Null Subject vs. Null Object: Some Evidence from the Acquisition of Chinese and English*

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Since young English-speaking children use null subjects systematically, it has been proposed that they begin with the initial parameter setting allowing null arguments (NAs), and must change this setting on the basis of linguistic evidence that adult English prohibits NAs. A recent proposal suggests that the licensing and identification of NAs used by English-speaking children is like that used in adult Chinese. This predicts that young Chinese- and English-speaking children should exhibit parallel performance in their use of NAs. This study investigated this prediction using an elicited production task with both Chinese- and English-speaking children. Although the hypothesis that early English allows null subjects was upheld, the evidence is against the claim that early English is a discourse-oriented language like Chinese: while the Chinese children systematically used null objects, the American children did not. An alternative analysis of the use of null arguments is suggested.

1. INTRODUCTION

1.1 The Null Subject Phenomenon in Early Child Language

The null subject phenomenon, i.e., the frequent absence of lexical subjects, is one of the most noticeable characteristics of early child language. The following (non-imperative) English sentences (1a) and (2a), spoken by children aged from 1;8 to 2;5 (cited by Hyams, 1983), are examples of this phenomenon.

(1) a. Read book
      Ride truck
      Want look a man
      Kathryn read this
      Gia ride bike
      I want take this off

(2) a. Outside cold
      No morning
      Yes, is toys in there
      ‘It’s cold outside’
      ‘It’s not morning’
      ‘Yes, there are toys in there’

In the examples in (1a) the subject, though not phonologically specified, has a definite reference which can be readily inferred from context. Since sentences with null subjects like those in (1a) co-occur with sentences like those in (1b), which do have lexical subjects, it is not likely that the missing subjects in (1a) can be attributed to a performance constraint on sentence length. A further characteristic of children’s speech at this age is illustrated by the examples in (2a). In these examples the unexpressed subject is an expletive, as shown by the ‘translations’ of these sentences in (2b). However, according to Hyams, children at this age do not produce sentences such as (2b).

Additional studies of children’s early use of subjectless sentences are found with both languages which do allow null subjects and those which do not, such as Italian (Hyams, 1986),
German (Clahsen, 1989; Weissenborn, in press), French (Weissenborn, in press), and American Sign Language (Lillo-Martin, 1986, 1991). In all of these studies, it has been found that at an early age children use subjectless sentences like the ones illustrated in English above.

The search for an explanation of children's early use of subjectless sentences can be related to studies of adult languages which permit such sentences as grammatically acceptable, by comparison to those which do not. In the next section, we review some characteristics of the null subject phenomenon in adult languages (since we include null objects as well as null subjects, the term has been generalized to 'null arguments'), and one proposal for the grammatical mechanisms underlying this phenomenon. We will then turn to a proposal accounting for children's use of null subject sentences which appeals to this analysis of adult language.

1.2 The Null Argument Phenomenon in Adult Languages

The null argument phenomenon is a well-known characteristic of adult languages such as Spanish, Italian and Chinese. Examples from these languages are given in (3). The English counterparts to these sentences require overt subjects.

In these so-called 'pro-drop' languages, the expletive elements equivalent to English it and there are also phonologically null, as illustrated in (4) (Italian, from Hyams, 1983), and (5) (Chinese).2

In adult Chinese, the expletive element equivalent to English it can be phonologically null as in Spanish or Italian, as illustrated above (5a, b, c).3 Alternatively, a non-expletive subject can be found in any of these sentence types, illustrated in (6a, b, c).

(3) a. Mangia come una bestia.  
   'He/she) eats like a beast.'  

b. Come como una bestia.  
   'He/she) eats like a beast.'  

c. [e] lái-le.  
   come-ASP1  
   '(He/she) came.'

(4) a. Sembra che Gianni sia matto.  
   '(It) seems that John is crazy.'

b. Piove oggi.  
   '(It) rains today.'

(5) a. [e] Xiàyù-le.  
   (It) rain-ASP  
   '(It) is raining.'

b. [e] Yao xiàyù-le.  
   (It) going to rain-ASP  
   '(It) is going to rain.'

c. [e] Kànhshàngqù [e] yao xiàyù-le.  
   (It) seem (it) going to rain-ASP  
   '(It) seems that (it) is going to rain.'
How can one account for the occurrence of null arguments in these languages, compared to languages which prohibit null arguments, such as English? Jaeggli and Safir (1989) proposed the following Null Subject Parameter, stated in (7), as a principle of Universal Grammar (UG) to make this distinction.

(7) The Null Subject Parameter
Null subjects are permitted in all and only languages with morphologically uniform inflectional paradigms.
(Jaeggli and Safir, 1989, p. 29).

According to Jaeggli and Safir, a morphological paradigm is uniform if all its forms are morphologically complex or none of them are. For example, the Italian inflectional paradigm consists entirely of morphologically complex forms, hence null subjects are allowed; in Chinese, no forms are morphologically complex, hence null subjects are allowed here too. In the case of English, however, morphologically complex forms such as walks, walked, walking, coexist with morphologically simple forms, such as walk. Thus English is a 'mixed' system and null subjects are prohibited.

The Null Subject Parameter stated in (7) tells us when a null subject is possible. However, Jaeggli and Safir (following others such as Rizzi, 1986) also propose that a null subject can occur only when its referential value can be recovered. They propose three mechanisms for the identification of null arguments: (i) local AG(reement) including a tense feature, (ii) a c-commanding nominal, or (iii) a Topic. Failure to satisfy either of the two necessary and sufficient conditions, namely, a morphologically uniform paradigm and a recoverable referential value for the thematic null subject, will result in the prohibition of null subjects in a language. Although the use of null arguments thus requires two conditions to be met, for ease of exposition we will refer to a Null Subject (or Argument) parameter with settings [+/-pro-drop]. (This also enables us to be neutral with respect to other analyses of the null argument phenomenon.)

The use of local AG to identify the reference of a null argument follows from numerous reports in the literature linking null arguments with 'rich' agreement. Early reports were confined to languages with only subject-verb agreement (such as Italian, discussed in Rizzi, 1982); these languages allow null arguments identified by agreement only in subject position. Later studies (such as McCloskey and Hale's 1984 work on Irish) have demonstrated that languages with other types of agreement often display null arguments in other positions. Jaeggli and Safir add the condition that a tense feature must be present in order to account for the lack of null arguments in German and other V2 (verb-second) languages. The null arguments which are identified by AG are considered to be members of the empty category pro, [+pronominal, -anaphoric].

