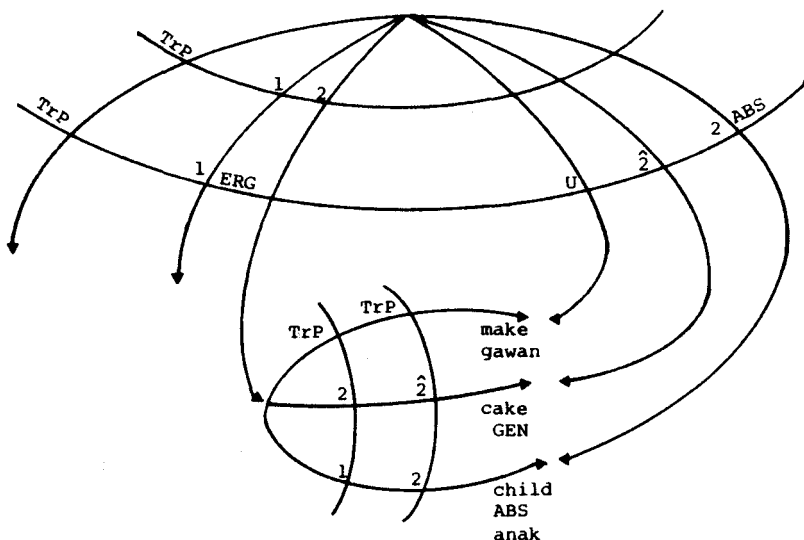
- (19) Buri ne - ng gawa-ng cake Maria ing anak
 c.p.+c.p. LK c.m. c.m.
 wants ERG+ABS make-GEN ABS child
 'Maria wants the child to make a cake.'

We may assume that the underlying embedded sentence is:

- (19a) Gawan ne ning anak ing cake
 c.p.+c.p. c.m. c.m.
 make ERG+ABS child ABS
 'The child makes the cake.'

The union of the two clauses would be represented in a RG network diagram as follows (U = Union Arc):

Figure 6. Equi-Subject Clause Union



It can be seen that (19) has only one set of copy pronouns through the union whereas a sentence containing an embedded clause would have two sets -- one for each predicate. In (19), anak has become the DO of the main clause, heads the final 2 arc and is consequently marked ABS, while cake has become a chômeur and is marked GEN. The union is reflected in the portmanteau pronoun ne which follows buri. This phenomenon can also be observed in causative constructions, but the limited scope of this paper does not permit further examples.

Non-Occurrence of the Copy Pronouns

There are several instances in which a clause is marked transitive by the appearance of the ERG 1 pronoun, but its ABS 2 partner is missing. I will show three different examples of this phenomenon and then discuss each occurrence individually:

- (20) Pekibat na - ng Pedro ING tumbukan ne - ng Juan y Maria
answered ERG ERG comp hit ERG+ABS ERG ABS
'Pedro answered that Juan was hitting Maria.'
- (21) Ikit na - ng Juan ing sarili na king salamin.
saw ERG ERG ABS self his OBL mirror
'Juan saw himself in the mirror.'
- (22) Asahan na - ng Pedro y Juan tumbukan ne y Maria
expect ERG ERG ABS hit ERG+ABS ABS
'Pedro expects Juan to hit Maria.'

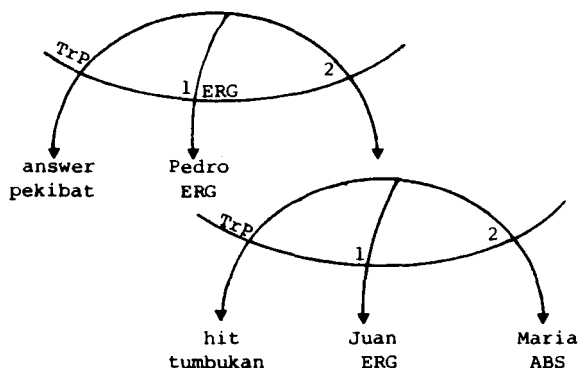
Verbal Complement Sentences

In (20) a complement sentence heads the 2 arc instead of an ABS marked nominal, and not only does the ERG pronoun stand alone, but the verb does not bear a cross-referencing suffix. The fact that this verb is normally affixed for DO focus can be seen by comparing (20) with (23), in which the DO is a NP.

- (23) Pekibatan ne - ng Juan ing kutang ku
answered DO ERG+ABS ERG ABS question my
'Juan answered my question.'

Both the ABS pronoun and the verbal affix -an are present. Thus it can be concluded that a complement sentence does not have termhood (which triggers an ABS copy pronoun and verbal affixation) as an NP, although it heads a final 2 arc.

Figure 7. Verbal Complement Sentence



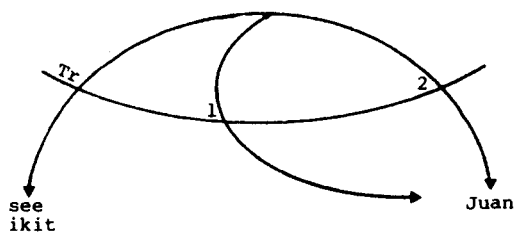
Further evidence, consistent with this analysis, can be derived from the non-occurrence of a copy pronoun with a subject complement sentence such as:

- (24) Delikado ing lilipat dalan
 dangerous ABS cross street
 'Crossing the street is dangerous.'

Reflexive Sentences

In (21) the ERG pronoun *na* stands alone, although there appears to be an ABS marked nominal in the sentence (*ing sarili na*). This NP is the reflexive pronoun, coreferential with term *I*. For this reason, in RG reflexive clauses are considered to be 'multi-attached' (Frantz 1981; Rosen 1984), and reflexivization is a mechanism whereby the multi-attachment becomes resolved. Multi-attachment means that one nominal heads two arcs in the first stratum and it would seem that the presence of only one pronoun in reflexive clauses indicates the speaker's subconscious awareness of this fact.⁵

Figure 8. Multi-Attachment of the Reflexive



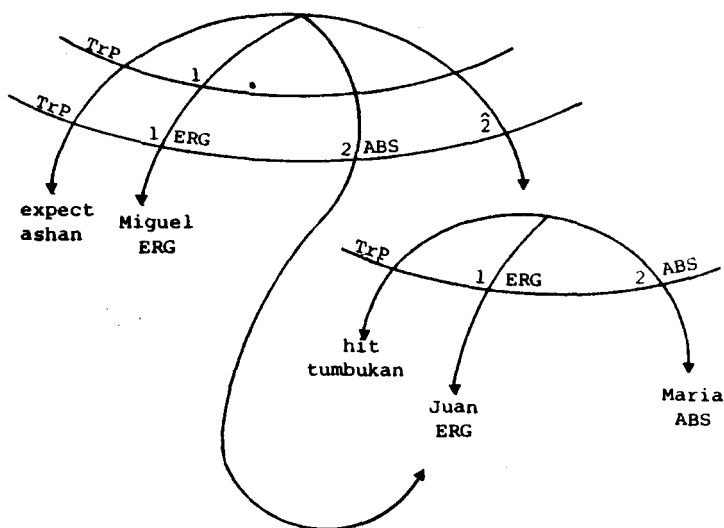
Ascension

Perhaps the most interesting example of the occurrence of a single ERG copy pronoun can be seen in (22) in which the subject from the lower clause (verbal complement sentence) apparently ascends (is raised) into the matrix clause where it is case marked ABS but is not preceded by an ABS copy pronoun. Let us assume that sentence (22) (repeated below for convenience) would appear as (22a) before the ascension took place:

(22a) Asahan na - ng Pedro ING tumbukan ne - ng Juan y Maria
 expect ERG ERG comp hit ERG+ABS ERG ABS
 'Pedro expects that Juan will hit Maria.'

(22) Asahan na - ng Pedro y Juan tumbukan ne y Maria
 expect ERG ERG ABS hit ERG+ABS ABS
 'Pedro expects Juan to hit Maria.'

