

# Longitudinal L2 Attrition: A Case Study of a Japanese-English Bilingual Child

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As part of a longitudinal case study of a bilingual child, this paper examines the attrition of the subject's English language proficiency over a period of four years and two months after he moved from an English-speaking to a Japanese-speaking community at the age of 7 years and 2 months. The study investigates how much and how fast language attrition occurs, and at what linguistic levels (phonology, morphology, lexicon and syntax) and in what linguistic skills (receptive skills and/or productive skills) language attrition occurs. The effects of four short trips to the U.S. on the subject's language attrition were also examined. The study further focuses on whether it is possible to prove either of two theories concerning language attrition: *cross-linguistic effects* and the *retrieval failure theory*. Data were collected through audio recordings of spontaneous speech, story-recalling tasks and pronunciation tests. The Peabody Picture Vocabulary Test and STEP (*Eiken*) were used to collect further data.

As a result, the following five points became clear: (1) The subject's L2 attrition began comparatively late, at 10 - 11 months after the change in his linguistic environment. (2) The subject's language attrition was most recognizable in his speaking skills. Attrition in listening skills and productive phonology was less pronounced. Significant change was present in the following three syntactical areas: answering negative questions, omission of sentence subjects and use of the *do + NP* construction. (3) These three syntactical changes were due in part to simplification or Japanese influence on English. In other words, L1 transfer was observed in his L2 attrition process. Thus, the results of this study support the theory of cross-linguistic effects. (4) The subject in the course of this study regained or relearned some of his English skills during and immediately after trips to the U.S. The findings of this study partially support the retrieval failure theory. Both competence restructuring and performance failure were recognized in specific areas. (5) The findings suggest the subject was also able to acquire new English skills after his language attrition had started. In terms of productive phonology, however, his newly acquired proficiency proved difficult to retain. It is also suggested that increased age plays a role in acquiring vocabulary and pronunciation or correcting grammatical errors using metalinguistic knowledge.

## 第二言語の言語喪失研究 - 日・英語のバイリンガル児童のケース・スタディ 平井清子、北里大学

本研究は、誕生から7年2ヶ月間、米国で日英二言語同時習得していた児童を、日本に移住（帰国）後4年2ヶ月間（7:02 ~ 11:04）調査し、英語力の喪失の推移を、言語運用能力面（聞く、読む、話す、書く）と言語面（音韻、形態素、語彙、文法）において考察したものである。また、帰国後、4回の米国短期滞在が言語喪失に与えた影響も調査した。更に、言語喪失研究の中でも、重要な研究課題となっている言語間干渉（cross-linguistic effects）説と想起不能論（retrieval failure theory）についても検証した。研究方法として、①英語の「自然会話」（spontaneous speech）②「語り」（story-recalling tasks）の英語分析、口ごもり現象（hesitation phenomena）とターゲット・ライク・ユース・フォーミュラ（Target-Like Usage formula）による測定 ③ 語彙テスト（Peabody Picture Vocabulary Test）、英語発音テスト、英検リスニング問題を用い、これらのデータを定期的に収集し、統合的に分析したものである。

その結果、以下の5点が明らかになった。（1）被験者の言語喪失は比較的遅く、帰国後約10 - 11ヶ月頃から始まり、後退喪失の速度も緩やかであった。（2）言語喪失は、リスニングと発音にはほとんど認められず、スピーキングに認められた。文法面においては、特に次の3つが見られた。① 否定疑問文 ② 主語の省略 ③ *do + NP*（3）3つの文法面の変化に、日本語から英語への言語転移（language transfer）が認められ、言語間干渉説が支持できた。（4）米国短期滞在后、英語のデータに回復が認められ、想起不能論が部分的に支持できた。以上により、言語（知識）の再編成（competence restructuring）と言語パフォーマンス不能（performance failure）の両方が、部分的に支持できた。（5）3度目の米国短期滞在后に発音（productive phonology）において習得が認められたものの、その後、短期間に、喪失、回復を繰り返し、定着しなかった。被験者の成長に伴う、身体的、知的成長や、メタ言語能力による学習も、被験者の言語の回復、習得に関与していると思われる。

## INTRODUCTION

It is an unfortunate fact that, just as we can learn languages, we can also forget them. There are two types of people who are likely to forget a language they have learned. One is students who have studied

a second or a foreign language for an extended period and then discontinued such learning. Returnee children who have lived in a different language environment and acquired their second language over a certain period, then returned to their home country and no longer use their second language also belong in this category. The other type of people who may forget a language is those who move to a place where the people do not speak their language. When newcomers have little or no contact with others who speak the language of their homeland, they may forget their old language as they learn the language of their new home. In fact, both groups complain that they easily forget the language they once knew so well. Of these two related problems, the former is called second language attrition (L2 attrition), and the latter, first language attrition (L1 attrition). Both are common and natural occurrences among people who use multiple languages.

This paper will deal with the problems involved in the investigation of second language attrition. The current study is part of a longitudinal case study of a Japanese-English bilingual child, Yuta, who was exposed to both English and Japanese in a natural setting from birth in the U.S. When he was 7;2 (7 years and 2 months old), Yuta and his family moved from the U.S. to Japan. The present paper examines his loss of proficiency in English after this move to Japan.

The study attempts to objectively investigate this subject's English language attrition between the ages of 7;2 and 11;4, over a period of four years and two months after he moved from the English-speaking community where he had acquired both languages simultaneously to a community in Japan where Japanese is dominant. Specifically, this study investigates at what linguistic levels (phonology, morphology, lexicon and syntax) and in what linguistic skills (receptive and/or productive skills) language attrition occurs. Further, it focuses on whether it is possible to prove either of two theories that have been put forth in the body of attrition research. The first theory, called "cross-linguistic effects" by Sharwood Smith, includes the influence of the other main language(s) (LO) involved and the role of LO transfer. The second, a theory discussed by Cohen (1989) and Yukawa (1997a), called "retrieval failure theory," covers attrition which is due not to competence restructuring but to performance failure during a subject's language attrition process.

Whereas previous studies have for the most part focused on subjects almost completely removed from either the L1 or L2 language environment, the subject of this study is an example of an increasingly more common type of foreign language learner: one who returns to the L2 environment at regular intervals. During the observation period, Yuta and his family made a total of four short trips to the United States. Moreover, because the observation period was relatively long (four years and two months) the subject experienced both physical and intellectual development during this period. Yuta was seven years and two months when his family returned to Japan, which would make him a 'younger' subject (5 - 8 years) according to Olshtain's classification (1986). However, the fact that Yuta was nearing Olshtain's cut-off age for this grouping means that the study was carried out at what may have been a very critical period. In addition, this is a longitudinal case study which collected various types of data to investigate the language attrition process; it may yield new information about linguistic behavior over time.

## LITERATURE REVIEW

Although in the past there was a lack of agreement on the terminology and definitions used in language loss research, there now seems to be general agreement that language attrition can be defined as the gradual forgetting of a language by individual *attriters* – persons who are experiencing attrition (Hansen, 2001). In an older study, in which Andersen (1982, p. 84) used the term "language loss" instead of "language attrition", it was described as the loss of competence or proficiency in a particular language in an individual.

