

**SPEED OF LANGUAGE ACQUISITION:
A COMPARISON OF
CHILDREN AND ADULTS**

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Abstract

Lenneberg (1967) proposed a critical period for language acquisition that ends at puberty. The present research attempts to evaluate the nature of this critical period for language. In particular, the present study was designed to examine the initial stages of second language acquisition, with a methodology adapted from Johnson & Newport's (1987) study of ultimate language acquisition. Twelve Japanese children and twelve Japanese adults, all of whom had recently arrived in the U. S., were given a grammaticality judgment test. Twelve native English speaking children and twelve native English speaking adults were also tested for comparison purposes. Japanese adults performed better than children on the test, although both groups had been in the U. S. for approximately six months. Thus, the critical period for language does not appear to have an effect at the initial stages of second language acquisition. Such an effect may be evident later in the acquisition process, as was shown by Johnson & Newport (1987). These two sets of results, taken together, suggest that the age effect reverses at some point between the first and the third years of exposure to a second language.

Speed of language acquisition: A comparison of
children and adults

It is usually taken for granted that adults are superior to children at most types of cognitive processes. Therefore, if language is a typical subset of cognitive development, it would be assumed that adults are superior to children at learning languages. However, some have argued that language acquisition is not in this sense a typical cognitive process. A three year old child's ability to use language is strikingly superior to his ability to use other cognitive functions. This suggests that perhaps children have a special aptitude for language learning. In order to substantiate this claim, it is important to study the nature of language learning abilities as a function of age

Lenneberg (1967) proposed the critical period hypothesis for language, which claims that there are age-related biological limitations to language acquisition. In particular, Lenneberg proposed that if normal language acquisition occurs during the critical period (through puberty), language will be acquired without ultimate language deficiencies. However, after the critical period, language acquisition does not

result in the same level of proficiency. Furthermore, Lennenberg proposed a neurological mechanism which might be responsible for this critical period. The left hemisphere of the brain is the site of normal language acquisition. According to Lennenberg, during the critical period, it is possible for the site of language acquisition to be transferred to the right hemisphere in the event that the left hemisphere is unable to acquire language. However, after the critical period, this plasticity in the brain no longer exists.

Lennenberg's main evidence came from the study of patients who had suffered from lateralized brain lesions at different stages of life. Lesions in certain areas of the brain lead to aphasia, the loss of the ability to make use of previously learned language. Lennenberg found that adults who have had left-hemisphere lateralized lesions to language areas almost always suffer from irreversible aphasia. However, children ages 3-10 who have had the same types of brain lesions tend to recover from aphasic disorders without ultimate language deficiencies.

Lennenberg also discussed language learning in patients ages 6 months to 22 years with Down's syndrome. In a study over a period of three years, children younger than 14 years old had progressed in

language development, while subjects older than 14 years old had not improved at all over the three year period. Both of these accounts by Lenneberg provide evidence supporting the critical period hypothesis for primary language learning.

Curtiss (1977) described the unfortunate case of Genie, a child who was severely neglected and isolated from language input and social contact from early infancy until she was 13 1/2 years old. When Genie was finally discovered and brought into a hospital, she appeared drastically underdeveloped both physically and mentally. She understood a few words, but otherwise had acquired virtually no language. Though she progressed considerably through 4 1/2 years of rehabilitation and training, she experienced a slow, extremely retarded rate of development. She never achieved anything close to normal fluency in English.

Curtiss claimed that Genie's language acquisition strongly resembled right-hemisphere language acquisition (in contrast to the left-hemisphere language of normal subjects). Consequently, she claimed that her case directly supported Lenneberg's critical period hypothesis. "The fact that Genie has right-hemisphere language may be a direct result of the fact that she did not acquire language during the 'critical period.' It suggests that after the critical

period, the left hemisphere may no longer be able to function in language acquisition, leaving the right hemisphere to assume control." (Curtiss, 1977, p. 234)

Both Lenneberg's and Curtiss' studies have described incomplete primary language learning in adults whose childhood development was disturbed in many ways aside from language development. Thus, it is difficult to isolate the exact cause of their language deficiencies. While their results could be directly related to a critical period for language, they could possibly be confounded by many other developmental problems. In order to substantiate the existence of a critical period for language, it would be advantageous to study primary language acquisition further in those cases which are not confounded by other developmental problems. The ideal way to do this would be to directly compare normal children and adults learning a primary language. However, it is rare to find otherwise normal adults who have not already been exposed to a primary language.

The circumstances of the deaf community provide a unique opportunity to compare socially and neurologically normal children and adults learning the same primary language. People who are born deaf begin learning to communicate in American Sign Language at varying stages of life, while often lacking adequate

exposure to any other language prior to this time. Thus, it is possible to compare children and adults both learning American Sign Language as a primary language. American Sign Language (ASL) is not a gestural translation of English (a frequent misconception). Rather, it is a fully developed visual-gestural language similar in many ways to typical spoken language (Klima & Bellugi, 1979; Newport & Meier, 1985).

Newport & Supalla (Newport, 1984, in press; Newport & Supalla, forthcoming) studied ASL competency in deaf adults. They divided their subjects into three groups. "Native learners" were exposed to ASL from birth by their deaf parents. "Early learners" were exposed to ASL by peers from ages 4 to 6. "Late learners" were exposed to ASL by peers after age 12. All subjects had had at least 40 years of exposure to ASL at the time of testing.