The use of a Topic to identify null subjects follows from Huang's (1984; 1989) proposal. Huang distinguishes "discourse-oriented" languages from "sentence-oriented" languages. The "discourse-oriented" languages, like Chinese, have a rule of "topic-chaining" by which the discourse topic is grammatically linked to a null sentence topic which in turn identifies a null
argument. This null argument is a variable left from the movement of the empty topic to sentence-topic position. According to Huang, a topic may bind a variable in either subject or object position. These two kinds of null arguments are illustrated in (8).

In addition, there is a third method of identifying null arguments which results in a subject/object asymmetry. Because a c-commanding NP can also be an identifier, in languages like Chinese a null pronominal (pro) may be found in embedded subject position, as in (9a), but not in object position, as in (9b). This distinction is found because the empty embedded subject can be identified by the matrix subject; it functions grammatically like a pronominal rather than a variable. However, the empty object cannot be identified by the matrix subject, since identification has to be by the closest nominal element. Thus, empty objects can only be identified by an empty topic, indicated by OP in (10).

To summarize, Jaeggli and Safir proposed that the difference between the grammar of pro drop languages such as Italian versus those such as Chinese is the method of identification of the null argument. This is illustrated in (11).

(8) a. Discourse Topic \(s\) topic \(s\) [e\(_i\)] INFL lái-le]

come-ASP

'(He) came.'

(Huang, 1984)

b. Discourse Topic \(s\) topic \(s\) wŏ INFL [méi kànjiàn [e\(_i\)]]

I not see (him\(_i\))

(9) a. Zhāngsān\(_i\), tā shū \(o\)[e\(_i\)] méi kànjiàn Līsī (Huang, 1989)

Zhangsan he say no see Lisi

'Zhangsan\(_i\), he\(_j\) said that (he\(_j\)) didn't see Lisi.'

b. *Zhāngsān\(_i\), tā shuo Līsī méi kànjiàn [e\(_i\)]

Zhangsan he say Lisi no see

'Zhangsan\(_i\), he\(_j\) said that Lisi didn't see (him\(_i\)).'

(10) [OP \(j\) [Zhāngsān\(_j\) shŭo [Līsī kànjiàn [e\(_i\)] le]]

Zhangsan say Lisi see ASP

'Zhangsan\(_j\) said that Lisi saw him\(_i\)/*j*/*k*.'

(11) a. \(s\) pro \(i\) [INFL AG/Tense] ...... ]

(identification by AG, Italian)

b. Discourse Topic \(i\) [topic \(i\) \(s\) ti [INFL] ...... ]

(identification by a discourse topic, Chinese)

c. Subject \(i\) verb \(s\) pro \(i\) VP]

(identification by a c-commanding NP, Chinese)
1.3 Null Subjects in Children's Grammars

From the above, it may be seen that 'Early' English resembles a pro-drop language in three respects. First, lexical subjects are optional; second, the subject has definite reference even when phonologically null (except in the case of null expletives); and third, lexical expletives are absent (Hyams, 1983; 1989).

How can one account for the development an English-learning child has to undergo in order to arrive ultimately at a steady state grammar so as to speak the right type of English? A recent analysis by Hyams (in press; Jaeggli & Hyams, 1987), following the analysis of null subjects in adult languages by Jaeggli and Safir (1989) discussed above, proposed that the early grammar, like adult grammars, is constrained by the Null Subject Parameter cited above. That is, the early grammar satisfies the requirement of morphological uniformity and the requirement that null arguments be properly identified.

Hyams argues that English-speaking children begin speaking a Chinese-like language, i.e., a discourse-oriented language. Under the child's initial analysis, English is morphologically uniform with uniformly simple forms. Hyams takes children's verb productions, which at this time are generally not inflected, as evidence for this position. She further proposes that young English-speaking children use null topics to identify the reference of their null subjects. The child will then need to learn that English is not a 'Discourse Oriented' language in order to properly exclude null subjects.

In the case of Italian-speaking children, Hyams proposes that their early empty subjects are identified by AG(reement), as is the case in adult Italian. She proposes this early correct null subject use since Italian speaking children acquire the inflectional system fairly early. Thus, for these children resetting of the null subject parameter is not required.

One potential problem for Hyams' analysis is that one would expect that a discourse-oriented child language should have both null subjects and null objects, since under topic identification the null subject and null object phenomena are grammatically equivalent. However, according to the data she reviewed, Hyams claimed that English-speaking children do not use null objects. In order to account for this, Hyams thus proposed, following Roeper, Rooth, Mallis, and Akiyama (1984), that in the early grammar, the inventory of null elements includes pro, but not variables. This hypothesis would predict a null subject/null object asymmetry. Since null objects can only be variables, under this hypothesis null objects would not be allowed in the early grammar until some later point when variables mature. In order for this account to hold, Hyams must depart from Huang's analyses of Chinese, and suggest that matrix empty subjects as well as embedded empty subjects can be pro, although only embedded empty subjects can be identified by a c-commanding NP. Hyams says that matrix empty subject pros are identified by a discourse topic.

According to Hyams' hypothesis, Chinese-speaking children, who will ultimately acquire a real discourse-oriented language, should first exhibit the same null subject/null object asymmetry as English-speaking children, and they should not produce null object structures until the point when they develop variables. Hyams' hypothesis would also predict one of two null subject-object asymmetries for English-speaking children. On the one hand, if they have not yet reset the Null Subject Parameter by the time that they acquire variables, then they will produce only null subjects early on, but will later include null objects as well once they have developed variables. On the other hand, if the English-speaking children have reset the null subject parameter before they develop variables, they will never use null objects. Thus, knowing when English- and Chinese-learning children use null subjects and objects compared to when they develop variables is important for evaluating Hyams' proposal.

The evidence regarding the timing of use of variables versus resetting the null subject parameter is not wholly consistent with Hyams' approach. Roeper (1986) gives evidence that children have some uses of variables by age three to four years. All of his evidence for the use of pros rather than variables with wh-questions occurs with older children (ages 8 to 10) and long-distance questions. However, his proposal that children use pros instead of variables even at this later age can also be questioned, given new evidence regarding children's very early comprehension and production of wh-questions and strong crossover constructions (see Thornton, 1990). We therefore used the production and comprehension of wh-questions in the study reported here as evidence for the existence of variables in children's grammars.

The timing of the use of null subjects is easier to determine. The acquisition data Hyams used to support her hypothesis indicate that the restructuring of the Null Subject Parameter takes place around 26 to 28 months. If Hyams' proposal
that young children do not have variables is true, then we will not expect to see any null objects in the production of English-speaking children, since the restructuring takes place prior to the development of variables; and of course a clear decline in their use of null subjects should appear following the resetting of the NA parameter around 2-1/2 years. However, if there is evidence that children do have variables while they still use null subjects (indicating that the resetting of the NA parameter has not yet taken place), then they will be expected to use null objects too, according to Hyams' account.