The study of language attrition is an expanding discipline which has been used systematically in bilingual research for approximately three decades. Investigation of language attrition phenomena deals with not only what is being lost, but also how the loss happens and why it happens. Although these seem to be easy questions, they are in fact difficult to answer (Hansen, 1999). To date, language attrition studies show that receptive skills and productive phonology tend to be retained, while all other areas, including productive skills, metalinguistic judgments and language processing, show attrition over time (Yukawa, 1998). Several variable factors which influence the speed, quality and quantity of language attrition have been found in recent language attrition research: age (Cohen, 1989; Olshtain, 1986 and 1989; Yukawa, 1998; Yoshida and Arai, 1990), pre-attrition proficiency level (Reetz-Kurashige, 1999; Yukawa, 1998; Bahrack, 1984), literacy skills (Olshtain, 1986; Cohen, 1989; Reetz-Kurashige, 1999), the learner's personality (Bierling, 1990; cited in Yukawa, 1997b; Yoshitomi, 1994), and attitude and motivation (Yoshitomi, 1999; Gardner, Lalonde, Moorcraft and Evers, 1987). In particular, many studies agree that the younger the subject, the quicker the loss, in terms of both the starting point and the pace of language attrition (Olshtain, 1986 and 1989; Cohen, 1989; Yukawa, 1998). Yukawa (1998) reported that her younger subject, who was three years old, lost her ability to produce sentences in Japanese (L1) within two to three months after she had moved to Sweden. Olshtain's (1986) study reached the conclusion that the younger group's (ages 5 - 8) L2 deteriorated to a greater degree and more quickly than the older group's (ages 10 - 14).

Much of the recent research in this field has attempted to reveal the attrition mechanism, with empirical data used to suggest some important hypotheses and theories with which to construct a theoretical framework for language attrition studies. The *retrieval failure theory* of language attrition is based on the idea that forgotten information is not permanently inaccessible, but has merely become misplaced: "if only we had the right retrieval cue, the information we seek could be successfully retrieved" (Loftus and Loftus, 1976, as cited in Hansen, 1999, p. 10). Cohen (1989) and Yukawa (1997a) refer to the retrieval failure theory as a possible explanation for their subjects' inability to "produce the attriting language in the latter part of the attrition period" (Yukawa, 1997b, p. 40). In Cohen's study, one of the subjects could readily identify words in an oral comprehensive task that he could not produce when telling stories during the previous story-telling task. This suggests that these words were not forgotten, but rather, that memory links were impeded by other material which prevented the production of the desired words from one story-telling session to the next. Yukawa (1998) concludes that inhibition of processing for production was the main cause of the attrition phenomenon in her studies. She takes the position that

in the absence of constant exposure, young children in particular suffer from processing failure which makes it difficult for them to produce a language they were once proficient in even though their knowledge of it appears to remain intact. Her assertion is called the "processing failure hypothesis".

On the other hand, the theory of *competence restructuring* suggests that linguistic knowledge itself is restructured during the attrition process and therefore is no longer accessible. Sharwood Smith (1983a) argues that there are cases in which linguistic knowledge itself is restructured (referred to as *competence change*), in addition to subjects whose acquired knowledge remains intact but becomes inaccessible (*performance failure*). Seliger (1996) also refers to these two types of cases, stating that, "(s)ome aspects of primary language attrition may be relegated to levels of language performance, whereas others may indicate that competence or abstract levels of language knowledge are affected" (p. 606).

Two possible causes of competence change during the attrition process have been suggested: *intra-linguistic driving forces* and *inter-linguistic driving forces*. The theory that language attrition is caused by the former is supported by Vago (1991) and Kauffman and Aronoff (1991), and states that the changes are induced internally according to the principles of rule simplification, rule reordering, rule loss, and lexical restructuring in the attriting language (LA) without outside influence.

In contrast, the theory of inter-linguistic driving forces, supported by Sharwood Smith and van Buren (1991) and Seliger (1989, 1991), argues that the attriting language can be affected by the replacing language during the attrition process, and that the changes are due to the influence of the other language. Influence from the replacing language during language attrition can be viewed as resource activity that restructures a linguistic system in transition. In Berman and Olshtain's (1983) pioneering study of L1 (Hebrew) transfer in L2 (English) attrition, the areas of language exhibiting the most marked attrition included structural properties in which the attriting language was significantly different from the dominant language.

In his research on L2 attrition, Sharwood Smith (1983a, 1983b) discusses the LO (other main language[s]) influence, which he terms "cross-linguistic effects". He offers anecdotal and empirical evidence to show the theory to be relevant to the field. Sharwood Smith cites the works of van Vlerken (1980) and Redeke (1979) and argues that language transfer is a fundamental factor in language loss and is manifested in psycholinguistically complex and interesting ways. In another study (1989), he notes that "it may simply be more convenient for the bilingual using both languages to create more proximity in order to be able to use the same or similar processing control mechanisms for both languages" (p. 196). Studies by Olshtain (1989), Altenberg (1991) and Major (1993) support the theory of cross-linguistic effects, asserting that the evidence of LO influence in language attrition is undeniable.

Other possibilities that have been examined in second language attrition research include the regression hypothesis and the threshold hypothesis. *The regression hypothesis* – the most widely used theory for describing the nature of the attrition process – suggests that the path of language loss is the reverse of that seen during language acquisition (as stated by Jakobson, 1941; 1968 English translation). Thus, at the inter-linguistic skills level, receptive skills precede productive skills in acquisition, and the opposite is true in attrition. Nevertheless, as the hypothesis has been applied to only a limited number of

specific syntactic structures, it is difficult to support at the intra-linguistic level (morphology, syntax lexicon).

In contrast to the regression hypothesis, Neisser (1984) suggests that "some response strengths reach a *critical threshold* during learning; beyond that threshold they become immune to interference or decay" (p. 33). It is difficult to determine the level of this "critical threshold", but it is generally agreed that this theory is important to the study of language attrition, and a significant amount of research supports this hypothesis (e.g., de Bot and Clyne, 1989; Yukawa, 1998).

Among all the relevant theories, Sharwood Smith's hypothesis of cross-linguistic effects is one of the most interesting when applied to language acquisition studies in early childhood. Garcia (1983) indicated that one of the most compelling, controversial and important issues related to early childhood bilingualism is the interactive influence of acquiring two languages across receptive and expressive domains, which he defines as language transfer. Similarly, in the field of language attrition in children, cross-linguistic effects is a fascinating area of study.

To date, most attrition studies on small children (Olshtain, 1986 [12 months]; Cohen, 1989 [9 months]; Yoshitomi, 1994 [12 months]; Kaufman and Aronoff, 1991 [24 months]) have not provided reports of longer terms of attrition. Most long-term studies are inevitably limited to adults. Only a few studies (Grendel, 1993; Weltens, van Els, and Schils, 1986; Tomiyama, 1998) range over more than four years. These few longitudinal studies, which collected a varied range of data to examine an individual's linguistic behavior, have shown that this sort of research is necessary in investigating the attrition process.

## RESEARCH QUESTIONS

The present study was designed to build on previous research in the field of language attrition, providing a longitudinal study investigating a number of aspects of second language attrition and examining the results to see if they offer evidence of cross-linguistic effects and/or retrieval failure. Specifically, the study addressed the following four research questions:

1. During the research period, how much and how fast did language attrition occur?
  - When did the subject's language attrition become apparent?
  - What factors influenced his language attrition?
2. During the research period, at what linguistic levels (phonology, morphology, lexicon and/or syntax) and in which linguistic skills (receptive skills and/or productive skills) did language attrition occur?
3. During the attrition period, was there any evidence to support the theory of cross linguistic effects?
4. During the research period, was there any evidence to support the retrieval failure theory?

## STUDY

### Subject

The subject of this study is the present researcher's son, a Japanese boy named Yuta who acquired English and Japanese simultaneously from infancy. The development of his two languages, and in particular, language attrition evident after changes in his linguistic environment, have been the focus of a

ax, longitudinal case study. For the present paper, the subject was observed during his second to fifth grade  
ths years in Japanese elementary school, a period of four years and two months following his family's move  
or from the United States to Japan. During this observation period, Yuta had an outgoing personality, liked  
hat to talk to both children and adults, and was both mentally and physically healthy and without any history  
rts of hospitalization or serious illness.