Subjects were tested on the production and comprehension of verbs of motion in ASL. Verbs of motion are morphologically complex in ASL; that is, they are composed of a number of components of form, each regularly related to a component of meaning. Percent correct on the test was computed for the elicited production and comprehension of a number of different morphemes within verbs of motion. Native

learners scored better than early learners, who scored better than late learners, on virtually every morpheme tested. There was no effect from number of years of exposure to ASL.

An error analysis showed that the few mistakes that native learners made were consistently morphologically related. This implies that they used a morphological process when acquiring ASL in childhood, similar to the process of any child acquiring spoken language. However, the mistakes made by late learners were qualitatively very different than those of native learners. Many of the late learners' errors appeared haphazard and internally inconsistent over test items and across subjects. This suggests that the late learners did not acquire ASL by the same process as the native learners, but perhaps rather by holistically memorizing signs.

Newport and Supalla's results clearly support the hypothesis that children have a special capacity for primary language acquisition. Younger learners of ASL are superior at acquisition, at least in terms of their ultimate performance many years later. In addition, younger learners of ASL appear to utilize a morphological analysis of verb forms. This is a much more complex method than the method of rote memorization apparently used by older learners of ASL.

Lenneberg, Curtiss and Newport's studies all provide substantial evidence for the existence of a critical period for primary language learning. Yet, many questions about the nature of this critical period remain unanswered. For instance, many researchers have challenged Lenneberg's original description of the critical period for language, along with the neurological mechanism for it which he proposed. Such questions are beyond the scope of this paper.

However, one way that researchers have attempted to look at the critical period for language in more depth is by studying the acquisition of second languages. Empirical evidence concerning the learning of a second language by adults should not be confused with evidence supporting or rejecting the critical period hypothesis for primary language learning. The critical period hypothesis does not assert that it is impossible for an adult to acquire a second language. Indeed, it is widely acknowledged that adults do have the ability to learn foreign languages to some degree. Thus, research about second language acquisition can neither confirm nor disconfirm the existence of a critical period for language. Rather, research about second language acquisition can help to describe the effects and the limitations of the critical period for language (for discussion, see Johnson & Newport, 1987).

In particular, one can ask whether the critical period for language learning also applies to second language learning, or rather whether it is confined only to primary language learning

Lenneberg (1967) briefly mentioned that foreign language acquisition is apparently increasingly difficult after puberty, although he did not give evidence to support this claim. Ervin-Tripp (1974) claimed that second language learning should follow a pattern similar to primary language learning. "If the human brain is especially competent to deal with language learning, there is no reason to suppose this ability would confine itself to the first language" (p. 112). However, this claim has not yet been substantiated.

The main advantage of studying second language (L2) learning is that the circumstances of acquisition (age of exposure, amount of exposure) can be examined in ways that are not possible with primary languages (L1). Many researchers have attempted to compare child and adult skills at second language learning. A variety of different methodologies have been used to study L2 learning. Consequently, many differing conclusions have been reached.

Krashen, Scarcella, and Long (1982) reviewed the L2 acquisition literature. They suggested that the contradictory results could be explained in terms of the length of time since the L2 had been first acquired (that is, where in the acquisition process the L2 learners fell). They labeled studies in which subjects had been learning the L2 for only up to one year as "short-term studies," and studies in which subjects had been using the L2 for five years or more as "long-term studies."

Figure 1 presents a simplified summary of the results of current L2 research. Short-term studies, which have studied the initial stages of language acquisition (0-1 year of exposure to the language), have claimed that adults and older children outperform younger children (Asher & Price, 1967; Ekstrand, 1976; Fathman, 1975; Olson & Samuels, 1973; Snow & Hoefnagel-Hohle, 1977, 1978). These data have been claimed to contradict the critical period hypothesis (although, as mentioned earlier, this is not truly sufficient evidence against the existence of a critical period for language). In contrast, long-term studies, which have studied ultimate performance in language acquisition (three years or more of exposure to the language), have claimed that children outperform adults (Asher & Garcia, 1969; Oyama, 1976, 1978; Patkowski, 1980,

Johnson & Newport, 1987). These latter findings have been claimed to be in accordance with the critical period hypothesis.

Most of the short-term studies have involved learning a second language only in a school or a laboratory setting. Snow & Hoefnagel-Hohle (1978) performed the only short-term study which compared children and adults learning L2 in a natural environment. In this study, they claimed that 12 to 15 year olds showed the most rapid L2 acquisition. Adults were next, followed by 8 to 10 year olds, 6 to 7 year olds, and finally 3 to 5 year olds. However, there are several reasons to be cautious about these results. First, their study involved English speakers learning Dutch. These languages have numerous grammatical similarities (and in fact are historically related languages). Such similarities between L1 and L2 could therefore be responsible for the greater speed of L2 learning by older children and adults, who might be expected to have a better mastery of the first language, and therefore more positive transfer from L1 to L2. These facts thus lead us to hesitate whether the findings could be generalized to other languages.

In addition, it must be noted that Snow & Hoefnagel-Hohle reported their main results as raw scores. This means that they compared children and

adults' performances without taking into account age-effects in general test-taking abilities. Older children and adults may thus perform better because they are more adept at performing experimental tasks, and not because they are more fluent in the language. Toward the end of their paper, they analyzed some of their data as percentages of native speakers' mean scores of the same ages (p. 105), a more appropriate way to compare adults and children. The results of this reanalysis, especially from the sentence judgment test, much less conclusively support their claim that older children perform better than younger children.