In order to more fully evaluate Jaeggli and Hyams' proposals, we collected data on the acquisition of English and Chinese. The following experimenter was designed to answer some relevant questions about Hyams' hypothesis through first-hand acquisition data. The questions we addressed include the following:

i. Is a null subject/null object asymmetry exhibited in child Chinese and child English? If so, is it equivalent for the two groups?

ii. If child Chinese or child English does exhibit null objects, do we have evidence that variables coexist with null objects? The emergence of wh-questions will be taken as evidence of acquisition of variables.

iii. Can the presence of lexical expletives be taken by American children as evidence that English is not [+pro-drop]? The use of overt versus null expletives will be examined to address this question.

iv. What does the developmental pattern look like, as far as the null subject and null object phenomena are concerned, in terms of the parameterized theory of UG?

v. What is the influence of linguistic environment during development of early grammar between ages 2 - 4-1/2?

2. Method

2.1 Subjects

2.1.1 Chinese and American children. Nine Chinese children, 4 female and 5 male, aged from 2:0 to 4:6, participated in the experiment. All of them were learning some variety of Mandarin Chinese as their first language. Their parents were graduate students from either mainland China or Taiwan, studying in the United States. Nine English-speaking children, 5 female and 4 male, aged from 2:5 to 4:5, were also tested using the same procedure. Their parents were members of the University community. All the subjects had normal hearing. There were no recorded developmental delays of any sort. Subject characteristics are given in Appendix 1.

2.1.2 Chinese adult controls. Nine Chinese-speaking female adults participated in the experiment. They were all born in mainland China or Taiwan, speaking some variety of Mandarin Chinese. They were the mothers of the Chinese child subjects.

2.2 Procedure

2.2.1 Controlled production data collection. This part of the experiment was carried out in the experimenter's home for the Chinese children, and in the observation room at a day care center for the English-speaking children. There were two story books used. One was a story book designed by the experimenter (QW) about the daily life of a little boy named Baldy (who had no hair). A doll house with dolls and furniture corresponding to the settings and characters in the book was used to familiarize the subject with the main character. Another story used was a pop-up book, "The Three Little Pigs." The testing was carried out after the experimenter played with the child subject a number of times and established rapport. The subject's task was to tell the experimenter the story. For the first story, the experimenter and the subject played with the doll house and dolls. Next, the subject was asked if he or she wanted to read a book about Baldy and then to tell a story about him. The answer was invariably positive. The entire procedure was audio recorded. All interaction with the Chinese-speaking children was conducted in Mandarin; that with the English-speaking children was in English.

2.2.2 Eliciting expletive structures. In this part of the experiment, a number of pictures were displayed to the child subject and then he or she was asked to tell what happened in the pictures. This part of the experiment was designed to elicit expletive structures for the English-speaking children and to compare their productions to those produced by the Chinese-speaking children under the same situation.

2.2.3 Adult controls. The Chinese adult subjects were asked to tell the stories and talk about the pictures, while pretending that they were talking to their own child. The testing was conducted in the subjects' home without their child or the experimenter present. The testing materials were identical to those prepared for the child subjects. The whole procedure was audio taped.

2.3 Data reduction

i. The mean percentage of sentences with null subjects for each speaker was calculated based on the ratios of the sentences with null subjects to
the total number of sentences produced when telling the two stories. These ratios were averaged over the total number of subjects in each language group, over each age level (2-, 3-, and 4-year olds), and over each MLU level (3.5, 4.5, 5.25) separately. The standard error of the means (s.e.) was also calculated. 

ii. The mean percentage of sentences with null objects was calculated using a similar method. The ratio was the total number of sentences with an underlying structure of SVO to the total number of sentences produced with a null object. For the Chinese data, in addition to this criterion, any two-morpheme compounds which have been identified as a word by the authoritative dictionary—Xiàndài Hànyù Cídian (Modern Chinese Dictionary) (Institute of Linguistics, Chinese Academy of Sciences, 1973)—were not included, even if they had the V+O formation. For example, (12a) was identified as a single word, so it was excluded; but (12b) was counted because it was not identified as a single word. The reason for this constraint is that it is generally agreed among Chinese linguists that a verb+complement compound is not equal to the structure of V+O; unlike the latter, the former is already in its minimal construction and is not divisible; therefore, these two types of words are analyzed differently.

(12) a. xì zǎo
wash bath
‘take a bath’

(12) b. xǐ shǒu
wash hands
‘wash hands’

iii. The MLU for child subjects in both languages was calculated, using the productions made for the stories, according to the method in Brown (1973).

iv. A second measure of the mean percentage of sentences with null subjects for English-speaking children was also calculated in the same way, excluding the sentences with null subjects using a gerund or to-infinitive. The reason for this exclusion is that given the discourse, these kinds of sentences are also allowed in the adult grammar of English. This second measure is labelled 'adjusted' in the figures.

v. The data gathered from testing the expletive structures was excluded from the calculation of the mean percentages. This part of the data was only evaluated for structural differences among the three testing populations. No quantitative analysis was involved.

vi. The children’s comprehension and spontaneous productions of wh-questions during the course of the study were evaluated, for the purpose of determining their use of variables.

3. Results

3.1 An Overall View of the Results (for details see Appendices 2 and 3)

3.1.1 Null subjects. From Figure 1, it may be seen that there is a noticeable difference between the mean percentages of sentences with null subjects produced by Chinese child subjects and that by American child subjects at 2 - 4-1/2 years. Examples for such sentences are (13a,b) for the Chinese child subjects, and (14a,b,c) for American child subjects.

![Figure 1. Mean percentage of sentences with null subjects produced by Chinese and American children and Chinese adults.](image-url)
The mean percentage of sentences with null subjects produced by Chinese children is 46.54% (s.e. = 3.78); while for the American children, it is 33.11% (s.e. = 6.12). The Chinese adults produced sentences with null subjects 36.13% of the time. Given that Chinese is a pro-drop language, all the sentences with null subjects produced by the Chinese children are considered grammatical, with the reference of the null subject determined by the discourse topic. Although English is not a pro-drop language, some of the sentences with null subjects produced by American children, i.e., sentences with null subjects but using infinitives or gerunds rather than a full verb, can be judged as pragmatically acceptable in the given context in which they were produced. If we exclude these sentences from our count of sentences with null subjects produced by American children, the mean percentage drops to 14.58% (s.e. = 5.03). Comparing this adjusted mean percentage, 14.58%, with the mean percentage of Chinese children, 46.54%, and that of Chinese adults, 36.13% [one way ANOVA omnibus $F(2, 24)=17.80$, $p=.0001$], it is clear that Chinese children are dropping their subjects at a much higher rate than American children, and even a bit higher than the rate of the Chinese adults. The differences between the American children and the Chinese children, and between the American children and the Chinese adults, are both significant by Scheffe's tests [$F(1,24)=31.96$, $p=.0001$, and $F(1, 24)=21.55$, $p=.0025$ respectively]; the difference between the Chinese children and the Chinese adults is not significant. Even still, it is clear that American children do drop subjects a relevant amount of the time.
For both groups of children, the null subject was sometimes clearly related to an antecedent from the discourse as shown in examples (15, Chinese) and (16, English). In other cases, the referent of the null subject was not previously mentioned in the discourse, although it was usually understandable from the context; often, it was part of the pictures the children were describing. Some examples of this type are given in (17, Chinese) and (18, English).