The subject was born and raised in the U.S. in a home where Japanese was the primary language.  
His parents both graduated from colleges in Japan and received graduate degrees in the U.S. Yuta was  
the exposed to Japanese and English from birth to seven years and two months, when his family moved from  
ted the U.S. to Japan. For the first five years of his life, he had no siblings to affect his language acquisition.  
sm He now lives in Tokyo with his parents and a younger sister.

he Prior to the period of observation for the current study, the subject's exposure to his two languages  
cts outside of the family was as follows. When Yuta was 1;8, an English-speaking babysitter began to care  
[9 for him two afternoons a week. At the same time, he started to go to pre-nursery school two mornings a  
led week. At age three, Yuta was enrolled in a small private nursery with a low teacher-student ratio. He was  
ew the only Japanese child in this nursery school. About the same time, he also began taking a Kumon class  
our for Japanese and math once a week. Subsequently, Yuta was enrolled in a local public elementary  
al's school. Both in kindergarten and the first grade, Yuta was the only Japanese child in his class. When he  
ss. was five, Yuta began attending a Japanese weekend school every Saturday and also started taking an  
advanced reading and writing class for native English-speaking students once a week. While living in the  
U.S., Yuta had many more American friends than Japanese friends. During the family's residence in  
America, they visited Japan and stayed at Yuta's grandparents' house on four occasions: when Yuta was  
on, ten months old, two years old (2;11), four years old (4;8), and six years old (6;5). They stayed in Japan  
nd for one month during each visit.

re. Before the family moved to Japan when Yuta was seven, he was described as a talkative child in  
both languages. Furthermore, he seemed to possess a normal amount of self-confidence in and positive  
feelings for both languages. Interviews with his teachers suggested that Yuta had almost the same  
proficiency in listening, speaking, reading and writing both languages as monolingual children around his  
age. The appraisal of Yuta's English ability was made by the classroom teacher of his local elementary  
3x) school and his advanced reading class teacher during interviews with the researcher, while the appraisal  
of his Japanese ability was made during interviews with the classroom teacher of his Japanese weekend  
school and his Kumon teacher for Japanese studies. His proficiency in both languages was also suggested  
by his behavior. For example, he enjoyed watching movies and appreciated stories in both languages.

ed When the family moved to Japan, Yuta began attending a local elementary school, where he was  
in placed in a regular second-grade class. He attended this school throughout the period of the present  
f a study. On the whole, he has been happy in his new school environment. He enjoys school and has been  
absent only a few days because of sickness.

**TABLE 1: Yuta's Language Environment in Japan (Ages 7;2 - 8;3, 8;4 - 11;4)**

Conversation Partners/ Language Environment	Language		Estimated Average Exposure	
	7;2 - 8;3	8;4 - 11;4	7;2 - 8;3	8;4 - 11;4
<b>Caregivers</b>				
Mother	Japanese (mostly) English (sometimes)	Japanese (mostly) English (sometimes)	5 hrs./day  6 hrs./month	4 hrs./day  4 hrs./month
Father	Japanese (mostly) English (sometimes)	Japanese (mostly) English (sometimes)	15 hrs./week  1 hr./month	10 hrs./week  30 mins./month
<b>Visitors/Visits</b>				
Most visitors and visits	Japanese	Japanese	2 hrs./week	4 hrs./week
Some visitors and visits	English	English	1 hr./week	30 mins./week
Peers outside school	Japanese (mostly) English (sometimes)	Japanese (mostly) English (sometimes)	1 hr./day  1 hr./week	1 hr./day  2 - 3 hrs./month
<b>Group Situations</b>				
Local school	Japanese	Japanese	30 hrs./week	30 hrs./week
Returnees class	English	English	2 hrs./week	1.5 hrs./week (private lesson)
Semi-private class	English	English	45 mins./week	45 mins./week
<b>Media and Other Sources</b>				
TV	Japanese (mostly) English (sometimes)	Japanese (mostly) English (sometimes)	1 hr./day  1-2 hrs./week	1 hr./day  2-3 hrs./month
Shops and services	Japanese	Japanese	2 hrs./week	1.5 hrs./week

In Japan, Yuta has a bilingual friend who has an American mother and a Japanese father. Yuta got together with him about once every other week for the first two years after the family's move to Japan and once a month for the following two years. They spoke English while they played. Yuta also took two to three English lessons a week for the first year after moving to Japan. One lesson stressed reading and writing skills; the others stressed conversational skills. Two of these lessons were private or semi-private,

and the other was a group lesson. During his second, third and fourth years in Japan, he took two English lessons per week: one private, which stressed reading and writing skills, and the other semi-private, stressing conversational skills. Since moving to Japan, Yuta has returned to his hometown in America for four visits. These occurred 5 months, 24 months, 29 months and 41 months after the family's move to Japan.

Yuta's language environment during the period of observation in Japan is summarized in Table 1, which is based on De Houwer's model (1990).

### Methodology

During this study, the subject was observed over a period of four years and two months, from ages 7;2 to 11;4. He was observed in the following three types of situations:

- (1) Engaging in spontaneous speech in a natural English language setting with an English-speaking friend or an adult native speaker.
- (2) Producing elicited speech in English, including recalling a story he had read and summarizing a movie he had watched in English. (An adult native speaker read books and asked Yuta to recall the stories and answer questions about them, and Yuta watched movies and was asked to summarize them and answer questions about them). Data collected before and after the subject's short trips to the U.S. were selected to be analyzed in the following three ways.

(a) Measuring hesitation phenomena. (Data collected at eight, nine and eleven months after the family's return to Japan were also analyzed in this way.) The following phenomena were measured: ① Rate of speech (ROS) = number of words per minute, ② Pause count = the number of silent pauses (SP) and filled pauses (FP), ③ Repetition count = the number of times the subject repeated himself, and ④ Self repair count = the number of times the subject corrected his own wording.

(b) Employing the TLU (Target-Like Usage) formula. First, each of the subject's verb phrases were analyzed as a unit, classifying them into nine types: present tense, regular past tense, irregular past tense, present progressive, past progressive, negative, passive voice, infinitive and past participle. Next, the TLU formula, which measures how accurately morphemes are used, was applied to these verb phrases. In this formula, the total number of accurate usages is calculated as a percentage of the total number of verb phrases used, as follows:

Number of Correctly Supplied Morphemes/Forms in Obligatory Context = SOC

Number of Morphemes Supplied in Obligatory Contexts + Number Supplied in Non-obligatory Contexts = OC + SNOC

(c) Administering Cohen's oral recognition test. Cohen (1989), developed this test to see if his subjects could still understand words which they no longer used. He selected lexical items which frequently appeared in earlier data but which did not appear at all during a later stage of the observation period, and gave his subjects these words to test their oral recognition of them.

(3) Taking the Peabody Picture Vocabulary Test, pronunciation tests and the Society for Testing English Proficiency (STEP, or *Eiken*) 3rd Grade test. These tests were used to obtain standardized (objective) measures of Yuta's English proficiency. Table 2 shows all of the English sounds tested in the pronunciation tests used in this study. In every test, Yuta was asked to pronounce the words shown in the table and his pronunciation of them was checked by a native speaker of English with an M.A. degree in English.