Johnson & Newport (1987) studied ultimate acquisition of English by giving a grammaticality judgment test to native Korean or Chinese speakers. All of the subjects had lived in the United States (with exposure to native English) for at least three years, with an average of ten years in the U. S. Subjects varied in their age of arrival in the U. S. (i.e. their age of initial exposure to English) from age 3 to age 39. Subjects were tested on knowledge of L2 syntax and morphology by being asked to judge the grammaticality of spoken English sentences. A strong negative linear relationship was found between age of arrival and performance ($r = -.77$); in fact, for ages of arrival from childhood to puberty (ages 3-15), the

correlation was $-.87$. That is, early ages of arrival resulted in better test performance. There was no significant effect of varying length of exposure to English over three years. Johnson and Newport claimed that their results are clear evidence that language acquisition begun in childhood is superior for ultimate language learning.

The present study is modeled directly on Johnson and Newport's study. However, instead of studying ultimate acquisition, it is intended to study the initial stages of acquisition (0-1 year). It is therefore intended to follow up on the results of Johnson & Newport (1987) for ultimate performance, as compared with those of Snow & Hoefnagel-Hohle (1978) for initial stages of acquisition. The central question in this new study is whether children are superior to adults in the initial stages of L2 learning (as depicted in Figure 2), or rather whether (as Snow & Hoefnagel-Hohle have claimed, and as depicted in Figure 1) adults are superior to children. If the results show the former, this would suggest that children are consistently superior throughout the acquisition process. On the other hand, if the results show the latter, it would suggest that there is a reversal in the nature of the age advantage at some point in acquisition. Each of these findings clearly would have

distinct implications for describing the nature of the critical period for languages.

This study is designed to investigate language acquisition in a natural setting, with different L1 and L2 than have previously been used. Since children and adults are given identical tests, age-corrected scoring procedures are used in order to compensate for the adults' higher test-taking abilities. The main analysis will examine age-corrected scores for children vs. adults.

Method

Subjects

Twelve native Japanese children and twelve native Japanese adults, all of whom had recently arrived in the U. S., were tested. Japanese was chosen as the primary language because of availability of subjects in central Illinois, and the fact that Japanese is neither typologically similar nor historically related to English.

Subjects were chosen who had been living in the United States for as close to six months as possible, and had been exposed to a significant amount of native-spoken English during that time period. Child subjects were found through local school systems. Adult subjects were recruited through the Illini Japanese Association at the University of Illinois, and were paid to participate in the study.

The ages of the children tested ranged from 7 to 11, mean = 8.2 years. They had been in the United States for between six to nine months, mean = 7.1 months. They thus arrived in the U. S. between the ages 6 and 10. All of the child subjects spoke Japanese in their homes. Eight of the children were enrolled in grammar school in Urbana, IL, where they were taught English as a second language two hours every day, and their native language one hour every day. The remainder of the school day was spent in regular English classes. The remainder of their school time was spent in English. Classmates were a mixture of native and nonnative speakers of English. Four of the children were enrolled in grammar school in Normal, IL, where they were provided with special instruction by a Japanese-speaking tutor approximately three times per week. Classmates were almost entirely speakers of English. Since there was no apparent difference in performance between the two schools, they will be treated here as one group.

The ages of the adults tested ranged from 22 to 37, mean = 29.2. They had been in the U. S. for 6 to 13 months, mean = 7.6 months. They thus arrived in the U. S. between the ages 21 and 36. Eight of the subjects spoke Japanese in their homes. The other four spoke English in their homes. Ten of the subjects were

currently affiliated with the University of Illinois, either as faculty, staff, or students, and therefore had substantial everyday exposure to English. One of the subjects attended Parkland College in Champaign, IL. One of the subjects was the wife of a visiting researcher at the University of Illinois. Eleven of the subjects planned on returning to Japan after a year. All of the adult subjects had received mandatory formal English training in Japan since about age 12, for an average of three to five hours per week. English classes in Japan emphasize grammar and literature, and don't give much attention to conversation and listening skills. Six of the adult subjects had participated in an Intensive English Institute for about 20 hours per week for at least three months. All of the adult subject had taken at least one ESL (English as a Second Language) class which met approximately three hours per week. The implications of the adults' training in English will be discussed in a later section.

Twelve native English speaking children and twelve native English speaking adults were tested for comparison levels. The children were tested at two grammar schools in the Champaign-Urbana vicinity. They were chosen on the basis of age, in order to match their ages to the ages of the non-native children

tested as closely as possible. Their ages ranged from 7 to 11 years old, with mean = 8.2. The native adults were Psychology 100 students at the University of Illinois who were given course credit for participating in the study. Their ages ranged from 18 to 36 years old, mean = 20.3.

One Japanese adult was eliminated from the study because he had attended an international school in Japan for 14 years, where English was a primary language. One American adult was eliminated from the study because he had grown up in a bilingual household.

Materials

A sub-set of 90 items was taken from the grammaticality judgment test used by Johnson & Newport (1987). The full version of this test has been used extensively in studies with adult L2 learners and is therefore known to provide reliable estimates of English proficiency in adult L2 learners (Johnson & Newport, 1987). The original test was 276 items long, and took approximately 90 minutes to administer. A shortened version was used for this study because we anticipated that the original test would be too long to give to children.

The structure of the shortened version was purposely kept similar to the structure of the full version. That is, both versions tested twelve rule types of English, which were chosen to represent a wide variety of the most basic aspects of English sentence structure. See Appendix A for a complete breakdown of the twelve rule types.