Figure 9. Ascension.



In (22a), the first copy pronoun, *na*, has no ABS partner because final term 2 is headed by a complement clause, whereas the *ne* in the lower clause copies both NPs in that clause. In (22) the subject of the lower clause (*-ng Juan*) appears to have ascended into the matrix clause where it has acquired ABS case marking (*y*) but has no copy pronoun (*na* rather than *ne*).

This phenomenon seems to run counter to the arguments advanced so far based on the most frequently occurring pattern of behavior of the copy pronouns in this language. When such an apparent exception is encountered it is necessary either to re-examine the counter-example or to reformulate the original hypothesis. Let us then start by re-examining the apparent counter-example (22). We assumed, because of the change in word order and case marking (*-ng Juan* became *y Juan*), that this sentence was an example of ascension in which the subject of the lower clause became the DO or term 2 of the matrix clause. Perhaps this was not the correct interpretation of the observed facts. Another analysis is possible if we consider *y Juan* in (22) to have been topicalized from the lower clause and therefore not to be part of the matrix clause, thus accounting for the lack of copy pronoun.

Topicalization of the subject of the embedded clause is found quite frequently following information verbs (which are usually followed by a complementizer).

(25) Isipan na - ng Miguel ING tumbukan ne - ng Pedro y Maria.
 think ERG ERG comp hit ERG ABS ABS
 'Miguel thinks that Pedro is hitting Maria.'

(25a) Isipan na - ng Miguel ING y Pedro tumbukan ne y Mari
 think ERG ERG comp ABS hit ERG+ABS ABS
 'Miguel thinks that Pedro is hitting Maria.'

The analysis of topicalization to account for (22), was further substantiated when I investigated the possible position of the complementizer ING seen in (22a) but absent in (22). After consulting several Kapampangan speakers on the position of the complementizer, I found that in (22) ING could never occur between y Juan and tumbukan but could (marginally) precede y Juan. This confirms the reanalysis suggested above, that ascension of the lower subject has not taken place, but that the subject of the lower clause has been topicalized (i.e. moved to precede its own verb and marked ABS). In this instance the non-occurrence of a copy pronoun provided a useful clue that my original assumption that (22) and other such sentences were examples of ascension was incorrect. This may lead me to consider whether ascension ever occurs in this language.

CONCLUSION

In this paper I have attempted to describe the ubiquitous copy pronouns in Kapampangan. I have suggested that they mark the transitivity of the verb which is either unaffixed or affixed to perform a different function necessitated by the focus construction characteristic of Philippine languages. These pronouns appear in inviolable order in an ergative pattern of case marking, ([ABS] or [ERG + ABS]). The [ERG + ABS] combination can show the occurrence of Clause Union, whereas the absence of the ABS pronoun from this pair can provide a useful pointer as to the status and relationship of nominals and sentential complements. I hope that, since many related languages are structurally similar to Kapampangan, but do not have obligatory copy pronouns, an observation of Kapampangan pronouns may prove valuable and lead to a clearer understanding of several areas of Philippine syntax.

FOOTNOTES

¹ For the Kapampangan data I acknowledge with gratitude the assistance of Ms. Maria Araceli Bautista of Calgary and Ms. Mariel Francisco of Manila.

² For a full account of the principles of RG see Frantz (1981) or Perlmutter (1983 and 1984).

³ I have omitted the further advancement to 1 required by the Final 1 Law (Perlmutter 1983:100) for the sake of simplicity as I wish to refer only to that part of the network that directly illustrates the focus system.

⁴ I have added ergative case marking to the original examples since Bell uses a passive rather than an ergative analysis of Cebuano.

⁵ Some speakers find the presence of the ABS pronoun acceptable which seems to indicate that for them the surface case marking is more salient.

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THE ACQUISITION OF JAPANESE PRONOUNS

Yoshiko Suzuki-Wei

INTRODUCTION

In this paper I will study the acquisition of pronoun interpretation by Japanese children. My study deals mainly with two issues. The first relates to the issue of when some of the principles involved in the interpretation of pronouns appear in child language. The other examines Barbara Lust's (1981, 1983) claim that abstract structural relations unique to the language faculty determine the interpretation of pronouns.

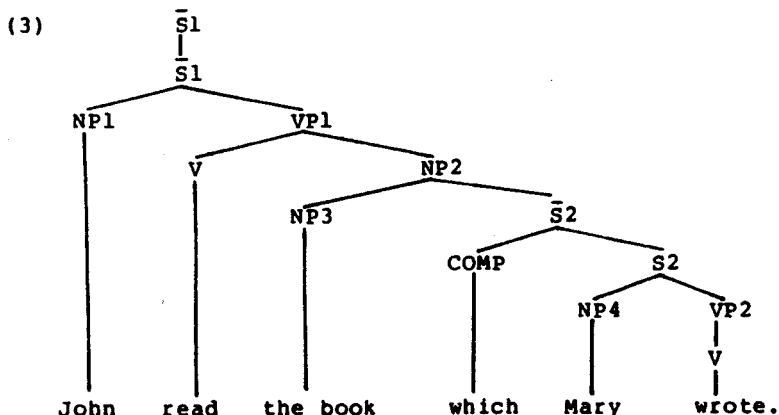
The first section describes some basic properties of Japanese and its pronoun system. Next, I discuss my experiments on Japanese reflexive pronouns and report on experiments dealing with other patterns of pronominalization. Lastly, I deal with the general implications of the experimental findings. An appendix contains the complete set of sentences employed in the experiments.

BASIC PROPERTIES OF JAPANESE

The basic word order in Japanese is S(ubject) O(bject) V(erb), although OSV patterns are also natural. A case particle assigned to each NP indicates its grammatical function. The most common particles are ga (Nominative) for subject, o (Accusative) for direct object, and ni (Dative) for indirect object. The particle wa (Topic) is employed to indicate topicality. As Li and Thompson (1976:45) state, the topic represents the discourse theme while the subject is a more sentence-oriented notion. The following sentences illustrate the SOV and OSV word orders and some of the case particles.

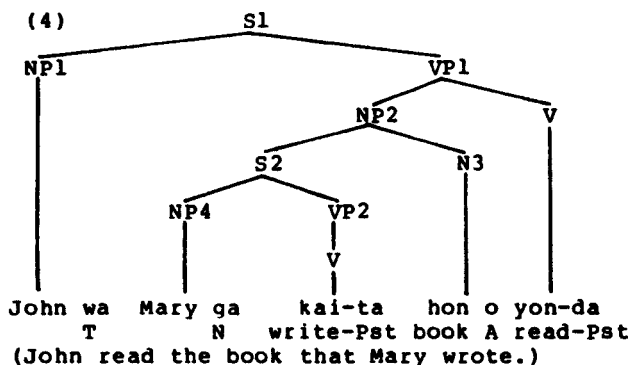
- (1) SOV
Mary ga John o home-ta.
N A praise-Pst
(Mary praised John)
- (2) OSV
John o Mary ga home-ta
A N praise-Pst
(Mary praised John)

Branching direction is another structural property of Japanese that is different from English. Languages are called right branching if they place recursive categories (such as relative clauses) to the right of the head noun, and left branching if they place them to the left. English is a predominantly right branching language as the syntactic tree in (3) illustrates.



As (3) shows, the relative clause (S2) follows the head noun the book (NP3).

In contrast, Japanese is a predominantly left branching language since, as tree (4) shows, a recursive term (S2) is attached to the left of the head noun (NP3).



Reflexive Pronouns

There are three types of pronominal elements in Japanese: the reflexive pronoun zibun "self", the lexical pronouns kare

"he", kanozzyo "she", etc. and the null pronoun marked as Ø.
Observe sentence (5).

- (5) Bob wa {zibun no/kare no/Ø} zyoosi o kirat-tei-ru.
T self G he G PRO boss A dislike-Pres
(Bob dislikes self's/his/Ø boss.)