(15) a.  Xiao zhūzhū zhū tāngtāng.
     little piggy boil soup
     'Little pig makes soup.'
     [e] zhū tāngtāng.
     (He) boil soup
     'He makes soup.'
     (WW, 2;5)

b.  Dà yě lǎng, zài zhē lǐ tōu kàn.
     Big wild wolf ASP here secretly look
     'The big wild wolf is here peeping secretly.'
     [ei] zài kàn xiǎo zhū.
     (It) ASP look little pig
     'It is looking at the little pig.'
     (HE, 3;1)

(16) a.  Look at this bad wolf. He got in there. [e] fell down.
     'Look at this bad wolf. He got in there. (He) fell down.'
     (DS, 2;10)

b.  The big bad wolf coming again and bang the door. [e] want to
     blow the house and the house is down.
     'The big bad wolf (is) coming again and bang the door. (He)
     wants to blow the house and the house is down.'
     (SR, 2;8)

(17)  [e] kàn jīngjīng. [e] méi chūān xiéxié.
     (He) look mirror (He) not wear shoe
     'He is looking in a mirror. He didn't wear shoes.'
     [e] méi chūān wàwà.
     (He) not wear sock
     'He didn't wear socks.'
     (ZY, 2;0)

(18)  [e] jump up. [e] jump in bed. [e] fall down.
     '(He) jumped up. (He) jumped in bed. (He) fell down.'
     (AR, 2;5)
Although both Chinese- and English-speaking children thus produced null subjects in a somewhat similar fashion, we believe this does not necessary show that they use the same mechanism in identifying and licensing the null subjects. We will return for further discussion of this point.

3.1.2 Null objects. From Figure 2, we may see that there is a considerable difference between the mean percentages of sentences with null objects produced by Chinese child subjects, which is 22.53% (s.e.=1.76), or by Chinese adults, 10.3% (s.e.=1.58), and that by American child subjects, which is 3.75% (s.e.=1.31), [one way ANOVA omnibus $F(2, 24)=37.21, p=.0001$]. Here, the differences between the American children and the Chinese children, the American children and the Chinese adults, and the Chinese children and the Chinese adults are all significant by Scheffé's tests ($F(1,24)=18.781$, $p=.0001$, $F(1, 24)=6.549$, $p=.0237$, and $F(1,24)=12.232$, $p=.0001$, respectively). With the Chinese children, only 27.59% of the total sentences with null objects are ungrammatical. The grammaticality of the Chinese object-drop sentences (i.e., whether the null object was used properly) was judged with respect to the context in which the sentence in question was actually produced. For the American children, 100% of the sentences with null objects were ungrammatical. Examples are given in (19) for Chinese child subjects, and (20) for American child subjects.

(19) a. *Ou, lǎng lái chī [e].
    oh, wolf come eat (it=pig)
    'Oh, the wolf came to eat (the pig).'
    (ZY,2;0)  (ungrammatical)

b. *Tāmén yào qiù gài [e].
    they going to build (it=house)
    'They are going to build (a house).'
    (WW,2;5)  (ungrammatical)

c. [e] Zài kànkàn [e].  (grammatical)
(He=wolf) again look look (it=pig)
‘(He) had another look at (the pig).’
(ZY,2;0)

d. [ei] chiwán [ej],
(He=wolf) eat finish (it=pig)
‘After (he) finished eating (the pig),’
lǎoláng dúzì jiòu biàn dà le.
old wolf belly then become big ASP
‘the old wolf’s belly became big.’
(LX,3;4)

(20) a. *Look at [ei]. [ej] go a little higher
‘Look at (him). (He) goes up a little higher.’
(DS,2;10)

b. *The other little pigs worry about [e].
‘The other little pigs worry about (him).’
(ER,3;8)

3.1.3 Null subject/null object asymmetry.
Comparing Figure 1 with Figure 2, it may be seen that the null subject/null object asymmetry is not unique to the Chinese children. The ratio of the mean percentage of sentences with null objects to those with null subjects is 0.48, 0.23, and 0.24 for Chinese children, Chinese adults, and American children, respectively. If we recalculate the ratio for the Chinese children, excluding the ungrammatical sentences as in example (19a and b), (which may be considered as errors), the ratio decreases from 0.48 to 0.29. If we do the same thing for the English children, considering their small percentage of object-dropping (3.57), which was ungrammatical, as errors, the ratio of course becomes zero.

The amount of null object use by the Chinese adults is surprisingly low. However, it is important to note that we believe the ratio for Chinese adults would be higher than the rate we obtained if the data had been collected in an Adult-to-adult conversational situation, where most object dropping takes place, rather than in children’s storytelling. Because of this discrepancy, we conducted a follow-up study with Chinese adults.

In the follow-up study, five Chinese-speaking adults were interviewed by the experimenter in an adult-to-adult conversational setting. These adults were all women who had recently given birth to their first child. The interviews took place in the subjects’ homes, and consisted of several parts. First, the subjects were asked to tell their child two stories as a warming up. Then, they engaged in conversation with the experimenter. The conversations all included the same three topics of discussion: the woman’s pregnancy and childbirth, her own lifestyle, and the growth and behavior of her child. The interviews were tape-recorded. Only the conversations were transcribed and scored according to the same procedures discussed previously for the initial study. The percentages of null subject and null object used by each speaker in this study are illustrated in Figure 3, and more detailed information is given in Appendix 4.