The test that was used for this study consisted of 90 sentences which were pre-recorded on tape by a native American female voice (E. N.). Each sentence was repeated twice, with a one to two second pause separating the repetitions. They were spoken clearly, with normal intonation at a slow to moderate speed.

Forty eight of the sentences were grammatical English sentences. Forty two of the sentences were ungrammatical English sentences. The ungrammatical sentences were formed by making one specific error in a grammatical sentence which was used in the original version of the test. However, both the grammatical and ungrammatical versions of the same sentence were not always included in the shortened version.

Nevertheless, since the test included several different sentences testing the same type of rule, the shortened version did include grammatical and ungrammatical sentences which were similar to one another except in the choice of particular words in the sentences. All

of the sentences were presented in random order, with the exception that care was taken not to present two sentences testing the same rule next to each other.

The ungrammatical sentences were spoken with the intonation pattern of their grammatical counterparts. The ungrammatical sentences were created carefully so that alternate interpretations of the errors were least likely (Johnson & Newport, 1987, p. 20). Two grammatical sentences and one ungrammatical sentence were ultimately eliminated from the scoring because native-English speaking adults disagreed about their grammaticality during Johnson & Newport's study (1987, p. 55). See Appendix B for a list of sample ungrammatical sentences.

Procedure

Subjects were told that this was an experiment on second language acquisition. They were told that they would hear 90 English sentences spoken by a female voice on a tape, each repeated twice in a row. They were asked to listen carefully to each sentence each time that it was spoken, and to judge whether the sentence was a good or bad sentence in English. Five practice sentences were read aloud by the experimenter in order to make sure that each subject clearly understood the goal of the task. The tape player was paused after each sentence in order to give the subject adequate time to respond.

After completing all 90 items, the Japanese adult subjects were given a short interview about general background information such as prior exposure to English, their reasons for coming to the U. S., and which language is spoken most at home (see appendix C).

The subjects were thanked and given a brief explanation of the purpose of this experiment.

Results

The primary question of this study was whether children or adults would perform better on the grammaticality judgment test. Japanese adults scored better on the total test (mean = 67 % correct) than children (mean = 52 % correct). A t-test showed that this difference is significant ($t = -6.47, p < .01$). Figure 3 presents these scores along with those for control children and adults. Scores were adjusted for age by dividing the per cent correct for each subject by the mean per cent correct of native English speakers in the appropriate age group. Adults still scored better on the adjusted per cent correct (adult mean = 70 %, children mean = 58 %) A t-test also showed that this difference is significant ($t = -4.33, p < .01$). Figure 4 presents these adjusted scores. These results suggest an adult advantage at the initial stages of L2 acquisition which is not due to the adult age advantage at taking tests.

Adjusted scores were also computed separately for ungrammatical and grammatical items. Adjusted per cent correct scores were higher for adults than for children on the ungrammatical items (adult mean = 68 %, children mean = 48 %). These scores were significantly different ($t = -3.55, p < .01$). However, on the grammatical items, there was no significant difference between adjusted scores (adult mean = 72 %, children mean = 68%, $t = -1.18, p > .10$). Table 1 summarizes the adjusted scores on the total test, ungrammatical items, and grammatical items. Adults scored higher than children on the total test and on ungrammatical items, but not on grammatical items. Possible implications for this finding will be discussed in the next section.

Scores on each of the twelve English rules were analyzed on ungrammatical items only, since for grammatical items, there is no way of defining precisely what rule of English is being tested. Figure 5 shows adjusted per cent correct for adults and children on the ungrammatical items for each of the twelve rule types. These scores are plotted according to the adults' scores. The order of difficulty of rule types is overall similar for children and adults, but with several notable differences, especially for the more difficult rule types.

Scores on the twelve rule types were compared with chance level for both Japanese children and adults. The children scored significantly better than chance on two of the rules, and significantly poorer than chance on five of the rules. The adults scored significantly better than chance on seven of the rules, and significantly poorer than chance on two of the rules. Tables 2 and 3 list these comparisons on all twelve rule types for both children and adults.

Discussion

Johnson & Newport (1987) have shown that the critical period can be extended to ultimate attainment in second language acquisition. After many years of exposure to the language, those who began as children outperform those who began as adults. The central question in this study was, does the critical period for language also extend to initial second language acquisition? The primary analysis of this experiment showed that, after six months of exposure to a new language, non-native adults perform better than children on a sentence judgment test. These results are consistent with results from previous short-term studies of L2 acquisition. Since the L1 (Japanese) and L2 (English) are not typologically similar, a positive transfer effect from the primary language to the new language is unlikely. Furthermore, after an age-corrected scoring procedure (which accounts for test-taking abilities related to age) was used, adults still performed significantly better than children. Thus, it appears that the adults are not performing better on the test solely because they are more adept at taking tests.

As mentioned earlier, the adults who participated in this study all attended approximately eight years of mandatory formal English classes in Japan, plus some

form of English as a Second Language once they arrived in the U. S. In Johnson & Newport's (1987) study, number of years of formal training in English did not affect performance on the sentence judgment test. Consequently, it is possible that in the present study the adults' formal English training in Japan might not have given them the advantage at language acquisition over people who came to the U. S. as children. However, it is also possible that the grammar and vocabulary that the adults had been exposed to in school in Japan gave them an apparent advantage in the initial stage of acquisition, which they lose later on.