TABLE 2: Sounds and Words Used in Pronunciation Test

[ i: ]	<u>e</u> ast <u>sh</u> ee <u>p</u> <u>s</u> ea	[ ɛ ə r ]	<u>a</u> ir <u>h</u> air <u>ch</u> air	[ tʃ ]	<u>ch</u> air <u>te</u> ach <u>er</u> <u>w</u> atch
[ i ]	<u>i</u> nk <u>b</u> ig <u>g</u> ive	[ u ə r ]	<u>y</u> our <u>po</u> or <u>s</u> ure	[ dʒ ]	<u>j</u> ump <u>jo</u> y <u>je</u> ans
[ e ]	<u>e</u> nd <u>p</u> en <u>h</u> ead	[ p ]	<u>h</u> appy <u>cap</u> <u>p</u> en	[ h ]	<u>h</u> ave <u>h</u> ear <u>t</u> <u>h</u> at
[ æ ]	<u>a</u> pple <u>m</u> ap <u>b</u> ack	[ b ]	<u>b</u> ed <u>b</u> aby <u>cl</u> ub	[ m ]	<u>m</u> an <u>su</u> mm <u>er</u> <u>h</u> ome
[ a ]	<u>n</u> ot <u>sh</u> ot <u>h</u> ot	[ t ]	<u>t</u> ea <u>bu</u> tt <u>er</u> <u>m</u> eat	[ n ]	<u>n</u> ame <u>m</u> ann <u>er</u> <u>p</u> en
[ ɔ: ]	<u>all</u> <u>l</u> aw <u>th</u> ough <u>t</u>	[ d ]	<u>b</u> ed <u>re</u> ad <u>ing</u> <u>da</u> y	[ ŋ ]	<u>king</u> <u>th</u> ing <u>l</u> ong
[ u ]	<u>bo</u> ok <u>lo</u> ok <u>co</u> ok	[ k ]	<u>key</u> <u>so</u> cc <u>er</u> <u>ki</u> ck	[ l ]	<u>lo</u> ve <u>le</u> ad <u>pl</u> ay
[ u: ]	<u>two</u> <u>no</u> on <u>sch</u> ool	[ g ]	<u>g</u> et <u>En</u> glish <u>ba</u> g	[ r ]	<u>re</u> ad <u>ri</u> ght <u>pr</u> ay
[ ʌ ]	<u>nut</u> <u>sh</u> ut <u>unc</u> le <u>mo</u> th <u>er</u>	[ f ]	<u>f</u> ine <u>f</u> ifteen <u>le</u> af	[ j ]	<u>y</u> es <u>ye</u> ar <u>y</u> oung
[ ə ]	<u>ag</u> ree <u>bal</u> loon	[ v ]	<u>lo</u> ve <u>ve</u> ry <u>fi</u> ve	[ w ]	<u>w</u> e <u>s</u> weet <u>w</u> inter
[ ei ]	<u>ei</u> ght <u>ca</u> ke <u>da</u> y	[ θ ]	<u>bi</u> rth <u>da</u> y <u>bo</u> th <u>no</u> th <u>ing</u>	[ ə r ]	<u>te</u> ach <u>er</u> <u>s</u> ug <u>ar</u> <u>mi</u> rr <u>or</u>
[ ai ]	<u>ic</u> e <u>li</u> fe <u>bu</u> y	[ ð ]	<u>th</u> en <u>clo</u> th <u>ing</u> <u>sm</u> ooth	[ ks ]	<u>s</u> ix <u>bo</u> x <u>cl</u> ock <u>s</u>
[ ɔi ]	<u>oi</u> l <u>bo</u> y <u>sp</u> oil	[ s ]	<u>s</u> ink <u>s</u> ick <u>le</u> ss <u>on</u>	[ kw ]	<u>qu</u> ick <u>qu</u> een <u>qu</u> iz
[ au ]	<u>hou</u> se <u>co</u> w <u>mo</u> u <u>se</u>	[ z ]	<u>Z</u> en <u>br</u> ee <u>ze</u> <u>clo</u> s <u>ing</u>	[ ɔ:r ]	<u>o</u> ar <u>po</u> rk <u>do</u> or
[ ou ]	<u>old</u> <u>ro</u> ad <u>bl</u> ow	[ ʃ ]	<u>sh</u> ip <u>st</u> at <u>ion</u> <u>fi</u> sh	[ a:r ]	<u>ar</u> m <u>dar</u> k <u>har</u> d
[ i ə r ]	<u>ear</u> <u>ne</u> ar <u>he</u> re	[ ʒ ]	<u>u</u> s <u>u</u> ally <u>pl</u> ea <u>su</u> re <u>vi</u> s <u>i</u> on		

The spontaneous English conversation data was recorded on audio cassettes once a week for about 30 minutes on Friday afternoons during the subject's private English lessons, or during play with his native English-speaking friend. A total of about 86 hours of this type of data was collected during the 50-month observation period. The story-telling tasks were recorded approximately once every four months for about 30 minutes. The total recording time for this type of data was about 5.5 hours. For these two types of observation, some of the scheduled sessions were missed due to the subject's illness or conversation partners' absence. The proficiency tests were performed approximately every three months for the first year and at four-month intervals for the next three years.

In order to evaluate the differences between the subject's acquisition of two languages and standard acquisition of a single language, comparisons were made between Yuta's language use and that of

English monolingual subjects of the same age. A total of ten monolingual children between the ages of seven and ten participated in this study. These children were friends of Yuta's. With the permission of their parents, their spontaneous speech during play sessions was recorded without their knowledge.

It was also necessary to collect Yuta's Japanese utterances to investigate whether changes in his English language use was due to a linguistic pattern or a developmental pattern. Recordings of over 60 minutes in duration were made once every three months for the first year and at four-month intervals for the following three years. The total recording time of his spontaneous Japanese speech was about 10.5 hours.

All of the data were audiotaped by the present researcher using a portable cassette recorder. As the subject is the researcher's son, the researcher was able to attend or observe conversations in all situations without hindering data collection in a natural setting.

All of the audiotapes were transcribed. A native speaker of English with an M.A. degree in English helped the researcher transcribe the data. Other informal data or findings within or apart from the three types of situations described above were recorded in the researcher's journal.

The goal of this study was to objectively and accurately examine the process of language attrition. To try to exclude the kind of bias inherent in a case study, the following measures were taken: the researcher selected subjects for the control group carefully using established criteria, covertly recorded the subjects' spontaneous speech, and tried to maintain a consistent tone of voice while asking the questions to elicit speech during the story-telling tasks and during the PPVT tests.

## RESULTS

### Attrition Periods

#### General findings

Throughout the observation period, there was no obvious change in Yuta's English listening comprehension as measured by the listening portion of the STEP (*Eiken*) 3rd Grade test. As can be seen in Table 3, which presents the results of this formal assessment, Yuta scored around 95% on most of the tests he took. Between the fifth and eighth tests, and again on the eleventh and twelfth tests, his score dipped slightly, but there did not appear to be any crucial long-term change in his English listening proficiency.

In contrast, significant change in Yuta's English speaking skills became evident approximately ten months after he left the U.S. The first sign of attrition in his productive English proficiency was increasing dysfluency, as measured by pauses, self corrections and repetitions in both spontaneous speech and story-telling tasks. For example, in a recording made ten months after his return to Japan, we hear: "... he got in, he got in, he got in the car...." Yuta's language attrition was also characterized by lexical and syntactical difficulties, which resulted in frequent employment of compensatory strategies, such as paraphrasing, approximation, simplification and avoidance, as when he would say, "Never mind" or "That's O.K."