As this Figure clearly shows, a subject-object asymmetry remains for the adult subjects, but the overall percentage of null object use increases greatly. Both of these facts are important for comparison with the children’s utterances. In the follow-up study, the average object drop is 40.1% (s.e.=1.77), while the average subject drop is 45.6% (s.e.=2.42). Although the amount of object drop is much higher than in the initial study (10.30%), the difference between the subject-drop and the object-drop is significant by a 2-tail paired t-test (t=4.073, p=0.015). Some examples of the adults’ utterances with subject and/or object drop are given in (21) and (22).
The pattern of use of missing objects is quite different (see Figures 5 and 6). Whether divided by age or by MLU group, the American children used missing objects much less frequently than null subjects. The two-year-olds (MLU 3.51) used missing objects only 8.3% of the time, while the older children used essentially none. In contrast again, the Chinese children used null objects much more frequently than the American children. They averaged 20.2% to 26.0% null objects, with the figures increasing slightly over the age/MLU ranges. Although the adults in the initial study produced far fewer null objects than the Chinese children, from the follow-up study we can see that the overall production of null objects by the children is approaching the level of use by adults in conversational settings.

Figure 5. Mean percentage of sentences with null subjects produced by Chinese and American children (by MLU, adjusted) and Chinese adults.

Figure 6. Mean percentage of sentences with null objects produced by Chinese and American children (by age) and Chinese adults.
The Chinese- and English-speaking children do not differ significantly in their use of null subjects at the earlier MLU stage tested: MLU level 3.5, but they do at the latter MLU stage: MLU level 4.5. These results provide strong evidence for pro-drop in younger English-speaking kids (MLU level 3.5). For the use of null objects, however, the two language groups differ significantly across all MLU levels. The differences in the use of null subjects and null objects by Chinese and American children indicate that the factors controlling the use of the two types of null arguments in the two groups are distinct. This is counter to the proposal by Jaeggli and Hyams (1987) which suggests that the two groups use null subjects for essentially the same reason.

3.3 Results of Eliciting Expletive Structures

In order to determine how the course of the development of expletive subjects interacts with the development of null versus overt subjects, children's productions of sentences calling for expletive subjects were examined. For the Chinese-speaking children, we examined whether they used a null subject as in (5) above, or a non-expletive lexical subject as in (6). For the English-speaking children, we examined whether they produced any lexical expletives, and further, whether there was any evidence that lexical and null expletives coexisted.

In general, there was no evidence of the Chinese children producing structures with overt non-expletive subjects, such as those in (6a, b, and c) above, even among the 4-year olds. The only structures they used in the weather conditions were those with null subjects, as in (5a and b). They did not use the structure as in (5c) either. The only exception occurred when they talked about a windy condition. In this case they either used a structure with a null subject as in (23), or they used ‘fēng,’ ('wind'), as an overt subject as in (24). The Chinese adults used all the structures as in (5) and (6). They also used ‘fēng,’ the word for 'wind,' in the same way as the Chinese children. The observed difference here between the Chinese children and the Chinese adults in their use of null subjects (as in 5a and b), and non-expletive
lexical subjects, (as in 6a and b), we believe, is due to a stylistic reason rather than a grammatical one. In fact, sentences in (5a and b) are more colloquial than those in (6a and b). However, it seems that the absence of the structure like that in (6c) from the data of the Chinese children is due to a grammatical reason. While the null subjects in (5a and b) can be interpreted as referential, the one in (6c) can not. The structure (as in 6c) requires the ability to raise the subject from the embedded clause to the matrix clause.

The American children had a different pattern. Except for the youngest one, (AR, 2;5), all the children showed some kind of evidence for the existence of expletive ‘it’ as in example (25). At the same time, however, they also used some null expletives as well, as shown in examples (25) and (26).

(23) [e] yào bā zhège guā diào,
(it=wind) want (BA) this blow down,
[e] hái yào bā zhège jē guā diào.
(it=wind) also want (BA) this too blow down.

‘(Wind) wants to blow this down,
(it) also wants to blow this down too.’
(ML, 4;3)

(24) Xiànzái guā fēng-le. Feng dòu tài dà-le,
now blow wind-ASP. Wind also too big-ASP
fángzi dòu chuí dào-le.
house also blow down-ASP
‘The wind began blowing now. The wind was so big
that the house was blown down.’
(SK, 4;1)

(25) It is raining.
It’s very windy so the clothes are going up. (SR, 2;8)
It’s rain. rain. They can’t come out. (DS, 2;10)

(26) Snow. Raining (DS, 2;10)
No snow. (SR, 2;8)
Windy now. (EL, 3;6)
Raining. (AR, 2;5)
Hyams (1986) suggests that one piece of evidence that English-speaking children use to reset the null subject parameter to [-pro-drop] is the presence of overt expletives. Hyams argues that since *it* and *there* are not being used for pragmatic purposes (because they do not contribute to the meaning of the sentence), they must therefore be present for strictly grammatical reasons. Hence, lexical expletives could be used to trigger parameter resetting. Furthermore, as noted above, Hyams found that children use null expletives at the time they use null subjects. So the emergence of lexical expletives coincident with restructuring to [-pro-drop] is predicted.

However, as our data show, some children do use both overt and null expletives at the time when they are using null subjects. Hence, it seems that the presence of overt expletives in the input is not a type of triggering data for resetting the null subject parameter. But why do the children use overt expletives when they sanction null subjects? Lillo-Martin (1987) has given a reasonable solution for this puzzle. She suggests that children have misanalyzed the expletives, and instead interpret 'it' as referential, even in sentences like, 'It's raining.' Because they have the wrong analysis of 'it,' they don't have the overt expletive evidence that English is not [+pro-drop]. So at this point, one cannot assume that the time at which a child starts using overt expletives will be coincident with the correct setting for the null subject parameter.

### 3.4 Results on the Use of Structures Exhibiting Variables

In our data, both child language populations have shown some evidence for the existence of variables though the production of wh-movement (English), or the comprehension and production of wh-questions (Chinese). This can be seen in (27) and (28). These questions were produced and comprehended during the course of the experiment described above, at the same time as these children showed evidence of using null arguments.

One might claim, following Roeper et al. (1984), that the empty categories used in these constructions are *pros*, not variables. However, work by Thornton (1990) and Sarma (1991) suggests that children at least at 3 years do use variables rather than *pros* in these constructions, since they correctly produce long distance questions and obey the strong crossover constraint. Therefore, we will assume that the empty categories used in the wh-questions shown above are variables rather than *pros*. In any case, it is the difference between Chinese- and English-speaking children with respect to null objects, without a corresponding difference with respect to evidence for variables in the form of wh-questions, that is relevant to our discussion.

(27) a. What's that?
   (AR, 2;5)
   (SR, 2;8)
   c. That's what I think he did.
   (DR, 3;9)

(28) a. Experimenter: Shuí lái-le?
   Who came-ASP
   ‘Who came?’