Since it is very difficult to find adults in the U. S. who have not received some sort of formal English training, it is nearly impossible to directly test whether formal training affects L2 acquisition at the initial stages. The test we used was intentionally designed to test language acquisition, rather than language learning. Thus, the test was a listening task rather than a written test, in order to minimize the impact of reading and writing practice in English.

To further investigate the effects of prior English training, the scores of adults who had attended IEI (Intensive English Institute) were compared with the scores of the other Japanese adults. Since people who attended IEI spent over twenty hours per week

learning English, it would be expected that their grammar and vocabulary would be superior to other adults who had not attended IEI. However, even with this experiential advantage, subjects who had attended IEI did not score significantly better than adults who had only attended ESL classes (which met substantially less time per week). Thus, it appears that our test does not reflect amount of formal training. This result bolsters the interpretation that adults' advantage in the present study was not due to English training, but rather to an advantage in natural language acquisition and performance in the initial stages.

The Japanese children scored much worse on ungrammatical items than on grammatical items, while the Japanese adults, as well as both American control groups, scored equally well on ungrammatical items as they scored on grammatical items. There could be several reasons for this asymmetry in the Japanese children. One possibility is that children are biased to say "yes" (therefore, "grammatical") whenever they are unsure of an answer. This would cause their scores on grammatical items to be unduly inflated, while their scores on ungrammatical items would be unduly decreased. This bias would not show up in the native-English speaking children's scores because they were

able to answer most of the items without having to guess. If this is the case, then a method of factoring out response bias would need to be adapted from the analyses used in visual signal detection experiments.

Another possibility is that children find it easier to identify a sentence as grammatically correct than to identify an error in a sentence. When a non-native speaker is presented with a novel sentence structure, there are two possible alternatives for the individual to choose from. S/he could decide that the sentence consists of grammatical structures to which s/he has not been exposed, or s/he could decide that it is an ungrammatical sentence. Perhaps grammatical sentences are easier for children to identify than ungrammatical sentences because these sentences are more likely to conform to structures that have already been encountered. In contrast, ungrammatical sentences could be novel sentence structures, thus more difficult to identify correctly. Thus, their higher performance on the grammatical items could be reflecting differential ability on these two types of items, rather than a response bias. If this is the case, then scores on grammatical and ungrammatical items are more important individually than total test scores. This would be an interesting finding because the children performed just as well as adults on grammatical items,

though significantly poorer than adults on ungrammatical items.

In addition to total test score, further insight into the similarities and differences of how children and adults acquire a new language can be gained from an analysis of scores on individual rule types. As described above, this analysis can only be performed on ungrammatical items. The pattern of performance over rule types was similar for children and adults for most of the rule types (Figure 5). In addition, the order of difficulty for the rule types in this study is similar to the order of difficulty that was found in other studies by Johnson & Newport (1987, forthcoming) with various other primary languages. This suggests that perhaps the order of acquisition of rule types is consistent for all new acquirers of English, regardless of their age.

However, before reaching such a conclusion, several other factors must be accounted for. For instance, as mentioned above, many of the rule type scores are below or the same level as chance. Scores below chance could be reflecting the use of an incorrect rule or biased guessing. It is possible that, particularly for adults, the primary language could be interfering with the acquisition of the second language. Both children and adults scored poorest on

the rule "determiners," which does not have an equivalent in Japanese (Steve Rothenberg, personal communication). However, despite the fact that Japanese is an SOV (Subject-Object-Verb) language, and English is a SVO language, both children and adults performed best on word order items. Overall then, performance is not consistently related to interference, although such interference may play some role in order of difficulty of rule types. A comparison of the acquisition of English by individuals from varying primary languages, at varying stages of acquisition, would help to further determine the nature of this primary language interference (Johnson & Newport, forthcoming).

In summary, adults performed better overall than children after six months of acquisition. It is possible to describe the critical period for language in one of two ways, using these results.

- 1) The critical period for language has no effect at the initial stages of acquisition of a second language. It takes effect at some stage later in the acquisition process. In this case, the adults appear to learn new languages better at the initial stages of acquisition due to their higher cognitive abilities.

2) The critical period for language might have had an effect at the initial stages of acquisition, but it has been overshadowed by extraneous variables such as second language learning in formal training.

The latter explanation is more appealing because it implies that the critical period does not discriminate between the different stages of acquisition. Rather, there is a continuous increase in the effect that the critical period has over time. Perhaps adults begin the acquisition process with a strong advantage due to their formal English training, which takes children time to overcome and surpass.

It is interesting that adults performed better than children after six months of acquisition in this study, while on a very similar test, children performed better than adults after more than three years of acquisition (Johnson & Newport, 1987). Taken together, these results suggest that there is a reversal in the effect of age at some point between the first and third years of exposure to the second language. Perhaps this reversal takes place because children and adults use different strategies when acquiring new languages. However, if this were the case, we would expect different patterns of rule type difficulty, which is not overall the case in this study. It is interesting that the children performed the same or

better than the adults on three out of the four rule types which were the most difficult for adults. Perhaps the children use a strategy which helps them to acquire more difficult rule types more efficiently. This advantage may be beginning to show up at six months of acquisition.

Future research should test people who have been in the U. S. between one and three years in order to determine at what stage of acquisition the reversal in the age advantage takes place. Information about overall performance, performance on ungrammatical items versus grammatical items, and order of difficulty of rule types should be collected at varying stages of the acquisition process. Such information can help determine how and when the critical period for language might limit second language learning.