**TABLE 3: STEP 3rd Grade Listening Test Results**

	Date	1st Time*	2nd Time*	Average*	Percentage
1	3/96	20/20	19/20	19.5/20	97.5%
2	6/96	19/20	19/20	19/20	95.0%
3	9/96	20/20	19/20	19.5/20	97.5%
4	12/96	20/20	18/20	19/20	95.0%
5	3/97	18/20	17/20	17.5/20	87.5%
6	7/97	19/20	18/20	18.5/20	92.5%
7	11/97	17/20	19/20	18/20	90.0%
8	3/98	18/20	18/20	18/20	90.0%
9	7/98	20/20	18/20	19/20	95.0%
10	11/98	18/20	20/20	19/20	95.0%
11	3/99	18/20	20/20	19/20	95.0%
12	7/99	18/20	18/20	18/20	90.0%
13	11/99	18/20	19/20	18.5/20	92.5%
14	3/00	19/20	19/20	19/20	95.0%

\* Number of Correct Answers / Number of Questions

In addition, Yuta started to replace or explain English words he could not remember. For example, in one recording, instead of using the verb *plant*, he explained it: "dig a hole and put the seed in the ground." Moreover, his sentences became shorter and the amount of his speech in general decreased, as evidenced by his frequent use of one-sentence utterances and one-word answers. Even so, Yuta did not resort to codeswitching—replacing forgotten words in the second language with those from the first—a phenomenon often observed by other researchers in their subjects' utterances during language attrition.

In contrast to these problems in Yuta's English speech samples, no pauses, self corrections, repetitions or simplifications appeared in his spontaneous Japanese speech samples.

### Fluency

It is generally agreed in recent language attrition research that the first sign of language attrition is not the loss of certain items, but rather an increase in the length of time needed for their retrieval (Hansen, 2001, p. 63). Attrition-related hesitation phenomena include silent pauses, filled pauses (voiced fillers such as *uh*, *um*, and *well*, in English), lower rates of speech, repetition, and self repair.

Since it was noticed that hesitation behavior gradually increased in Yuta's spontaneous speech samples ten to eleven months after he left the U.S., it was decided to check the audiotapes made around that time for these phenomena. Story-telling tasks recorded eight, nine and eleven months after Yuta's move to Japan were selected for measurement of hesitation phenomena to determine the onset of attrition. Measurements included the rate of speech (ROS), pauses, repetitions and self repairs. Since the total number of words for each story-telling task was not the same, Tomiyama's (1999) system was followed to generate a percentage figure for each hesitation phenomenon. The resulting figures indicate how many seconds and how many times he paused and how many times he made repetitions or self repairs for every 100 words he spoke. These figures are presented in Table 4.

**TABLE 4: Fluency on Story-Telling Tasks Near Onset of English Attrition**

Time Elapsed Since Leaving English-Speaking Environment	8 Months	9 Months	11 Months
<b>Rate of Speech</b> (Words per minute)	51.1 wpm	54.3 wpm	41.7 wpm
<b>Pauses (Silent and Filled)</b> Time in Seconds / Number Total Number of Words Percent (Length / Number)	12.9 / 4.8 118 10.9% / 4.1%	12 / 4.4 110 10.9% / 4.0%	25 / 6.3 144 17.4% / 4.4%
<b>Repetitions</b> Number/Total Number of Words Percent	1.6/118 1.4%	1.6/110 1.5%	4.7/144 3.3%
<b>Self Repairs</b> Number/Total Number of Words Percent	0/118 0.0%	0/110 0.0%	1.6/144 1.1%

As seen in Table 4, Yuta's rate of speech eleven months after his move was slower than that eight or nine months after he left the States. His pauses were more frequent and longer eleven months after the move than they were at eight or nine months. He also made more repetitions at eleven months. In addition, he made a self-repair eleven months after the move (replacing "It doesn't" with "It wasn't"), but neither phrase was correct in the context. These results clearly indicate that Yuta's overall fluency deteriorated ten to eleven months after he left the U.S., confirming that his language attrition started around that time.

#### **Productive phonology**

As explained above, Yuta was asked to pronounce all the words in Table 2 in every test, and the data were checked by a native speaker of English with an M.A. degree in English. At the time Yuta moved to Japan, he already had three English pronunciation problems. First, he pronounced words ending with "-er" as "uh" [ʌ / ə] rather than a clear [ə r]. Second, he had a problem pronouncing the [ɜ]

sound in "pleasure" and "usually": he produced a [dʒ] sound instead of a [ʒ]. Third, he had a lisp; he said the [θ] sound for the [s] in "seven" and "soccer".

During the course of the research period, the pronunciation tests showed that Yuta retained these three problems until July 1998. Then in the test performed in August of that year, shortly after his third trip to the U.S., Yuta started to produce correct [ər] and [ʒ] sounds. However, three months after this, from November to December 1998, Yuta again started to mispronounce the [ʒ] sound, saying [dʒ] instead. Another two to three months after this, around the time of the test performed in February 1999, his problem pronouncing the [ər] sound also reappeared. However, in the test performed in June 1999, Yuta started to use the correct [ər] sound again. Then in the last test performed in March 2000, he used correct [θ] and [ʒ] sounds, which meant that his lisp had disappeared. Although the [θ] sound does not exist in Japanese, Yuta used it instead of an [s] sound in both Japanese and English contexts until March 2000. Except for these three problems, Yuta showed no signs of change in his English pronunciation after moving to Japan. These results are summarized in Table 5.

**TABLE 5: Productive Phonology (Evidence of Three Pronunciation Problems)**

<b>Problem</b> ① mother "uh" [ʌ/ə] replaces final "er" [ər] (sister, teacher, summer, etc.) ② usually [dʒ] replaces [ʒ] (pleasure, vision) ③ sea lisp: "th" [θ] replaces "s" [s] (ice, school, sweet, six, etc.)		
Date	Language Environment	Problems Detected During Testing
10/95	Living in the States	①+②+③
3/96	Moving to Japan	①+②+③
3/97		①+②+③
3/98		①+②+③
3-4/98	Second short stay in U.S. (2 weeks)	
4/98		①+②+③
7/98		①+②+③
8/98	Third short stay in U.S. (3 weeks)	
8/98		③ (lisp only)
11/98		②+③
2/99		①+②+③
6/99		②+③
8/99	Fourth short stay in U.S. (3 weeks)	
8/99		②+③
10/99		②+③
12/99		②+③
3/00		② (③ lisp disappeared)

## Syntax

### General findings

In the area of syntax, there were three symptoms of attrition in Yuta's English: difficulties in answering negative questions in English properly, omission of sentence subjects, and use of *do* plus a noun phrase as a substitute for certain verbs.

Judging from samples of Yuta's spontaneous speech, his English language attrition seemed to continue for 24 months after the move to Japan until the family had a two-week stay in the U.S. After this visit--Yuta's second following the move to Japan, but his first after beginning to show signs of language attrition--his English attrition seemed to slow down, and he actually seemed to regain his English ability in some areas. The family visited the U.S. again 29 months after moving to Japan--this time, for three weeks. After this visit, Yuta's third, his English attrition appeared to be partially eliminated. Yet he seemed to begin to exhibit loss of English proficiency again three months after the third visit. Yuta's fourth visit to the States took place 41 months after he moved to Japan and lasted three weeks. His loss of English seemed to have been eliminated when he returned from the visit, but later it seemed to resurface--this time only two months after his stay in America.

To confirm these initial observations in his spontaneous speech samples, Yuta's syntax during these apparent periods of language attrition and retrieval was examined. The observation period after Yuta's initial 10 months in Japan was divided into five segments: from 10 to 24 months after the move (an attrition period), 25 to 32 months (a retrieval period), 33 to 41 months (attrition), 42 to 43 months (retrieval) and 44 to 48 months (attrition). The findings are reported below.