   Child subject: Láng, Láng lái-le.
   wolf, wolf came-ASP
   ‘The wolf came.’
   (ZY, 2;0)
b. Experimenter: 大灰狼干神没来-儿?
big grey wolf do what come-ASP
'Why did the big grey wolf come?'
Child subject: [e] 娃小猪阿.
(He) take little pig 阿!
'(He) came to take the little pig away, of course.'
(AN, 2;3)

c. 那是什没? 那是谁吩咐的?
that is what? that is who did
'What is that?' 'Who did that?'
(WW, 2;5)

4. DISCUSSION: THE PARAMETERIZED THEORY OF UG AND LINGUISTIC EVIDENCE

A review of Figures 4 through 7 indicates the following:

i. At the earliest age tested, 2 years old or average MLU of 3.5, both Chinese and American children are using null subjects. The Chinese children are also using null objects. Although the American children do have a few sentences with null objects, the mean percentage of their sentences with null objects is only 3.57, so we will count these as errors; i.e., outside of the children's grammars.

ii. For the Chinese children, as their MLU increases, the mean percentage of sentences with null subjects decreases, and the mean percentage of sentences with null objects increases. By the MLU level of 5.28, their subject-dropping rate is very close to that of Chinese adults, and their object-dropping rate is approaching that of the adults in the follow-up study.

iii. For the American children, as their MLU increases, the mean percentage of sentences with null subjects (as well as sentences with null objects, which we are not counting as part of the children's grammar) decreases drastically, thus also coming in line with the corresponding adult grammar.

iv. At each MLU level, both mean percentages are much higher for the Chinese children than their American counterparts, although for the first MLU group (MLU level 3.5) the difference between the Chinese- and English-speaking children in their use of null subjects is not statistically significant.

How can the observation that as early as 2 years old both Chinese and American children are using null arguments be explained? It might be understandable that Chinese children do so because adult Chinese is a pro-drop language. But then why would the American children also do so, given that null arguments are not allowed in adult English? On the other hand, how can the observed differences between Chinese and American children in the null argument phenomena be explained along developmental lines?

If we adopt the idea that part of the formulation of UG is a system of parameters, and the initial setting for a particular parameter is the same for all children constrained by certain principles, then the observed phenomena can be explained. As discussed above in detail, the principles of UG may tell us when a null subject can occur and how it can be identified. The data we obtained support the hypothesis that English- and Chinese-speaking children at a very early age have a grammar which allows null subjects.

We are left, however, with three important questions for discussion. First, how strong is the asymmetry we found comparing subject and object dropping in English compared to Chinese, and how can it be accounted for by parameter theory? Second, how does the child who begins with an incorrect parameter setting make the change to the adult grammar? Third, how does the linguistic environment make an impact on this parameter resetting?
4.1 On the Subject/Object Asymmetry

Our data did not confirm Jaeggli and Hyams' hypothesis with respect to null objects. Instead, our data indicate that while the Chinese-speaking children used null objects from as early as 2 years old (the youngest age tested), the English-speaking children by and large did not use null objects. This returns us to the potential problem with Jaeggli and Hyams' account discussed above. If English-speaking children have a Chinese-type language as their initial parameter setting, then we would expect children learning both languages to progress similarly in terms of the use of null objects. However, this was not the case.

We do not think that the null subject/null object asymmetry we found in Chinese- and English-speaking children's use of null objects can be accounted for by the non-existence of variables in early grammar. Both the Chinese- and the English-speaking children provided evidence for the emergence of variables. According to Hyams' hypothesis, the English-speaking children in this situation should use null objects at least as productively as the Chinese-speaking children do, but our data show that they do not. The small percentage (3.57) is really within the error range. If the English-speaking children have reset their null argument parameter at this point, they should have stopped using both null subjects and objects. Our data show that this is not the case: they continued to use null subjects but essentially no null objects even though they had acquired variables. At the same time, the Chinese-speaking children (who showed the same kind of evidence of variables) did use null objects productively.

As an alternative to Jaeggli and Hyams' hypothesis, we propose that there is more than a single parameter controlling the use of null arguments (following Lillo-Martin, 1986; 1991). One parameter, which can be called the Discourse Oriented Parameter (DOP) (following Huang, 1984), permits languages with discourse oriented properties to have both null subjects and null objects. These null arguments can be one of two types. Most are variables identified by a Discourse Topic. In embedded subject position there is also the option of pro, identified by a c-commanding NP. These null arguments correspond straightforwardly to two of the identification options proposed by Jaeggli and Safir, given in (11b and c) above. For learnability reasons, assuming parameter setting takes place on the basis of positive evidence, we might expect that the initial setting of the DOP is [-DO]. If so, the performance of the Chinese-speaking children in our study indicates that resetting of the DOP to [+Discourse Oriented] can take place early. Since other characteristics of discourse oriented languages, such as topic-comment structures and discourse-bound anaphors, can serve as evidence for determining this parameter setting, it is reasonable to assume that the Chinese-speaking children have made this setting and produce null subjects and null objects in accord with this grammatical option.

The second part of our proposal is that null arguments in adult languages like Italian are due to a separate parameter, which we will call the Null Argument Parameter. This parameter permits null arguments when licensed by certain Case-assigning maximal categories, following Rizzi (1986). These null arguments are empty categories of the type pro, identified by the person, number-, and / or gender-features of the licensing category. Although subject-verb agreement is insufficient to license or identify null subjects in adult English, we take it that English-speaking children who use null subjects are doing so because of this parameter, rather than the DOP. The subject-object asymmetry is related to the cross-linguistic observation that object agreement is much less common than subject agreement; hence pro null objects are found in many fewer languages than pro null subjects. Children will universally posit an INFL category with the potential of being a licensor for empty subjects, but not for empty objects. Hence, universally children will begin with a null subject hypothesis. Changing the parameter setting to disallow null subjects will thus only take place after morphological agreement has been analyzed.

Other proposals have been made arguing that the null subject phenomenon in early English is due to performance factors rather than a grammatical parameter setting (e.g., Bloom, 1990; Gerken, 1990; Mazuka, Lust, Wakayama, and Snyder, 1986). Although these suggestions are worth considering, there is considerable cross-linguistic evidence to take the early null subject phenomenon as representing a grammatical stage. Performance accounts of the early null subject phenomenon do not make the same cross-linguistic predictions as grammatical accounts do. More cross-linguistic work can contribute to the resolution of this debate; but the data currently available support the grammatical account. For reviews of performance versus grammatical accounts, see Hyams and Wexler (1991) and Lillo-Martin (1991).
4.2 Parameter Resetting

The evidence is quite strong that both Chinese- and English-speaking children have a grammar which allows null subjects at an early age, since they were both using null subjects even at the age of 2 (examples 12a, b and 13a, b). For the Chinese children, since the adult language allows null arguments, no change will have to be made in their parameter setting. However, for the English-speaking children, a parameter will have to be reset on the basis of evidence for [-pro-drop] from the linguistic environment. Our data shows that roughly between the age of 2 and 3 or MLU 3.5 to MLU 4.5, a drastic change has taken place in the English-speaking child's grammatical development. That is, during this transition the English-speaking children show a dramatic decline in the production of null subjects. It seems to be at this point that the parameter resetting has taken place.