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Table 1

Adjusted Means for Children vs. Adults

	Children	Adults
Total test	58 %	70 %
Ungrammatical items	48 %	68 %
Grammatical items	68 %	72 %

Table 2

Rule types vs. chance for Japanese Children

Below Chance	Same as Chance	Above Chance
Determiners	Auxiliary verbs	Wh-questions
Past tense	Particle movement	Word order
Pronouns	Present progressive	
Subcategorization	Plurals	
Third person sing.	Yes/No questions	

Table 3

Rule types vs. chance for Japanese Adults

Below Chance	Same as Chance	Above Chance
Determiners	Auxiliary verbs	Particle movement
Plurals	Pronouns	Past tense
	Subcategorization	Present progressive
		Wh-questions
		Yes/No questions
		Third person sing.
		Word order

Figure 1
Possible interpretation of current research

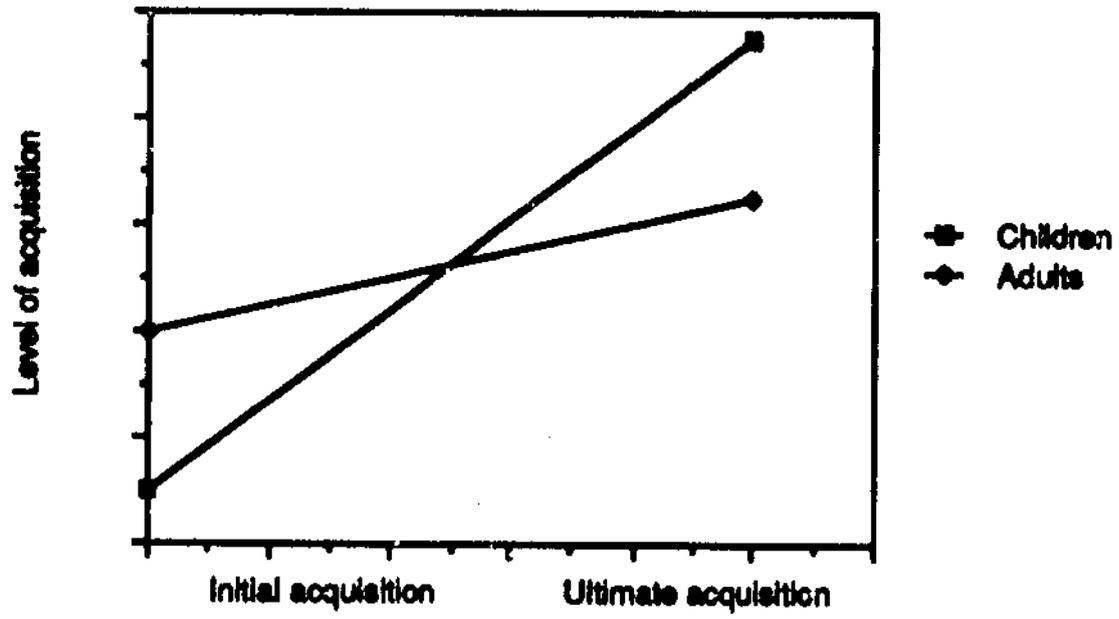


Figure 2
Alternate interpretation of current research

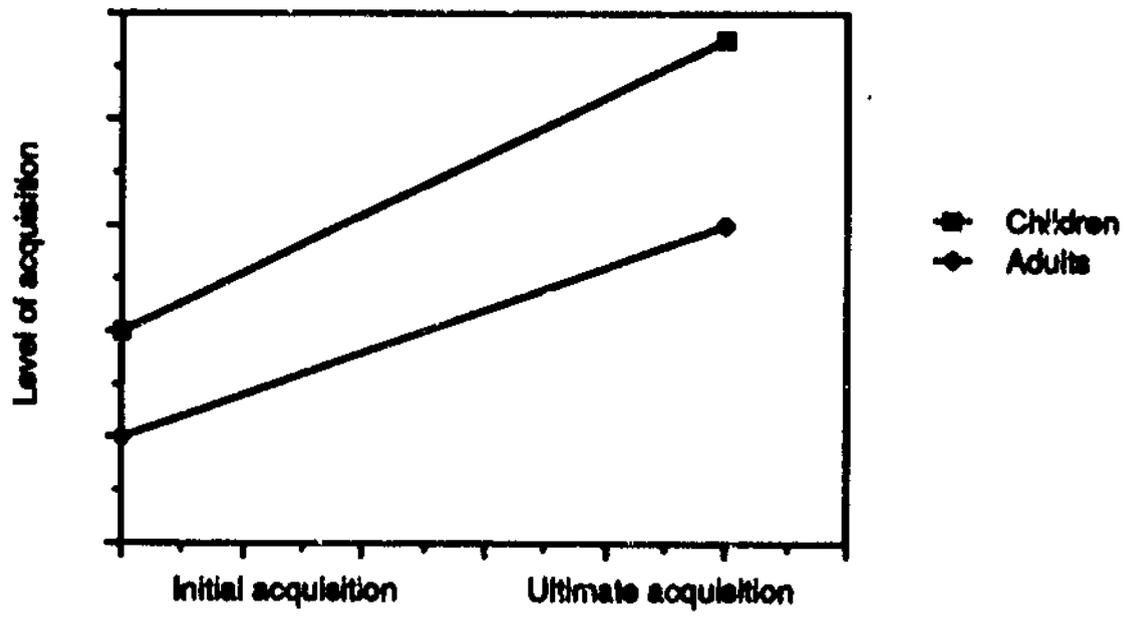


Figure 3
Flaw scores for children and adults

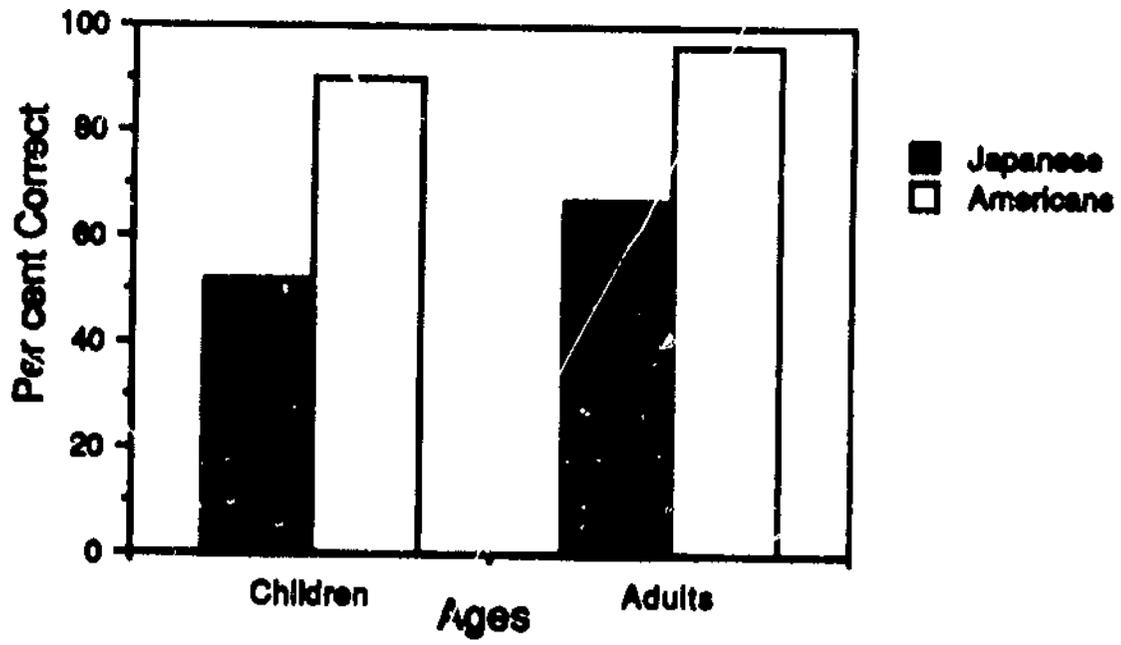


Figure 4
Adjusted scores for children and adults

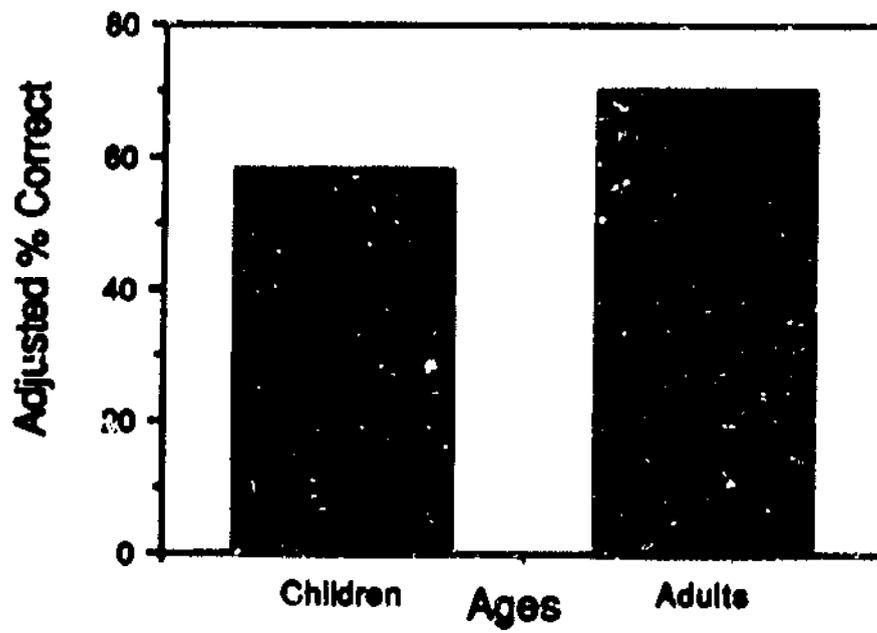
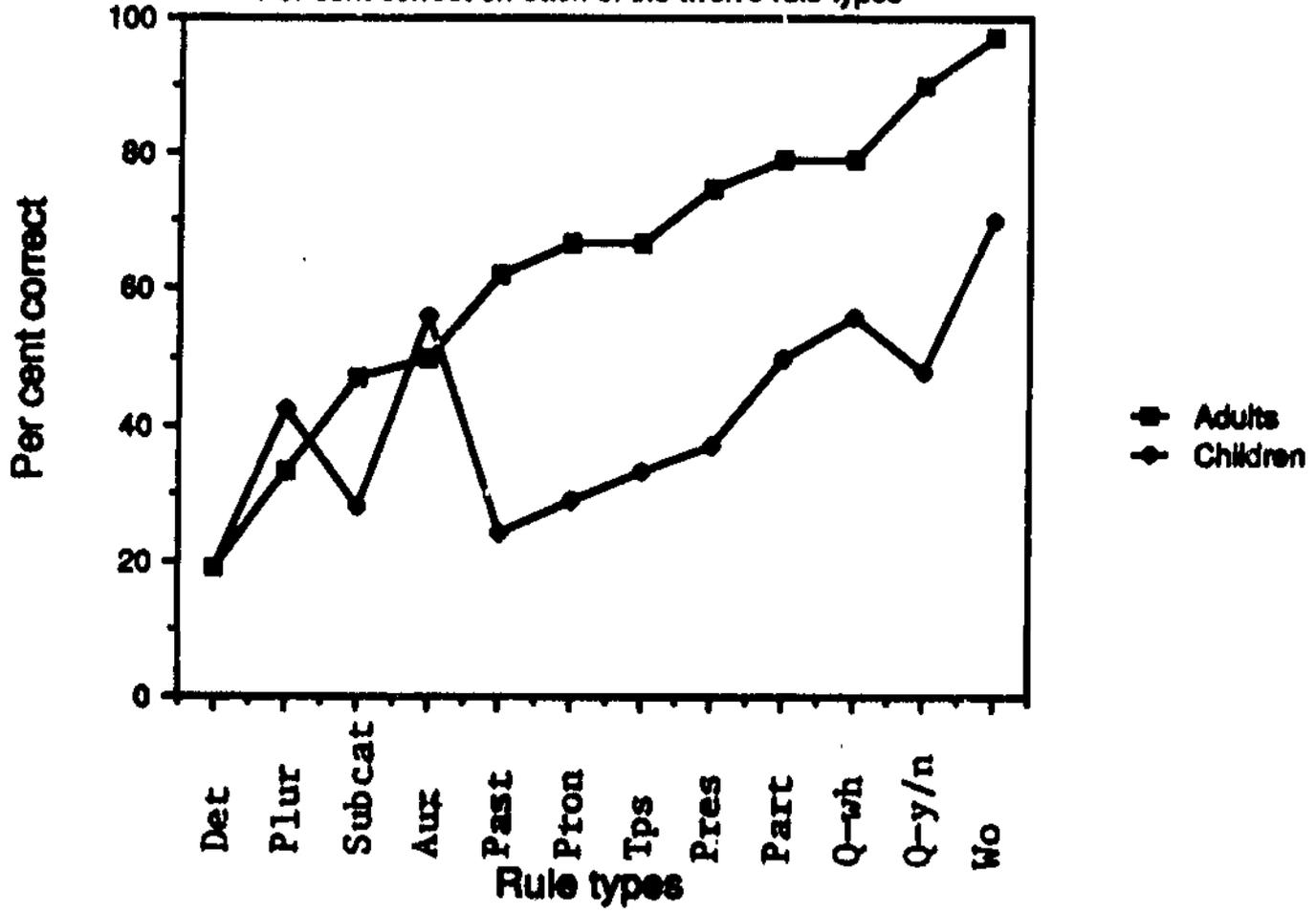