### Answering negative questions

Although the system for answering positive questions is the same in Japanese and in English, the systems for answering negative questions in these two languages are quite different. In response to a question such as "Aren't you coming?" in English, the speaker answers "yes" or "no" depending on his or her intention about the matter: "Yes, I'm coming" or "No, I'm not coming". In Japanese, however, the speaker answers "yes" or "no" to indicate agreement or disagreement with the literal meaning of the question; that is, the speaker answers, "No" if s/he intends to come, and "Yes" if s/he does not intend to come. In other words, in answering a negative question, Japanese *hai* (yes) means, "What you just said is correct" and *ie* (no) means, "What you just said is incorrect." Thus, the systems for answering negative questions in these languages are exactly opposite (Akiyama, 1979, p. 488). For this reason, Yuta's use of "yes" or "no" to show agreement or disagreement with the literal meaning of a negative question in English speech samples indicates transference from Japanese to English.

I started to analyze the syntax of Yuta's spontaneous and elicited speech data ten months after our move to Japan because I began to recognize language attrition around that period. However, I had collected and analyzed data concerning negative questions from the same subject in one of my previous studies (Hirai, 1999), which focused on language transfer rather than attrition. The period of evaluation for that study was the eleven months following our move to Japan, when Yuta was between 7;2 and 8;3.

As the method of data collection and analysis in that study was not the same as I have utilized in this study, it is not appropriate to use the data from that study here, even though the time periods overlap. Nonetheless, that previous study yielded a notable finding which is relevant to the present study: I found that for the first five months after we moved to Japan, Yuta answered negative questions in English correctly less and less often; however, after six months away from the U.S., this trend was reversed. Yuta seemed to have acquired the rules for answering negative questions in English between September 1996 and January 1997.

In the current study, Yuta started to answer negative tag questions incorrectly in his spontaneous speech in English in June 1997—15 months after our move from the U.S. However, since the number of samples of negative questions and negative tag questions in the spontaneous speech samples was small, samples were elicited by asking negative and negative tag questions about stories and movies, especially during the fifth segment of the observation period. The results of the analysis of Yuta's responses to negative questions and negative tag questions, as well as those of the English monolingual control group, are presented in Table 6.

**TABLE 6: Responses to Negative Questions in Spontaneous and Elicited Speech**

Yuta								
Time Period: Months After Return to Japan (No. of Months in This Period)	Incorrect			Correct				
	Negative Questions		Negative Tag Questions		Negative Questions		Negative Tag Questions	
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
10 – 24 (15)	0	0%	6 *(3)	6.6% (3.3%)	81	100%	85 (88)	93.4% (96.7%)
25 – 32 ( 8)	0	0%	1 (0)	3.1% (0%)	26	100%	31 (32)	96.9% (100%)
33- 41 (9)	0	0%	3 (1)	6.4% (2.1%)	27	100%	44 (46)	93.6% (97.9%)
42 - 43 (2)	0	0%	1 (1)	3.7% (3.7%)	15	100%	26 (26)	96.3% (96.3%)
44 - 48 (5)	0	0%	1 (1)	5.3% (5.3%)	16	100%	18 (18)	94.7% (94.7%)
*( ) self-corrections								
Native English Subjects								
Boy A	0	0%	0	0%	16	100%	17	100%
Boy B	0	0%	0	0%	13	100%	18	100%
Boy C	0	0%	0	0%	20	100%	21	100%
Boy D	0	0%	0	0%	11	100%	9	100%

In response to negative tag questions in English, Yuta answered correctly 93.4% of the time in the first segment of the observation period, 96.9% of the time in the second segment, 93.6% of the time in the third segment, 96.3% of the time in the fourth segment and 94.7% of the time in the fifth segment. Examples typical of Yuta's incorrect responses to negative tag questions are presented below.

**Example 1**

Alice: "You don't like it, do you?"

Yuta: "Yes, I don't like it."

**Example 2**

Peter: "You don't know the name, do you?"

Yuta: "No, I know."

In contrast, Yuta answered negative English questions correctly 100% of the time in all segments of the observation period.

In spontaneous Japanese speech, Yuta answered both negative and negative tag questions correctly 100% of the time throughout the observation period. The English monolingual subjects also answered both negative and negative tag questions correctly 100% of the time.

Sentence subject omission

There is fairly general agreement that, in English, sentences are required to be syntactically complete, with the exception of imperative sentences and some colloquial expressions, such as "Can't see" or "Coming!" In Japanese, on the other hand, there is no equivalent of the English "It" used to replace an omitted subject in expletive constructions, such as "*It's raining*," or "*It's fun*." In Japanese, "It's hot" is said, "*Atsui desu*," not, "*Sore wa [It] atsui desu*". Thus, omission of the subject—especially *It* or *It's*—in the English speech samples of a Japanese-English bilingual can be taken to indicate rule transference from Japanese to English. Therefore, in the current study, sentence subject omission, especially of *It* and *It's*, was investigated in Yuta's spontaneous speech samples and story-telling tasks.

As a point of comparison, the subject's language proficiency in the pre-attrition stage should be noted: Yuta did not omit *It* or *It's* in any expressions before he moved to Japan.

Analysis of Yuta's spontaneous speech and story-telling tasks during the five segments of the observation period following the onset of his English language attrition revealed that Yuta correctly retained *It* and *It's* as the subject in expletive constructions 88.7% of the time during the first segment. That is, he omitted *It* or *It's* as the subject 11.3% of the time. For example, he said, "Monday yesterday", and [It's] "Raining". Yuta used such expressions not only in conversation but also in statements. During the second segment of the observation period, Yuta omitted *It* or *It's* in this way 8.5% of the time, during the third segment, he omitted them 9.8% of the time, during the fourth segment, 9.1% of the time, and during the fifth segment, 10.9% of the time.

In contrast, the English monolingual subjects were found to omit *It* and *It's* as sentence subjects an

average of only 2.8% of the time. For example, one of them said, [It's] "Funny." They produced this kind of expression only in conversational situations.

These results are tabulated for easy reference in Table 7.

**TABLE 7: Use of *It's/It* as Sentence Subject**

Yuta				
Time Period: Months After Return to Japan (No. of Months in This Period)	Omission		Retention	
	<i>n</i>	%	<i>n</i>	%
10 - 24 (15)	26	11.3%	204	88.7%
25 - 32 (8)	11	8.5%	118	91.5%
33 - 41 (9)	12	9.8%	111	90.2%
42 - 43 (2)	2	9.1%	20	90.9%
44 - 48 (5)	7	10.9%	57	89.1%
Native English Subjects				
Boy A	2	3.4%	57	96.6%
Girl A	1	1.9%	53	98.1%
Boy C	2	3.2%	61	96.8%
Total	5	2.8%	171	97.2%

Use of *do* + NP

In Japanese, the verb *suru* [do] is often added to a noun phrase to make nouns into verbs. In the current study, it was found that Yuta appeared to transfer this Japanese structure to English, using *do* as an all-purpose verb (e.g., "*did* fishing") instead of using verbs specific to the object NP (e.g., "went fishing"). For example, he would say, "I *do* this game lots of times" or "I *did* soccer with Doug." Yuta had not used unnatural expressions incorporating *do* in this way before he moved to Japan. His spontaneous speech samples and story-telling tasks were therefore examined for this construction.

During the first segment of the observation period after English attrition became apparent, Yuta used *do* plus an NP as a substitute for specific verbs 5.2% of the time, and used specific verbs 94.8% of the time. During the second segment, he used *do* plus an NP 4.4% of the time, during the third segment, he used this construction 6.3% of the time, during the fourth segment, 4.7% of the time, and during the fifth segment, 5.9% of the time. The English monolingual subjects used *do* plus an NP an average of 1.9% of the time. These results are presented in Table 8.