How does this resetting occur? It is possible that the presence of overt expletives can be used as evidence that English is [-pro-drop], as discussed above. However, there is now some cross-linguistic data which indicates that the perfect correlation between overt expletives and [-pro-drop] which is needed for this kind of evidence does not exist (cf. Jaeggli & Hyams, 1987, Hyams, in press). Even if this positive evidence is unavailable, however, it is possible that indirect negative evidence can be used (Lasnik, 1989). For the English children, since the child's initial setting is also [+pro-drop], he would, like the Chinese children, expect to hear sentences with null subjects. When the child fails to hear sentences with null subjects in English, this will then be taken as indirect negative evidence that such sentences are not allowed in his language, hence, ungrammatical. The incorrect positive parameter will then be replaced by the correct negative setting [-pro-drop].

Note that our data do agree with some empirical data existing in the literature, which together may be taken as evidence for certain a priori, language-independent properties of early grammar hard-wired by parameters of UG. For instance, with our Chinese child subjects at MLU level 3.5, 20% of the transitive verb constructions were produced with null objects, which is very close to the 17% of the similar constructions obtained in Japanese children (Mazuka et al., 1986). Also, for the American child subjects, the mean percentage of sentences with null subjects (15%) is very close to the percentage found in Gerken's imitation study (19%, subjects' mean age was 2;3; Gerken, 1990). Further, the dramatic decrease in the mean percentage of sentences with null subjects observed in our American children between age 2 and 3 is consistent with Hyams' proposal of an inverse relationship between null subjects and the use of inflectional morphology. These studies all point to an initial [+pro-drop] setting, with resetting to [-pro-drop] for English-speaking children during the third year.

4.3 Effects of Linguistic Environment

What role does the linguistic environment play in this parameter-setting account of language development? Clearly, only data from the linguistic environment can trigger the resetting of a parameter, such as is needed for English-speaking children. However, the interaction between the child's initial setting of this null-subject parameter and the input of the child's linguistic environment seems to make itself felt even earlier and in more subtle ways than parameter resetting. Even the 2-year-olds we tested displayed a noticeable difference in the null subject/null object phenomena between the two testing populations. First of all, only the Chinese-speaking children used null objects to any extent. This, as we suggested, can be due to a different parameter from the one used for null subjects in English-speaking children; one that could possibly be set on the basis of entirely independent data.

A more extensive consideration of the role of the linguistic environment is called for if we take into account the proportions of null arguments used across the different age ranges in Chinese and English. Although the English-speaking children used null subjects frequently, they still used them less frequently than the Chinese children. In the case of null objects, we have suggested that the difference between English- and Chinese-speaking children is a difference related to their grammars: the Chinese-speaking children's grammars allow null objects, while the English-speaking children's grammars do not. However, we do not make the claim that the difference in the use of null subjects is a grammatical difference. This seems to be a prime example of an area where the force of the linguistic environment is felt. Furthermore, as they develop, the use of null arguments by the Chinese-speaking children approaches that of the adult subjects. For example, the Chinese adults produced sentences in which the null argument is interpreted by virtue of a discourse topic established several sentences earlier, as in example (22) above. The youngest children did not exhibit this kind of long distance topic chaining. The factors that control the pragmatically acceptable use
of null arguments (as opposed to their general grammaticality) will need to be learned by Chinese-speaking children, independent from the setting of grammatical parameters. This will be directly related to the linguistic environment.9

5. CONCLUSION

In general, this study has shown some support for the hypothesis that English-speaking children begin speaking a [+pro-drop] language. The specific hypothesis of Jaeggli and Hyams (1987), that early English is a Chinese-type language, received mixed support. Support in favor of Jaeggli and Hyams' proposal may be seen through the following points:

i. As early as 2 years old, which was the earliest age tested, the English-speaking children produced sentences with null subjects at 34.57%.

ii. The English-speaking children did display an asymmetry in the use of null subjects, compared to their very low incidence of null objects.

However, this data also throws Jaeggli and Hyams' (1987) theory into a dilemma. They use Roepers' (1986) proposal for the later development of variables in order to account for the proposed null subject/null object asymmetry. Our result shows that apart from the low level of null object errors, the English-speaking children never used any true null objects, consistent with Jaeggli and Hyams' analysis. However, we found this even after the children had developed variables (as indicated by production of Wh-questions). According to Hyams, the English-speaking children should have displayed null objects when they developed variables, or else they should have gone through the business of null argument parameter restructuring by this time, and displayed no null subjects. But our data shows that they did use null subjects at this age. Furthermore, the English-speaking children were different from the Chinese-speaking children, in that the latter used both null subjects and null objects during the time we tested them. These observations provide counterevidence to the Jaeggli and Hyams proposal.

This study also shows that although it is important to have theory guide research in the field of language acquisition, it is likely that the data will show where the predictions of the theory are in error, or where the theory needs refinement. Even if the parameter theory generally holds, it still could be true that the process of resetting might be slower for some parameters than others; in other words, in some aspects of the use of null subjects, the restructuring can be gradual and take a longer time than was previously thought. The result of this study also suggests that the linguistic environment or linguistic input shapes the child's grammar from a very early stage, e.g., as seen in the early cross-language differences in use of both null subjects and null objects.

REFERENCES

Children; 17, 501-557. Academic Publishers. must be identified by the closest children interesting pro. c) can be interpreted or understood occurrence comparison can be made with the acquisition In Adventures AC=American K. Issues psycholinguistics in doctoral out, Gennan-speaking children Adults. German is island constraints. is German in analysis, by which only embedded subjects can be those children. Akiyama, S. in German pragmatic factors which allow for children German of arguments which are necessary for the development of person-number null arguments in early grammars: Implications for parameter setting theory. In J. Weissenborn, H. Goodluck, & T. Roeper (Eds.), Theoretical issues in language acquisition. Hillsdale, NJ: Lawrence Erlbaum Associates.