Figure 5
Per cent correct on each of the twelve rule types



Appendix A

Twelve Rule Types

1. Auxiliary verbs
2. Determiners
3. Particle movement
4. Past tense
5. Plural
6. Present progressive
7. Pronoun
8. Question: Wh
9. Question: Yes/No
10. Subcategorization
11. Third person singular
12. Word order

Appendix B

Examples of Ungrammatical Sentences

- * Arnold may have be sleeping when we called.
- * A boys are going to the zoo this Saturday.
- * Tom called the hall down to his mother.
- * Yesterday the baby throwed a cat into the bathtub.
- * Two mouses ran into the house this morning.
- * The little boy is speak to a policeman.
- * We are teaching herself the Spanish alphabet.
- * Who you meet at the park every day?
- * Is waiting Sally in the car?
- * I want you will c. to the store now.
- * Every day Terri talk with her mom on the phone.
- * The man the dinner burned.

Appendix C

Second Language Acquisition Questionnaire

Name _____

Age _____

Birthdate _____

Are you a student here?

Y What major? _____

B.S./M.S./PhD _____

N What occupation? _____

Highest level of education _____

Native language _____

Any other languages _____

At what age did you first start learning English? _____

Please describe briefly the circumstances in which you started
learning English (school/immersion/special) _____

Did you learn English in school in your native country?

Y For how long? _____

How many hrs. per week? _____

Why? (required?) _____

What were the classes like?

Do you remember what book you used?

Was your instructor a native speaker of English?

N go to next question

Were you exposed to English in your native country in places
other than school?(TV, radio, travel..) _____

When did you come to the U. S.? _____

At what age did you first come to the U. S.? _____

Was this the first time you were exposed to native English speakers?

Y

N please explain _____

Why did you come to the U.S.? _____

How much schooling have you had in the U.S. _____

How much instruction have you had in English since you have been in the U.S.? _____

When and where do you speak your native language most often?

When and where do you speak English most often? _____

Which language do you speak most at home? _____

Please rate the following statements on a scale of 1 to 5, where

1 means "strongly agree", and 5 means "strongly disagree":

It is very important to me to be able to speak English well.

1 2 3 4 5

I am relatively fluent in English.

1 2 3 4 5

I am very motivated to improve my English.

1 2 3 4 5

It is very difficult to learn to speak English.

1 2 3 4 5

Do you plan on staying in the U.S.?

Y

N for how long? _____

Are you an American citizen?

Y

N plan to be? when? _____

Are you married?

Y Has your spouse been in the U.S. for the same amount of
time as you? _____

Do you have any children? _____

N

That was the last question. Thank you very much for your time.

Do you know other people who might be willing to participate in
this research project? _____