**TABLE 8: Use of *do* + NP**

Yuta				
Time Period: Months After Return to Japan (No. of Months in This Period)	<i>do</i> + NP		Specific Verbs	
	<i>n</i>	%	<i>n</i>	%
10 - 24 (15)	45	5.2%	819	94.8%
25 - 32 ( 8)	13	4.4%	282	95.6%
33 - 41 (9)	23	6.3%	345	93.7%
42 - 43 (2)	3	4.7%	61	95.3%
44 - 48 (5)	18	5.9%	285	94.1%
Native English Subjects				
Boy A	2	1.9%	103	98.1%
Boy B	3	2.4%	121	97.6%
Girl A	1	1.1%	92	98.9%
Total	6	1.9%	316	98.1%

**Retrieval Periods**

In considering the changes in Yuta's language use during the observation period, as he experienced what appeared to be periods of language attrition alternating with periods when his English skills seemed to be retrieved, findings in four areas warrant special attention. First, in all three areas of syntax under investigation (mistakes in answering negative questions, omission of sentence subjects, and misuse of the *do* + NP construction) instances of incorrect English usage declined during the second and the fourth segments of the observation period compared to the first, third, and fifth segments. This suggests that Yuta's language attrition decreased shortly after his second and fourth trips to the U.S.

The second important group of findings was revealed through analysis of story-telling tasks in which Yuta was asked to recall the plot of the movie "Forrest Gump". Yuta watched this video in English one time. After that, he was asked to summarize the story on a number of occasions. I selected four samples of this story-telling task from two different phases of the observation period: July 1998 and August 1998, which were just before and after his third trip to the U.S., and March 1999 and September 1999, which were prior to and following Yuta's fourth trip to America.

First, I examined Yuta's grammar during two of these sessions. As Table 9 indicates, in the story-telling task performed in July 1998 (#1), Yuta used simple sentences, compound sentences and coordinate conjunctions. In contrast, in the retelling task performed in August 1998 (#2), he used a wider

variety of constructions, including complex sentences and relative clauses. Although he made some mistakes in verb tenses and articles in the second session, his accuracy was higher than it was in the first session.

**Table 9: Selections from Yuta's Retellings of "Forrest Gump"**

1	July 1998	#1	* <u>Forrest Gump</u> , he couldn't walk, ** <u>because his bone was a little um.. funny.</u> <u>He had machine shoes</u> and he was walking.
	August 1998	#2	<u>There is a boy whose name is Forrest Gump</u> , and he couldn't walk. <u>He did supported shoes, like machine shoes.</u>
	(Abridged)		
2		#1	And he got <u>into the school bus.</u> <u>Nobody put him on the seat.</u> <u>And one girl said, "You got a seat here"</u> and <u>he was her friend forever.</u>
		#2	And he got <u>on the bus, school bus.</u> <u>Nobody put him sit.</u> <u>It was a girl named Jenny and she said, "You can sit here."</u>
	(Abridged)		
3		#1	Then, he was in high school. <u>The three boys had a car, one car.</u> And Forrest Gump was faster than a car. And <u>he went to a football ... lesson ... place.</u> <u>He was running through there. And the coach was looking at him.</u>
		#2	And in high school, <u>the three boys were there, and they throw rocks again and ran.</u> Then, he was faster than a car. And then, <u>he got to the field.</u> He was running very fast and everyone was running. And <u>Forrest was going through the field. The team coach got him, Forrest Gump.</u> And <u>he went to the college. He scored lots of goals.</u>
	(Abridged)		
4		#1	<u>He lost his legs at Vietnam War with the bomb.</u> But <u>Bubba's shoot like here</u> (pointed to the heart) and <u>Bubba died at Vietnam.</u>
		#2	<u>He helped people and found the coach</u> and his leg was very bad and <u>he took him up and put him down.</u> He found Bubba. He went there but Bubba died. <u>He was a best friend of Bubba.....</u> <u>Bubba died in Vietnam. Then he did a shrimp boat captain.</u> <u>He made a boat named Jenny.</u>
	(Abridged)		
5		#1	<u>Forrest Gump visited there</u> and he married with Jenny but she died on Saturday. That was sad.
		#2	<u>He went to Jenny's house. She had a boy named Forrest and he came back</u> and he married with Jenny <u>at his home.</u> <u>And I can't say but Lieutenant Dan lost his legs, both legs but he came with two legs with his girl, woman.</u> And Forrest married with Jenny, but Jenny died on Saturday. Jenny died <u>with the sick named virus and she died.</u>
			* Single underline indicates rewording. ** Double underline: indicates occurrence in only one recall.

The data from these story-telling tasks were further analyzed using the TLU (Target-Like Usage) formula as set forth in Methods of Morpheme Quantification by Pica (1983). Table 10 contains the results of this analysis.

**TABLE 10: TLU (Target-Like Usage) Analysis of Selected Story-Telling Tasks**

Date	Total Number of Verbs Used Accurately (SOC)	Total Number of Verbs Produced (OC + SNOC)	Target-Like Usage (TLU)
July 1998	48	60	80.0%
August 1998	101	117	86.3%
March 1999	86	119	72.3%
September 1999	154	208	74.0%

As seen in Table 10, Yuta's TLU score on his story-telling task in July 1998 was 80.0%, in August 1998, it was 86.3%, in March 1999, 72.3%, and in September 1999, 74.0%. Thus, his TLU score in August 1998 was higher than his score in July of that year, and his score in September 1999 was higher than his score in March of that year—again suggesting that Yuta retrieved some of his English proficiency during the periods following his third and fourth trips to the States.

Two of these story-telling tasks were also examined for support for the retrieval failure theory. One was the task performed in March 1999—seven months after his most recent trip to the U.S. The other was the one performed in September 1999—immediately after his fourth trip. The following factors were selected for measurement: 1) rate of speech, 2) pauses (silent and filled), 3) repetitions, and 4) self repairs. Several linguistic items displayed by Yuta after certain silent and filled pauses were also examined. As Hansen (1999) pointed out, "In the retrieval failure view, a critical element in measuring language attrition is ... processing time" (p. 10). I therefore focused especially on processing time in measuring hesitation phenomena in these story-telling tasks. The results of this analysis are presented in Table 11.

As seen in the table, the total length of pauses for the story-telling task performed in September 1999 is just over half of the pause time measured in March 1999. Also, the number of repetitions Yuta made in September 1999 is less than half of those made in March of that year. Here again we see evidence suggesting language retrieval after a visit to an English-speaking environment.

In examining cases where Yuta corrected himself during story-telling tasks, I considered the number of such instances as well as the nature of each repair. For example, in September 1999, he corrected himself in the following two ways: "there is → there was", and "comed → came" (twice). In March, despite taking time (8 seconds), Yuta failed to find the word he needed in one case ("the President"). Instead, he finally explained himself, saying "I don't know, but somebody...." In the September session that year, however, Yuta correctly used the term "the President" without any hesitation at all. It should be noted that both "came" and "President" had been used previously by Yuta in his spontaneous speech samples. Thus, it appears that he had trouble retrieving them in March 1999, but was successfully able to do so in September of that year, immediately after his fourth trip to the States.