In (5) the pronominal element (zibun, kare, Ø) can be dependent for its interpretation on the name Bob. This interpretive relation between a pronominal element such as zibun, kare, Ø and its referent is called anaphora.

One property that distinguishes the reflexive pronoun zibun "self" from other pronouns is the Subject-Antecedent Condition stated in (6).

- (6) The Subject-Antecedent Condition
The antecedent of a reflexive pronoun must be the subject of a sentence (Kuroda 1979, Kuno and Kaburaki 1977).

The Subject-Antecedent Condition predicts that zibun will be coreferential with either the matrix subject Harry or the subordinate subject Jane in (7).

- (7) [Harry wa [Jane ga zibun o hihan-si-ta to] it-ta].
S T S N self A criticize-P COM say-P
(Harry said that Jane criticized self.)

The Japanese reflexive, unlike English reflexives, zibun can be used regardless of the person, gender and number of the antecedent.

Another important property of the Japanese reflexive is the Humanness Condition stated in (8) and illustrated in (9).

- (8) The Humanness Condition
The antecedent for zibun has an animate referent (Inoue 1976, Kuno and Kaburaki 1976).

- (9) a. Tanaka wa kono mondai o zibun no ronbun de siteki si-ta.
T this problem A self G paper in point out do-P
(Tanaka pointed out this problem in self's paper.)

- *b. Kono mondai wa Tanaka ni zibun no ronbun de siteki
this problem T D self G paper in point out
sare-ta.
pass-P
(*This problem was pointed out by Tanaka in self's paper.)

Although the inanimate NP kono mondai is subject in (9b), it cannot be the antecedent of zibun. However, as the following example shows, zibun can have as its antecedent an NP denoting a higher animal, especially pets (Inoue 1976:119).

- (10) Inu wa zibun no ie o sit-tei-ru.
 dog T self G house A know-Pres
 (A dog knows self's house.)

Null Pronouns

A pronoun in Japanese can either follow its antecedent as illustrated in (11a) or precede it as shown in (11b).

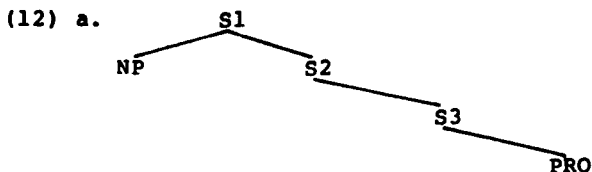
- (11) a. Forward Anaphora: antecedent precedes the pronoun.

Jane wa isoga-nakat-ta node she basu ni nori-hagu-ta.
 T hurry-NEG-P because PRO bus on get-miss-P
 (Because Jane did not hurry, she missed a bus.)

- b. Backward Anaphora: pronoun precedes its antecedent.

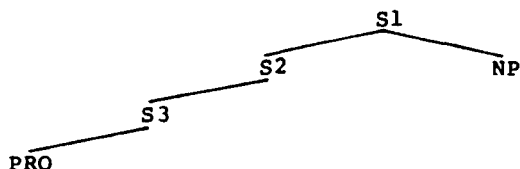
she biiru o nom-i-sugi-ta node Ken wa hutukayoi ni
 PRO beer A drink-over-P because T hangover from
 kakat-ta.
 suffer-P
 (Because he drank too much beer, Ken suffered from a hangover.)

Although both patterns of anaphora are acceptable in the adult grammar, Lust (1981, 1983) claims that children understand anaphora best when the direction of anaphora accords with the branching direction of the language they acquire. Thus children who speak English (a predominantly right branching language) will favor the forward direction of anaphora since it generally contains a pronoun to the right of its antecedent as illustrated in (12a).



In contrast, children who speak Japanese (a predominantly left branching language) will prefer the backward pattern of anaphora since a pronoun is located to the left of its antecedent as shown in (12b).

(12) b.



The "directionality" issue will be discussed in detail below.

The purpose of the experiments reported below was to determine (a) at what age the Subject-Antecedent Condition comes to play a role in interpreting reflexive pronouns, and (b) which of the properties of reflexives is more salient for children, humanness or subjecthood. The purpose of the imitation experiment derives from a controversial claim made by Lust (1981, 1983) to the effect that children understand anaphora best when the direction of anaphora accords with the branching direction of the language they are acquiring.

EXPERIMENTS ON JAPANESE PRONOUNS

My study consisted of three experimental tasks: an act-out task, a question-answer task and an imitation task. The act-out task and the question-answer task are discussed in this section. These tasks were designed to test the acquisition of the Subject-Antecedent Condition and the Humanness Condition respectively.

The subjects were 60 children ranging in age from 4;1 to 11;11. They were divided into five age groups in the manner illustrated in Table 1.

Table 1. Subjects.

Group	Age	Number		Total	Ave. Age		Ave. Age
		M	F		M / F		
K2	4	6	6	12	4;5/4;7		4;6
K3	5	6	6	12	5;5/5;4		5;4
G2	7	6	6	12	7;7/7;5		7;6
G4	9	6	6	12	9;8/9;6		9;7
G6	11	6	6	12	11;8/11;7		11;8
Total		30	30	60			
Adult	24;9-30;8	5	5	10	26;4/27;0		26;8

All the children in K2 and K3 came from a large private day care center in Iwahune, Tochigi prefecture, Japan. The children in

G2, G4 and G6 were from one of the public elementary schools in Iwahune. All subjects were native speakers of Japanese with normal development in aural, visual and linguistic skills. The socio-economic status of the children varied considerably, but the majority can be described as lower to middle class or working class.

At the beginning of the experimental session, each child was introduced to five dolls, two males and three females, of approximately the same size. The dolls' names, which corresponded to the human NPs in the stimulus sentences, were selected on the basis of familiarity. Every child distinguished the dolls from each other immediately and there was no confusion.

The author tested the children individually in an audio-visual room in the elementary school and in the guest room in the kindergarten. The children from G2 to G6 completed the four tasks in one experimental session, while the K2 to K3 children underwent each experiment separately--an arrangement which allowed them to take a break and to play in the next room. All children completed their experimental tasks on the same day.

Four experimental tasks (two question-answer tasks, an act-out task and an imitation task) were given to the children in random order. A pretest was given prior to each task to ensure that the children understood what was required of them. Half the children took Question-Answer task 1 before Question-Answer task 2 while the others were given the tests in the reverse order.

Ten adults, five males and five females, also participated in the experiments to determine the adult speakers' judgements (see Table 1). Nine of them had completed their university education and the other senior high school.

The Subject-Antecedent-Condition

The act-out experiment was designed to examine the effect of grammatical relations on interpretation. Twenty sentences were organized in random order and presented to the children. The children were tested individually and told that they were to play a game which involved making the dolls do what the experimenter said. Two simple warm-up sentences were given followed by the 20 sentences in random order. A practice sentence is shown below.

Okaa-san ga zibun no kata o tati-ta.
mother N self G shoulder A pat-P
(Mother patted self's shoulder.)

All the children who participated in experiments understood the practice sentences well and acted them out correctly with the dolls.

Three tokens each of sentence type involving four pairs of grammatical relations (Subject/D.O., Subject/I.O., Subject/Possessive, Matrix Subject/Subordinate Subject) were devised. Each type included two or three human NPs to the left of a reflexive pronoun. The only sentence type which is ambiguous in the adult grammar is type IV, with either subject serving as antecedent.

The sentences were designed to determine whether children choose the subject as antecedent regardless of the other grammatical relations present in the sentence. Tokens which manifest each pair of grammatical relations are illustrated below.

I. Subject/D.O.

Ken-tyan ga Hana-tyan o zibun no tebukuro de sawat-ta.
 N A self G glove with touch-P
 (Ken touched Hana with self's gloves.)

II. Subject/I.O.

Ken-tyan ga Midori-tyan ni zibun no omotya o mise-ta.
 N D self G toy A show-P
 (Ken showed Midori self's toy.)