FOOTNOTES

1 Also University of Connecticut
1 Also Wesleyan University
†† Also Wellesley College
The following abbreviations are used in the glosses:
[a]: null argument
ASP: Aspect
DE (footnote 7); NE (p.14); MA (p.20): Chinese particles which have no stress, and no meaning of their own when used in a statement
BA (p.23): a passivizing morpheme in Chinese
2 Chinese examples not otherwise credited are provided by QW.
3 The null subjects in (5a, b & c) can be interpreted or understood as "sky."
4 In his (1989) paper, Huang amends this option in a way which also allows the matrix subject to be pro, by saying that an empty pronominal (pro) must be identified by the closest nominal element if there is one. We will continue to adopt the (1984) analysis, by which only embedded subjects can be pro.
5 Roeper, Root, Mallis, and Akiyama make this suggestion for a completely different reason. They discuss an experiment in which children appear to violate strong crossover for a long period of time. They account for this finding with the hypothesis that children begin with pro but not variables as empty categories. However, there is new evidence which suggests that children do not actually violate strong crossover (see McDaniel & McKee, in press, Thornton, 1990), and that they do have variables.
6 The experimenter, QW, is a native speaker of Mandarin from the People's Republic of China. She is also fluent in English.
7 None of the Chinese children in MLU group 3.5 (2-year-olds) and 4.5 (3-year-olds) produced any sentences with embedded clauses. Only one of the 4-year-olds (YD) produced few sentences with embedded clauses. However, all three of his sentences with embedded clauses were produced with an overt subject, e.g.,
    Tā xiǎng, Lào wúng chū bù dào zhè mòtòu fángzi de.
He thought, old wolf blow not down this wood house DE 'He thought that the old wolf could not blow down the wood house.'
8 Statistical comparison between the use of null objects by the American children and the Chinese children was unnecessary given the big differences between the ranges of the percentages.
9 An interesting comparison can be made with the acquisition of German. Weissenborn (in press) claims that adult German is like Chinese in allowing null arguments identified by discourse topics, but he says that the occurrence of null arguments in German is more restricted than in Chinese, according to pragmatic factors. As he points out, German-speaking children will then need to learn those pragmatic factors which allow for null arguments in German on the basis of more linguistic experience than that which allows the Discourse Oriented Parameter to set. He indicates that the development of the correct use of null arguments in German takes some time.
10 CC=Chinese Children; AC=American Children;
AAC=Adjusted American Children; CA=Chinese Adults.
Null Subject vs. Null Object: Some Evidence from the Acquisition of Chinese and English

APPENDIX 1: CHILD SUBJECTS

<table>
<thead>
<tr>
<th>Subject</th>
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### APPENDIX 2: RESULTS FROM ADULT SUBJECTS

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<tr>
<td>WC</td>
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<td>8.929</td>
</tr>
<tr>
<td>YL</td>
<td>43.177</td>
<td>6.667</td>
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</table>
APPENDIX 3: RESULTS FROM CHILD SUBJECTS

Mean percentages of sentences with null subjects and with null objects

<table>
<thead>
<tr>
<th>Subj.</th>
<th>Subj.-drop</th>
<th>(s.e.)</th>
<th>Obj.-drop</th>
<th>(s.e.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>CC</td>
<td>46.543</td>
<td>3.776</td>
<td>22.533</td>
<td>1.761</td>
</tr>
<tr>
<td>AC</td>
<td>33.105</td>
<td>6.120</td>
<td>3.572</td>
<td>1.313</td>
</tr>
<tr>
<td>AAC</td>
<td>14.584</td>
<td>5.025</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CA</td>
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<td>2.296</td>
<td>8.387</td>
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Testing results arranged according to chronological age

<table>
<thead>
<tr>
<th>Subj.</th>
<th>Age</th>
<th>MLU</th>
<th>Subj.-drop</th>
<th>(s.e.)</th>
<th>Adj.SD</th>
<th>(s.e.)</th>
<th>Obj.-drop</th>
<th>(s.e.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>CC</td>
<td>2</td>
<td>3.41</td>
<td>55.728</td>
<td>4.098</td>
<td></td>
<td></td>
<td>20.192</td>
<td>2.165</td>
</tr>
<tr>
<td>CC</td>
<td>3</td>
<td>4.41</td>
<td>45.650</td>
<td>7.215</td>
<td></td>
<td></td>
<td>21.376</td>
<td>4.361</td>
</tr>
<tr>
<td>CC</td>
<td>4</td>
<td>5.28</td>
<td>38.252</td>
<td>5.026</td>
<td></td>
<td></td>
<td>26.031</td>
<td>1.991</td>
</tr>
<tr>
<td>AC</td>
<td>2</td>
<td>3.51</td>
<td>34.571</td>
<td>12.427</td>
<td>25.885</td>
<td>12.871</td>
<td>8.308</td>
<td>0.459</td>
</tr>
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<td>4.65</td>
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<tr>
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</table>

Testing results arranged according to MLU

<table>
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<th>Age</th>
<th>MLU</th>
<th>Subj.-drop</th>
<th>(s.e.)</th>
<th>Adj.SD</th>
<th>(s.e.)</th>
<th>Obj.-drop</th>
<th>(s.e.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>CC</td>
<td>2</td>
<td>3.41</td>
<td>55.728</td>
<td>4.098</td>
<td></td>
<td></td>
<td>20.192</td>
<td>2.165</td>
</tr>
<tr>
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<td>3</td>
<td>4.41</td>
<td>45.650</td>
<td>7.521</td>
<td></td>
<td></td>
<td>21.376</td>
<td>4.361</td>
</tr>
<tr>
<td>CC</td>
<td>4</td>
<td>5.28</td>
<td>38.252</td>
<td>5.026</td>
<td></td>
<td></td>
<td>26.031</td>
<td>1.991</td>
</tr>
<tr>
<td>AC</td>
<td>2</td>
<td>3.51</td>
<td>34.571</td>
<td>12.427</td>
<td>25.885</td>
<td>12.871</td>
<td>8.308</td>
<td>0.459</td>
</tr>
<tr>
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<td>32.372</td>
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<td>8.933</td>
<td>2.884</td>
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</tbody>
</table>
### APPENDIX 4: THE FOLLOW-UP STUDY

<table>
<thead>
<tr>
<th>Subject</th>
<th>Total # of sentences</th>
<th># of sentences with transitive verbs</th>
<th>% Subj.-drop</th>
<th>% Obj.-drop</th>
</tr>
</thead>
<tbody>
<tr>
<td>HD</td>
<td>295</td>
<td>176</td>
<td>41.36</td>
<td>38.07</td>
</tr>
<tr>
<td>HH</td>
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<td>132</td>
<td>47.73</td>
<td>43.94</td>
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<tr>
<td>LQ</td>
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<td>97</td>
<td>38.54</td>
<td>35.05</td>
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<tr>
<td>SL</td>
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<td>122</td>
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<td>39.34</td>
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<tr>
<td>TJ</td>
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<td>50.87</td>
<td>44.31</td>
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</table>