III. Subject/Possessive

Hana-tyan no Okaa-san ga zibun no yoohuku o arat-ta.
 G mother N self G clothes A wash-P
 (Hana's mother washed self's clothes.)

IV. Matrix Subject/Subordinate Subject

Hana-tyan wa [Ken-tyan ga zibun o tunet-ta to] it-ta.
 T N self A pinch-P COM say-P
 (Hana said that Ken pinched self.)

There were five major response types: correct intrasentential response (that is, a subject antecedent), correct extrasentential response (a first person singular antecedent), a pseudo-subject response (when the child chose an incorrect NP to be the subject but then interpreted it as antecedent), other incorrect responses and no response.

The results of the act-out test are given in Table 2.

Table 2. Results of the Subject Antecedent Task.

S	Response	Age					Mean
		4	5	7	9	11	
I	Correct	75.5	83.3	80.5	91.6	100.0	86.2
	Pseudo-S	16.7	8.4	13.9	5.6	0.0	8.9
	Addressee	0.0	0.0	0.0	0.0	0.0	0.0
	Error	8.4	8.4	2.8	2.8	0.0	4.5
	No Resp.	0.0	0.0	2.8	0.0	0.0	0.6
II	Correct	61.1	86.1	86.1	97.2	97.2	85.6
	Pseudo-S	19.5	5.6	5.6	0.0	2.8	6.7
	Addressee	0.0	0.0	0.0	0.0	0.0	0.0
	Error	16.7	8.4	8.4	2.8	0.0	7.3
	No Resp.	2.8	0.0	0.0	0.0	0.0	0.6
III	Correct	41.7	83.3	80.5	75.0	91.6	74.4
	Pseudo-S	8.4	0.0	2.8	5.6	2.8	3.9
	Addressee	0.0	0.0	0.0	0.0	0.0	0.0
	Error	50.0	16.7	16.7	19.5	5.6	21.7
	No Resp.	0.0	0.0	0.0	0.0	0.0	0.0
IV	Correct	22.3	33.3	47.3	27.8	55.6	37.2
	Pseudo-S	19.5	25.0	13.9	8.4	16.7	16.7
	Addressee	0.0	0.0	2.8	0.0	0.0	0.6
	Error	58.4	38.9	36.1	63.9	27.8	45.0
	No Resp.	0.0	0.0	2.8	0.0	0.0	0.6
Mean	Correct	50.0	71.6	73.6	72.9	86.1	70.9
	Pseudo-S	16.0	9.7	9.0	4.9	5.6	9.0
	Addressee	0.0	0.0	0.7	0.0	0.0	0.5
	Error	33.4	18.1	16.0	22.2	8.4	19.6
	No Resp.	0.7	0.7	0.7	0.0	0.0	0.5

Note: Sentence Types according to component Grammatical Relations

I Subject--Direct Object

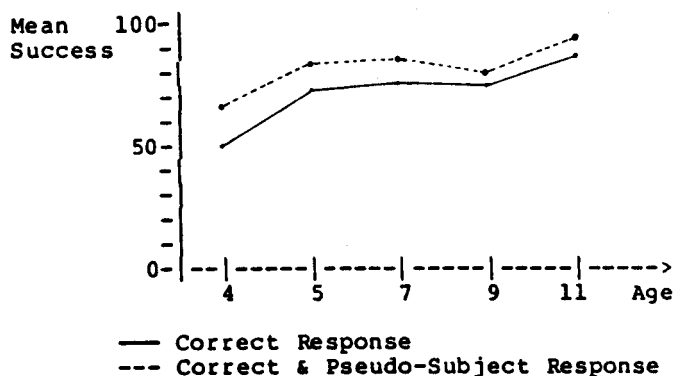
II Subject--Indirect Object

III Subject--Possessive

IV Matrix Subject--Subordinate Subject

A three-way ANOVA shows that children's age ($F(4,200)=13.768$, $p,.0001$) and sentence type ($F(3,200)=54.499$, $p,.0001$) are significant as main effects.

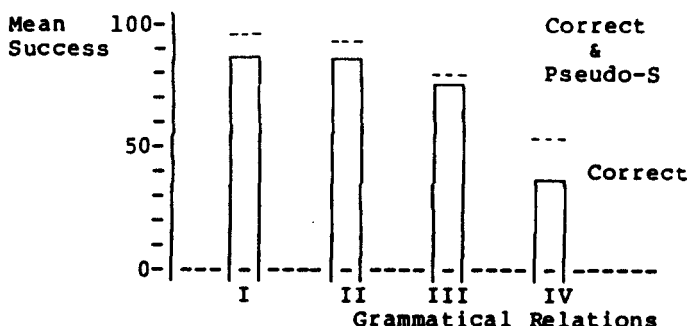
Figure 1. Results of the Subject Antecedent Task.



In Figure 1 the dotted line represents all responses in which children linked the reflexive to the NP which they chose as subject, regardless of whether this choice was correct. A one-way ANOVA shows that the factor of age is significant between 4 and 5, 4 and 7, 4 and 9, 4 and 11, and 5 and 11 years old ($p, .01$). There is a slight decline in the rate of correct responses between 7 and 9 years old, but it was not statistically significant.

Figure 2 shows the effect of different pairs of grammatical relations on children's interpretation of reflexives.

Figure 2. Effect of Grammatical Relations on Subject Antecedent Task.



Note: I Subject-Direct Object
 II Subject-Indirect Object
 III Subject-Possessive
 IV Matrix-Sub.Subject

A one-way ANOVA reveals that the difference between type IV and types I, II and III was significant ($p, .01$). Children responded almost equally well in both type I (86.2%) and type II (85.6%) sentences and did slightly less well on the bi-clausal type IV sentences (37.2%). In this type there was even one case where a child (a 7-year-old female) regarded herself as the referent of the reflexive. Moreover, children performed least well (31.6%) when they acted out sentences involving three human NPs (two subjects and one object).

Addition of the pseudo-subject responses to the correct ones yields even higher scores (indicated by the dotted line). A one-way ANOVA shows that types III and IV are each significantly different from types I and II ($p, .01$). Children observed the Subject-Antecedent Condition more than 90% of the time on type I and II, and in almost 80% of the cases on type III. However, children achieved only a chance level on type IV.

The first major cut-off point is between ages 4 and 5. Apparently the 5-year-olds become more aware of differences among case particles and are therefore better able to distinguish grammatical relations than the 4-year-olds. Another major cut-off point is between age 11 and the rest of the younger groups.

Children applied the Subject-Antecedent Condition with the greatest success when the sentences involved a subject and a direct or indirect object. There was, however, some confusion in cases where the sentence contained both a subject and a possessive (type III). It is possible that children have more

difficulty identifying the grammatical role of the possessive than that of the direct and indirect object since a possessive NP, unlike a direct or indirect object NP, appears in the sentence initial position in this structure so that children often took it to be subject. Thus children acted out a sentence such as (13) as either (14) or (15).

- (13) Hana-tyan no Okaa-san ga zibun no yoohuku o arat-ta.
 G mother N self G clothes A wash-P
 (Hana's mother washed self's clothes.)
- (14) Hana-tyan ga Okaa-san no yoohuku o arat-ta.
 N mother G clothes A wash-P
 (Hana washed mother's clothes.)
- (15) Okaa-san ga Hana-tyan no yoohuku o arat-ta.
 mother N G clothes A wash-P
 (Mother washed Hana's clothes.)

The error type exemplified in (14) accounts for 15.4% of the total mistakes made on type III while the error type in (15) accounts for 61.5%.

The high incidence of errors such as (15) could conceivably have been the result of the pragmatic variable of "empathy" which, Kuno (1975:321) asserts, refers to the "speaker's attitude with respect to who, among speech event participants (the speaker and the hearer) and the participants of an event or state that he describes, the speaker takes sides with". For example, according to Kuno, the speaker is taking sides with John in (16a) and Mary in (16b) since they are mentioned by name.

- (16) a. John hit his wife
 b. Mary's husband hit her.

In my sentence (13), then, the speaker should be empathizing with Hana-tyan. Since Kuno (ibid:324) further states that "syntactic prominence" is given "to a person who you are describing who you are empathizing with", it is plausible that children chose Hana-tyan as antecedent of the reflexive in (13) because of its high empathy factor.

Another error pattern, which accounts for 17.9% of the mistakes, involved interpreting a sentence such as (17) as (18).

- (17) Midori-tyan ga Ken-tyan no atama ni zibun no hon o nose-ta.
 N G head on self G book A put-P
 (Midori put Ken's book on his head.)
- (18) Midori-tyan ga Ken-tyan no atama ni Ken-tyan no hon o
 N G head on G book A
 nose-ta.
 put-P
 (Midori put Ken's book on Ken's head.)

In this error pattern children seem to interpret the reflexive self as a non-reflexive \emptyset since a null pronoun does not require the Subject-Antecedent Condition.

As for the contrast between the matrix and subordinate subjects, there was great confusion. Most of the errors involved ignoring the reflexive and taking the matrix subject as agent and the subordinate subject as the patient. This pattern occurred in 60.5% of the 81 errors.

In cases where the sentence contained three human NPs there were various other errors, most of which involved ignoring one or more NPs and/or the matrix verb. It is probable that three proper names in a row created processing difficulties which made children eliminate one of the nominals.

One reason for the difficulty which children encountered on the type IV sentences may have been their center-embedded structure. Thus a sentence such as (19) involves three consecutive NPs in the sentence initial position. The center-embedded clause is placed in brackets.

- (19) Hana-tyan wa [Ken-tyan ga zibun o tunet-ta to] it-ta.
 T N self A pinch-P COM say-P
 (Hana said that Ken pinched self.)

Children have to wait until the end of the sentence to find the verb associated with the matrix subject. A sentence such as (20) would place even greater strain on the language processing mechanisms since it contains four NPs in a row before a single verb is encountered.

- (20) Midori-tyan wa Ken-tyan ni [Hana-tyan ga zibun o kai-ta
 T D N self A scratch-P
 to] it-ta.
 COM say-P
 (Midori said to Ken that Hana scratched self.)

In fact children did worse on token (20) than (19) (31.6% versus 40.0%).

The Humanness Condition

There was only one sentence type which imposed a choice on the children between the Subjecthood and the Humanness Conditions. Three tokens of this sentence type were prepared, all of them involving a non-human subject and a human direct object as illustrated in (21).

- (21) Hebi ga Hana-tyan o zibun no niwa de kan-da.
 snake N A self G yard L bite-P
 (A snake bit Hana in self's yard.)

Zibun no niwa te dare no niwa?
 self G yard who G yard
 (Whose yard is self's yard?)

In the published literature on Japanese reflexives, the sentences used to support the Subject-Antecedent Condition always contain a $\frac{1}{2}$ +human subject. It is therefore not clear which of these features -- syntactic subjecthood or semantic humanness -- is more salient in the development of interpretation of anaphora. In this experiment the children could (i) choose the non-human subject, (ii) select the direct object, which was the only human NP in the sentence, (iii) shift the reference to the first person singular.

Three experimental sentences were given to the children. The stimulus sentences were repeated as often as needed and the entire procedure was tape-recorded.

Four types of responses were scored: subject, object or the speaker as antecedent and no response.

A two-way ANOVA shows that there is no significant effect of main factors (age and sex) at the $p, .01$ level. The subjects through all age groups consistently chose a human object NP as antecedent of a reflexive pronoun as outlined in Table 3.¹

Table 3. Results of Humanness Condition Task.

Ant.	Age					Mean	Adults
	4	5	7	9	11		
Non-H.S.	13.9	2.8	22.2	27.8	27.8	18.9	60.0
Human O.	75.0	55.6	75.0	72.2	72.2	70.0	16.7
Speaker	0.0	0.0	0.0	0.0	0.0	0.0	23.3
No Resp.	11.1	41.7	2.8	0.0	0.0	11.1	0.0

Children chose the human object in 70.0% of the cases, while they chose the non-human subject only 18.9% of the time. A chi-square analysis shows this difference to be significant ($\chi^2 (1)=52.9$, $p, .001$).

Children's responses are in contrast with those of adults, who chose the non-human subject 60.0% of the time and the human object in only 16.7% of the cases. Adults also took the reflexive to be coreferential with the "speaker" 23.3% of the time.

The results suggest that humanness is the critical criterion for coreference used by children in interpreting reflexive pronouns since it overwhelmingly outweighs the Subjecthood Condition in all age groups. This is an interesting result since it

contrasts with what is found in adults who take subjecthood to be the vital property of reflexive pronouns. It is conceivable that adults metaphorically humanize non-human subjects in order to ensure that their interpretation of zibun complies with the Subject-Antecedent Condition and the Humanness Condition.

DIRECTIONALITY

In both Japanese and English, a pronoun can either precede or follow its antecedent. It has been found that at some point of development children show a preference for forward over backward anaphora (Chomsky 1969, Ingram and Shaw 1981). In other words, they prefer that the pronoun follow rather than precede its antecedent. It is conceivable that this preference is the result of the processing strategy described (but not adopted) by Lust (1983:144).

(22) Processing Theory

Children begin acquisition universally with a forward direction of anaphora, simply in keeping with basic cognitive constraints involved in real time, on-line processing of sentences. Since real time processing may be represented as left to right, it is consistent with forward anaphora.

This version of processing theory predicts that children from any language background will favor the forward pattern of anaphora.

Another possibility is that the forward preference is the result of branching direction, which reflects both linear order and dominance relations. The notion (PBD) of the Principal Branching Direction (PBD) is stated in (23).

(23) Principal Branching Direction (PBD)

PBD refers to the branching direction which holds consistently in unmarked form over major recursive structures of a language, where "major recursive structures" are defined to include relative clause formation of complex NP, adverbial subordinate clause, and sentential complementation.

Lust (ibid:141) claimed that PBD constrains children's directionality preference in the way indicated in (24).

(24) Constraint on Anaphora

In early child language, the direction of grammatical anaphora accords with the Principal Branching Direction (PBD) of the specific language being acquired. Anaphora is constrained forward in a principally right-branching language. It is constrained

backward in a principally left-branching language.

In an attempt to confirm this hypothesis, Lust and Wakayama (1981) tested 81 monolingual Japanese children between the ages of 2;5 and 5;10 on coordinate structures. Since Japanese is a left-branching language, Lust predicted that children would initially prefer backward anaphora. Lust and Wakayama employed two types of coordinate structures (two tokens for each type) to determine if the direction of anaphora involved in coordinate structures makes any difference in children's performance of an imitation task. Forward and backward coordinations are shown in (25a) and (25b) respectively.

(25) a. Forward Coordination

Inu wa hoeru si \emptyset kamituku.
dog T bark and PRO bite
(dogs bark and \emptyset bite.)

b. Backward Coordination

Usagi \emptyset kame ga hasiru.
rabbit PRO and turtle N run
(Rabbits \emptyset and turtles run.)

As the \emptyset symbols indicate, Lust and Wakayama assumed that coordinate structures involve zero anaphors corresponding to the understood NP iau "dog" in (6a) and to the understood verb hasiru "run" in (6b).

The results of the elicited imitation task revealed that Japanese children correctly imitated backward coordination more often than forward coordination, as predicted by the 'constraint on anaphora'. The success rate for the backward coordination was 1.65 out of 2 tokens (82.5%), while that of forward coordination was 1.21 (60.5%). It was not reported whether this difference was statistically significant.

Lust (1983) provides further evidence that children are aware of abstract and complex dominance relations in both right- and left-branching languages. Based on data from natural speech and experimental studies in right-branching languages (English, Arabic) and in left-branching languages (Japanese, Chinese, Sinhalese), she concluded that English and Arabic speakers imitated forward coordination more successfully than backward coordination and that there was a delay in productive use of backward coordination in natural speech. In contrast with the results obtained from speakers of right-branching languages, it was found that Japanese, Chinese and Sinhalese speakers had more difficulty imitating forward coordinate structures and that they develop later than backward structures in natural speech.

In yet another experiment, Lust (1981) tested 69 English-speaking children aged 3;6 to 5;7 on sentences containing a subordinate clause. The task involved imitation of the

structures exemplified in (26). Subordinate clauses are placed in brackets. The subscript s indicates occurrence in a subordinate clause.

- (26) a. Redundant (NP-NPs)
Jane was sad [because Jane dropped the ice cream cone].
- b. Redundant (NPs-NP)
 [Because Sam was thirsty], Sam drank some soda.
- c. Forward Pronominalization (NP-PROs)
Tommy ran fast because he heard a lion .
- d. Backward Pronominalization (PROs-NP)
 [Because she was tired], Mommy was sleeping.
- e. Forward Pronominalization (NPs-PRO)
 [Because Jenna saw a mouse], she ran away.

Lust used two tokens for each type, one with the connective because and the other with while. She found that the pronominalized structures (c,d,e) were correctly imitated significantly more often than the redundant constructions (a,b). The predominant error type in the redundant structures involved conversion to a forward structure (c,e), which occurred in 47% of the cases. Among the pronominalization structures, the forward pattern of anaphora was correct more often than the backward ones (89% versus 59%). A common error in backward anaphora involved conversion into the forward structure. This occurred 28% of the time, compared to 4% for the reverse change. Lust found that neither the connective type nor clause order had a significant effect on the children's performance.

A similar study was carried out on left-branching languages by Lust and Mangione (1983), who reported on experimental results involving both coordinate and subordinate structures from English, Chinese and Japanese. Lust and Mangione used four tokens for the coordinate structures (see (25)) and two tokens for subordinate clause structures in each language. Examples of the subordinate clause structures in Japanese are given in (27).

- (27) a. Forward subordinate structure
Papa ga gohan o taberu-to, he otya o ire-ta.
 N meal A eat-when PRO tea A pour-P
 (When Papa ate the meal, he poured tea.)
- b. Backward subordinate structure
he mado o akeru-to, Onee-san ga kusyami o si-ta.
 PRO window A open-when sister N sneeze A do-P
 (When she opened the window, the elder sister sneezed.)

In Chinese and Japanese the anaphor consisted of a zero pronoun rather than an overt pronoun since this is the more natural pattern (Huang 1984:553-554).

The results revealed that English speakers imitated forward anaphora significantly better than backward anaphora. On the other hand, Chinese and Japanese subjects imitated backward sentences better than forward ones in coordinate structures, which supports Lust's hypothesis concerning PBD.

However, close examination of the data showed that Chinese speakers did better on the forward pattern (71%) than the backward one (63%) in the subordinate clause structures. Moreover, Japanese speakers did only slightly better on the backward cases (approximately 46%) than the forward ones (approximately 37%) on the subordinate clause structures. (Approximate percentages had to be computed from the graph provided by Lust and Mangione (ibid:156), as they did not present exact figures.) Lust and Mangione claim that the latter difference indicates "a significant preference for backward forms" (ibid:153), even though the difference was small.

In addition, half of the experimental sentences exhibited a serious problem. Consider in this regard (28).

- (28) Mama-ga kasa-o otosi-ta-no, \emptyset doa-o akeru-to.
 mother-N umbrella-A drop-P PRO door-A open-when
 (Mama dropped the umbrella when she opened the door.)

Sentence (28) sounds unnatural if the zero pronoun refers to Mama. Since a zero pronoun in a subordinate clause can not refer BACK to a nominative-marked NP in Japanese, it is more natural to interpret the pronoun as referring to the speaker or a third person. However, if the matrix NP is marked as topic (with the suffix -wa as in (29)), it sounds natural and qualifies as antecedent of the zero pronoun in the subordinate clause.

Sentence (28) is unnatural for a second reason since the matrix verb is located in the middle of the sentence. The sentence becomes natural if the matrix verb is located sentence finally as in (29).

- (29) Mama wa [\emptyset doa o akeru to] kasa o otosi-ta-no.
 T PRO door A open when umbrella A drop-P
 (Mama, when she opened the door, dropped the umbrella.)

Lust and Mangione's results could obviously have been affected by the unnaturalness of their test sentences.²

Although Lust's own data were flawed in certain aspects, the PBD principle has been very influential and has been accepted as a fact in some quarters. For instance, in Newmeyer's (1983:17) important book on grammatical theory, it is reported that "(children) are sensitive to the highly abstract, specifically grammatical concept of 'principal branching direction'". I now attempt to test the validity of Lust's claim for Japanese.

The Imitation Experiment

The subjects were 72 children ranging in age from 3;5 to 11;11. They were divided into six age groups in the manner illustrated in Table 4.

Table 4. Subjects.

Group	Age	Number		Total	Ave. Age	
		M / F			M / F	Ave. Age
K1	3	6 / 6	12		3;9/3;8	3;8
K2	4	6 / 6	12		4;5/4;7	4;6
K3	5	6 / 6	12		5;5/5;4	5;4
G2	7	6 / 6	12		7;7/7;5	7;6
G4	9	6 / 6	12		9;8/9;6	9;7
G6	11	6 / 6	12		11;8/11;7	11;8
Total		36/36	72			

Although the children in K1 did not participate in the other three tasks, they took part in the imitation task. Children in K1 as well as K2 and K3 came from the same day care centre in Iwahune. The subjects described in section 2.0 were also employed in this experiment.

In an attempt to test Lust's (1983) predictions concerning directionality preferences for pronominalization, I designed an imitation task consisting of three sentence types with three tokens of each type. A total of nine sentences were given to the children. Six of the nine sentences were based on the tokens used in Lust's (1981:78) experiment and translated into Japanese while three tokens using the connective "after" were added for this experiment. Lust originally designed five sentence types which are exemplified again below. (The subscript s indicates occurrence in a subordinate clause.)

I NP-NPs Jane was sad, because Jane dropped the ice cream cone.

II NPs-NP Because Sam was thirsty, Sam drank some soda.

III NP-PROS Tommy ran fast because he heard a lion.

IV PROS-NP Because she was tired, Mommy was sleeping.

V NPs-PRO Because Jenna saw a mouse, she ran away.

The Japanese counterparts of these sentences are listed below. (Brackets show the location of a subordinate clause.)

I NP-NPs Jane wa [Jane ga aisu-kuriimu o otosi-ta kara]
 T N ice-cream A drop-P because
 kanasikat-ta.
 sad-P

II NPS-NP [Sam wa nodo ga kawai-ta kara] Sam wa sooda o
 T throat N thirst-P because T soda A
 non-da.
 drink-P

III NP-PROS Tommy wa [Ø raion ga hoeru no o kii-ta kara]
 T PRO lion N roar COM A hear-P because
 hayaku hasit-ta.
 fast run-P

IV PROS-NP [Ø kutabiretei-ta kara] Okaa-san wa netei-ta.
 PRO tired-P because mother T sleeping-P

V NPS-PRO [Jenna wa nezumi o mi-ta kara] Ø nige-ta.
 T mouse A see-P because PRO run away-P

In the Japanese counterparts of Lust's type I and III two identical NPs appear in sentence initial position and their grammatical roles must be differentiated on the basis of the case markers *-wa* (theme) and *-ga* (nominative). This case marking system distinguishes the matrix subject (marked by *-wa*) from the subordinate subject (marked by *-ga*) in the adult grammar.

Unfortunately, however, topic and nominative case markings are acquired at a fairly late stage in language acquisition (Harada 1983). This suggests that children may not be able to use case markers effectively to interpret the sentences we are considering. For this reason, type I and III sentences were not used in the experiment which I will discuss here. I supplied three tokens for each of the remaining three structures.

The children were told to repeat a sentence immediately after the experimenter said it to them. Sentences were addressed to the child as many times as was necessary to elicit a response.

The children were given two one-clause practice sentences to ensure that they understood the task. A sample practice sentence is given below.

Midori-tyan ga onigokko o si-ta.
 N hide & seek A do-P
 (Midori played hide-and-seek.)

All the children passed the practice session easily. In the experiment, three tokens of each of the type IV and V sentences were presented to the children in random order followed by three of the redundant type II sentences. The pronominalized sentences were ordered before the sentences containing redundant NPs because a pilot study suggested that children were apt to assume two lexical NPs were obligatory in every sentence when they are exposed first to the redundant sentences.

Responses were scored for correct imitation of nouns and pronouns. There were five response types besides correct imita-

tion; conversion to forward anaphora, conversion to backward anaphora, double pronominalization, creation of a redundant NP and deletion of one clause.

A three-way ANOVA revealed that age ($F(5,180)=29.281$, $p,.0001$) and sentence types ($F(2,180)=126.131$, $p,.0001$) were significant as main effects. The percentages for each response type are tabulated in Table 5 and represented graphically in Figures 3 to 5.

Table 5. Results of Directionality Study.

		Age						Mean
	Resp.	3	4	5	7	9	11	
II	✓	5.6	5.6	11.1	30.6	63.9	88.9	34.3
	F	63.9	86.1	88.9	69.4	36.1	11.1	59.3
	B	2.8	0.0	0.0	0.0	0.0	0.0	0.5
	g-g	2.8	0.0	0.0	0.0	0.0	0.0	0.5
	*	13.9	8.3	0.0	0.0	0.0	0.0	3.7
	?	11.1	0.0	0.0	0.0	0.0	0.0	1.9
IV	F	38.9	27.8	13.9	0.0	13.9	0.0	15.8
	B ✓	27.8	58.3	86.1	100.0	80.6	100.0	75.5
	PRO- g	16.7	8.3	0.0	0.0	5.6	0.0	5.1
	NP-NP	2.8	2.8	0.0	0.0	0.0	0.0	0.9
	*	5.6	2.8	0.0	0.0	0.0	0.0	1.4
	?	8.3	0.0	0.0	0.0	0.0	0.0	1.4
V	F ✓	77.8	94.4	100.0	100.0	100.0	100.0	95.4
	B	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	g -PRO	2.8	2.8	0.0	0.0	0.0	0.0	2.8
	NP-NP	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	*	13.9	2.8	0.0	0.0	0.0	0.0	2.8
	?	5.6	0.0	0.0	0.0	0.0	0.0	0.9

Note: Sentence Structures

II NP-NP

IV PRO-NP

V NP-PRO

Response Type

✓ Correct

F Forward Response

B Backward Response

NP-NP An NP Insertion

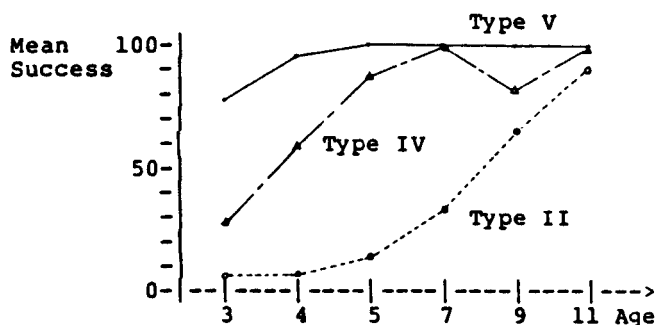
PRO-NP An NP Deletion

* Error

? No Response

As Figure 3 illustrates, the percentage of correct imitation increases constantly with age.

Figure 3. Results of Directionality Study.

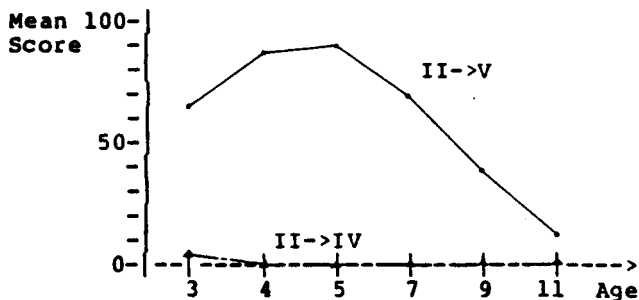


Note: Type II (NP-NP)
 Type IV (Pro-NP)
 Type V (NP-PRO)

The easiest sentence structure involves forward pronominalization (type V [NP-PRO]); even the youngest group (age 3) correctly imitated it in 77.8% of the cases. Five-year-olds and the older children achieved 100% correct imitation on this structure. In contrast, the redundant structure (type II [NP-NP]) was the hardest. Five-year-olds achieved a mean score of only 11% although they performed without error on type V.

Figure 4 illustrates the major error patterns for the redundant structure.

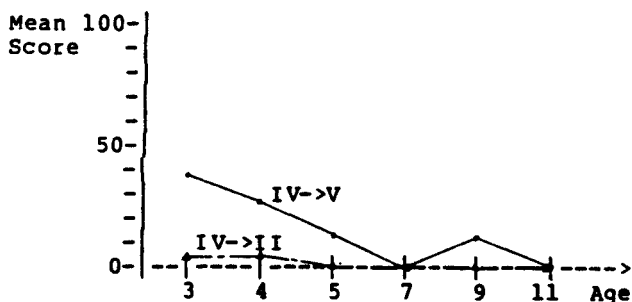
Figure 4. Conversion of Type II (Redundant) Structure.



Redundant sentences were overwhelmingly converted into forward patterns (type V) by replacing the second NP with a zero pronoun. A chi-square analysis showed this structural conversion to be a statistically significant trend ($\chi^2 (1)=6561.0, p,.001$). Notice that there was virtually no conversion to the backward pattern (type IV).

The major error on backward anaphora (type IV) involved conversion to the forward pattern (type V) by switching the positions of a zero pronoun and an NP. This is indicated in Figure 5.

Figure 5. Conversion of Type IV (Backward Anaphora) Structures.



Conversion to a forward pattern of anaphora was most common among the youngest group (38.9%). The only other error in this group was made by a 3-year-old who converted backward pronominalization to a redundant structure by replacing the zero pronoun with an NP. Forward anaphora, however, did not involve these major structural changes.

From these results it is clear that pronominalized structures are easier than redundant structures and that forward pronominalization is far easier than backward. These results are compared with results obtained from English-speaking children by Lust (1981) in Table 6.

Table 6. Comparison of Scores Between English and Japanese Children.

S	Resp	Eng/Jap	Age			Mean
			3	4	5	
II	✓	English	30.4	45.2	63.9	46.5
		Japanese	4.2	8.3	12.5	8.3
	F	English	52.0	45.5	34.0	43.8
		Japanese	70.8	87.5	87.5	81.9
IV	B	English	0.0	0.0	0.0	0.0
		Japanese	4.2	0.0	0.0	1.4
	F	English	32.0	27.3	25.0	28.1
		Japanese	37.5	20.8	12.5	23.6
V	B ✓	English	55.4	60.2	66.7	60.8
		Japanese	25.0	62.5	87.5	58.3
	F ✓	English	71.5	84.3	91.7	82.5
		Japanese	75.0	91.7	100.0	88.9
	B	English	--	--	--	--
		Japanese	0.0	0.0	0.0	0.0

Note: Sentence Structure Response Type
 II NP-NP (Redundant) ✓ Correct
 IV PRO-NP (Backward) F Forward Response
 V NP-PRO (Forward) B Backward Response

As this comparison shows, Japanese children converted redundant structures into the forward pattern of anaphora almost twice as much as English children did (81.9% versus 82.5%). Furthermore, Japanese children converted backward anaphora to the forward pattern only slightly less than English children (23.6% versus 28.1%).

It is clear from the results cited above that there is a strong preference for forward anaphora among Japanese children. These results contradict Lust's prediction that in left-branching languages children will prefer backward anaphora and suggests that children universally prefer the forward pattern of anaphora regardless of the PBD in the language they are learning. In contrast, the version of processing theory which favors forward patterns of anaphora seems to account for the data.

CONCLUSION

In my experiments the Japanese children observed the Subject Antecedent Condition regardless of the grammatical relations present in the sentences. It was also found that children took humanness rather than subjecthood to be the vital factor in the interpretation of the Japanese reflexive zibun.

With respect to Principal Branching Direction, my study disconfirms Lust's (1981, 1983) claim about the Constraint on

Anaphora. Like English speaking children, the Japanese children overwhelmingly preferred the forward pattern of anaphora. These findings seem to support the Processing Theory stated in (22) above which predicts that children will favour the forward pattern of anaphora regardless of the PBD of the language and that it is universally less marked than the backward pattern of anaphora.

FOOTNOTES

¹Five-year-olds did not respond 41.7% of the time, which is the highest incidence of refusal for any age group. It is conceivable that children at this stage believe that subject NPs should have human referents. Thus they might have been puzzled over the non-human subject in the stimulus sentence. Somehow, this period of confusion does not extend to the following stage (7-year-olds) in this experiment.

²See Terazu (1983) for a critique of Lust's studies and O,Grady, Suzuki-Wei and Cho (1985) for an alternative account of Lust's results.

APPENDIX

The Act Out Experiment

Pretest Sentences

1. Okaa-san ga zibun no kata o tatai-ta.
mother N self G shoulder A pat-P
(Mother patted self's shoulder.)
2. Midori-tyan ga zibun o tunet-ta.
N self A pinch-P
(Midori pinched self.)

Experimental Sentences

1. (Ken touched Hana with self's glove.)
 - (1) Ken-tyan ga Hana-tyan o zibun no tebukuro de sawat-ta.
N A self G glove with touch-P
 - (2) Ken-tyan ga zibun no tebukuro de Hana-tyan o sawat-ta.
N self G glove with A touch-P
 - (3) Zibun no tebukuro de Ken-tyan ga Hana-tyan o sawat-ta.
self G glove with N A touch-P
 - (4) Hana-tyan o Ken-tyan ga zibun no tebukuro de sawat-ta.
A N self G glove with touch-P
 - (5) Hana-tyan o zibun no tebukuro de Ken-tyan ga sawat-ta.
A self G glove with N touch-P
 - (6) Zibun no tebukuro de Hana-tyan o Ken-tyan ga sawat-ta.
self G glove with A N touch-P
2. Midori-tyan ga Ken-tyan o zibun no musimegane
N A self G magnifying glass
de mi-ta.
with see-P
(Midori saw Ken with self's magnifying glass.)
3. Midori-tyan ga Hana-tyan o zibun no hankati de
N A self G handkerchief with
mekakusi-si-ta.
blindfold-P
(Midori blindfolded Hana with self's handkerchief.)

4. Ken-tyan ga Midori-tyan ni zibun no omotya o mise-ta.
 N D self G toy A show-P
 (Ken showed Midori self's toy.)

5. Midori-tyan ga Hana-tyan ni zibun no booru o nage-ta.
 N D self G ball A throw-P
 (Midori threw self's ball to Hana.)

6. Hana-tyan ga Ken-tyan ni zibun no boosi o kabuse-ta.
 N D self G hat A put-P
 (Hana put self's hat on Ken.)

7. Hana-tyan no Okaa-san ga zibun no yoohuku o arat-ta.
 G mother N self G clothes A wash-P
 (Hana's mother washed self's clothes.)

8. Ken-tyan no Otoo-san ga zibun no kutu o migai-ta.
 G father N self G shoes A polish-P
 (Ken's father polished self's shoes.)

9. Midori-tyan ga Ken-tyan no atama ni zibun no hon o
 N G head on self G book A
 nose-ta.
 put-P
 (Midori put self's book on Ken's head.)

10. Zibun ga Ken-tyan no Otoo-san o tatai-ta.
 self N G father A hit-P
 (Self hit Ken's father.)

11. Zibun ga Hana-tyan no Okaa-san ni batti o take-ta.
 self N G mother D badge A put-P
 (Self put a badge on Hana's mother.)

12. Zibun ga Ken-tyan no Otoo-san o tunet-ta.
 self N G father A pinch-P
 (Self pinched Ken's father.)

13. Hana-tyan wa Ken-tyan ga zibun o tunet-ta to it-ta.
 T N self A pinch-P COM say-P
 (Hana said that Ken pinched self.)

14. Midori-tyan wa Ken-tyan ni Hana-tyan ga zibun o
 T D N self A
 kai-ta to it-ta.
 scratch-P COM say-P
 (Midori said to Ken that Hana scratched self.)

15. Ken-tyan wa Hana-tyan ga zibun ni batti o take-ta to
 T N self D badge A put-P COM
 it-ta.
 say-P
 (Ken said that Hana put a badge on self.)

Question-Answer Task 1

Pretest Sentences

1. Midori-tyan ga zibun o tunet-ta.
 N self A pinch-P
 (Midori pinched self.)
2. Ken-tyan ga zibun o kai-ta.
 N self A scratch-P
 (Ken scratched self.)

Experimental Sentences

1. Hebi ga Hana-tyan o zibun no niwa de kan-da.
 snake N A self G yard in bite-P
 (A snake bit Hana in self's yard.)
2. Raion ga Otoo-san ni zibun no kodomo no tikaku de
 lion N father D self G child G near L
 hoe-ta.
 roar-P
 (A lion roared at father near self's child.)
3. Sika ga Midori-tyan no senaka o zibun no hiroba de
 deer N G back A self G open place L
 tutui-ta.
 poke-P
 (A deer poked at Midori's back in self's open place.)

The Imitation Experiment

Pretest Sentences

1. Midori-tyan ga onigokko o si-ta.
 N hide&seek A do-P
 (Midori played hide-and-seek.)

2. Okaa-san ga keeki o yai-ta.
 mother N cake A bake-P
 (Mother baked a cake.)

Experimental Sentences

1. Ken-tyan wa nodo ga kawai-ta kara Ken-tyan wa zyuusu o
 T throat N thirsty because T juice A
 non-da.
 drink-P
 (Because Ken was thirsty, Ken drank juice.)
2. Otoo-san ga kuruma o untensi-tei-ru aidani Otoo-san wa
 father N car A drive-ing while father T
 torakku ni butukat-ta.
 truck D bump-P
 (While Father was driving a car, Father bumped a
 truck.)
3. Midori-tyan wa ason-da atode Midori-tyan wa Okaa-san o
 T play-P after T mother A
 tetudat-ta.
 help-P
 (After Midori played, Midori helped Mother.)
4. ♀ kutabire-tei-ta kara Okaa-san wa ne-tei-ta.
 PRO tired-P because mother T sleep-ing-P
 (Because she was tired, Mother was sleeping.)
5. ♀ soto ni i-ta aidani Ken-tyan wa syooboosya o mi-ta.
 PRO outside be-P while T fire truck A see-P
 (While he was outside, Ken saw a fire truck.)
6. ♀ kingyo ni esa o age-ta atode Hana-tayn wa puuru
 PRO gold fish D bait A give-P after T pool
 e it-ta.
 to go-P
 (After she fed gold fish, Hana went to pool.)
7. Hana-tyan wa nezumi o mi-ta kara ♀ nige-ta.
 T mouse A see-P because PRO run away-P
 (Because Hana saw a mouse, she ran away.)
8. Ken-tyan wa uma ni not-tei-ru aida ♀ mawari o
 T horse on ride-ing while PRO around A
 mi-ta.
 look-P
 (While Ken was riding a horse, he looked around.)

9. Otoo-san wa outi ni kaet-te-ki-ta atode ~~o~~ sinbun
father T home to come-P after PRO newspaper
o yon-da.
A read-P
(After Father came home, he read a newspaper.)

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