**TABLE 11: Fluency on Story-Telling Tasks Before and After Fourth Visit to U.S.**

Date	March '99	September '99
Relationship to Fourth Visit	Before	After
Rate of Speech (Words per minute)	43.4 wpm	44.9 wpm
<b>Pauses (Silent and Filled)</b> Time in Seconds / Number Total Number of Words Percent (Length / Number)	19.8 / 6.2 138 14.3% / 4.5%	10.5 / 3.6 133 7.9% / 2.7%
<b>Repetitions</b> Number/Total Number of Words Percent	1.5/138 1.1%	0.7 / 133 0.5%
<b>Self Repairs</b> Number/Total Number of Words Percent	0.2 / 138 0.1%	0.4 / 133 0.3%

The third significant measure of changes in Yuta's language abilities came from the PPVT (Peabody Picture Vocabulary Test). Table 12 presents Yuta's scores on this test.

**TABLE 12: PPVT (The Peabody Picture Vocabulary Test) Scores**

Date	Time Since Return to Japan (Months)	Raw Score	Chronological Age (CA)*	Age Equivalent (AE)*	Difference Between CA and AE*
1/98	22	104	9;0	7;10	-1;2
3/98	Short stay in the U.S. (2 weeks)				
5/98	26	108	9;4	8;0	-1;4
7/98	28	116	9;6	8;10	-0;8
8/98	Short stay in the U.S. (3 weeks)				
8/98	29	129	9;7	10;1	+0;6
4/99	37	121	10;3	9;1	-1;2
8/99	41	117	10;7	8;6	-2;1
8/99	Short stay in the U.S. (3 weeks)				
9/99	42	133	10;8	10;6	-0;2

\* In years; months

The Table clearly shows attrition in Yuta's active vocabulary after long periods in Japan, followed by gains immediately after trips to the States. For example, in the vocabulary tests administered in May and July 1998, after Yuta's second visit to the U.S., his raw scores on the PPVT were 108 and 116, while the gaps between his actual (chronological age) and the age equivalent of his test score were -1;4 (one year and four months lower) and -0;8 (eight months lower). However, the test performed in August 1998—shortly after his third visit to the U.S.—yielded a raw score of 129 and a gap between Yuta's chronological age and the age equivalent of his score of +0;6 (six months higher). The following year, attrition was again in evidence. In the test performed in April 1999, Yuta's raw score was 121, and the gap between his chronological age and age equivalent was -1;2. By August of that year, shortly before his fourth visit to the U.S., Yuta's raw score had dropped to 117 and the difference between his chronological age and age equivalent was -2;1. In contrast, the test performed in September 1999, shortly after his fourth visit, resulted in a raw score of 133 and a gap of -0;2.

The fourth significant measurement of changes in Yuta's English proficiency derived from an "oral recognition test", a procedure developed by Cohen (1989) to prove that attrition occurs not because forgotten knowledge is permanently inaccessible, but because it has become difficult to access. To examine whether my subject's performance in this study supports the retrieval failure theory, I followed Cohen's procedure and selected ten words (four nouns and six verbs) which Yuta had used in a story-telling task right after his third trip to the U.S. but which he no longer used by the time he had returned from his fourth trip. These words are listed in Table 13.

TABLE 13: Examples of Attrited Productive Lexicon\*

Verbs (6)	Nouns (4)
supported	field
ran	goals
go through	practice
scored	feather
brought	
blew	

\* Words listed in order of appearance in story.

I then had the subject take an oral recognition test of these words immediately after he completed the fourth story-telling task. Yuta recognized eight out of the ten words. Of the words shown in Table 13, he did not recognize *brought* and *blew*, both verbs.

## DISCUSSION

### Absolute Speed of Attrition

Evaluation of Yuta's spontaneous speech samples and analysis of his hesitation phenomena during three of the story-telling tasks indicate that Yuta's language attrition started ten to eleven months after the family's move to Japan. In English speech samples taken around that time, Yuta was seen to employ compensatory strategies, while in spontaneous Japanese speech samples, no such strategies were evident. This suggests that these symptoms were due not to a developmental pattern, but to a linguistic pattern.

Compared to previous studies (Kuhberg, 1992; and Kaufman and Aronoff, 1991), Yuta's attrition process was slow. Kuhberg's (1992) two Turkish subjects' (ages 9 and 7) loss of German (L2) was not substantial in any area for the first five months after they left Germany, but lexical (free morpheme) codeswitching to Turkish was observed in their usage after six months. Kaufman and Aronoff (1991) found the first sign of attrition of their subject's Hebrew (L1) seven months after the subject moved to the United States. In Tomiyama's (1998) longitudinal study of L2 English attrition in a subject whose L1 was Japanese, she reported that the onset of attrition could be characterized by the subject's lexical retrieval difficulty starting at around eight months after his return to Japan. It may be assumed that the reason the start of Yuta's attrition was delayed is that he returned to the U.S. for a visit three months after moving to Japan.

It may also be assumed that Yuta's short visits in the U.S. significantly slowed the progression of his language loss. In Kuhberg's (1992) study, one of his subjects had become ashamed of her L2 by the 15th month, so Kuhberg terminated his research. The language attrition of the subject in Kaufman and Aronoff's 1991 study was also faster. In the 12th month of the study, due to the onset of disintegration in the L1 verbal system of the subject, she became increasingly unwilling to express herself in her L1. In comparison with these subjects, the subjects in Tomiyama's 1998 study had rather slower attrition processes. Tomiyama wrote that her subjects, "at 16 to 19 months, are still speaking spontaneously and willingly, with morphology being relatively unaffected despite lexical retrieval difficulty and being less fluent" (1994, p. 22).

Yuta, on the other hand, even after 44 to 48 months of relatively less English usage, responded spontaneously and comfortably in English conversations, despite lexical retrieval difficulties and deterioration in fluency. Further, after his second visit to the U.S. (25 months after moving), his language attrition was reduced, and after his third and fourth visits, it had partially disappeared. These results suggest that Yuta's short stays in the U.S. slowed the pace of his language attrition.

Another factor which has been reported to contribute to language maintenance is literacy (Olshtain, 1989; Cohen, 1989; Reetz-Kurashige, 1999; Tomiyama, 1998). While living in America, Yuta gained the English literacy level of an American first-grader, and during the last year of his stay he attended an advanced reading and writing class with children who were native speakers. This may also have slowed the attrition process.

The subject's age is also thought to effect the speed of attrition: Olshtain (1986) argues that the L2

English of younger subjects (ages 5 - 8 years) deteriorates more severely than that of older children (ages 10 - 14). Yuta's age when the family moved to Japan was 7;3. Although this would technically put him in Olshtain's more vulnerable "younger" subject group, it is near the dividing line between her two age groups, so it may be assumed that the effect of his age on attrition speed was not so clear.

Thus, it may be assumed that the combination of L2 literacy, borderline age, and possibly the length of L2 exposure both before and after his move to Japan, as well as Yuta's motivation to maintain his English, contributed to the slow pace of attrition.

#### **Differing Attrition Rates for Different Linguistic Skills**

During the observation period of 4 years and 2 months, no substantial attrition was detected in Yuta's listening skills or his productive phonology, apart from the three pronunciation problems he already had before the move to Japan. Studies by many previous researchers, such as Robinson (1985, cited in Yukawa, 1997b), Weltens et al. (1989), Yoshitomi (1994) and Yukawa (1997a) have found the same tendency. Yukawa (1997b) suggested that "receptive skills and productive phonology tend to be retained, or at least, it tends to be more difficult to detect loss in these areas with the kinds of instruments that attrition studies to date have employed" (p. 20). In contrast, there was obvious attrition in Yuta's speaking skills, which supports findings by Yukawa (1997a), Kuhberg (1992), Yoshitomi (1994) and Tomiyama (1998).

#### **Compensatory Strategies**

Yuta was found to employ compensatory strategies such as pauses, repetitions, self corrections, paraphrasing, approximation and avoidance. Also, the length of his sentences, and the amount of his speech in general, decreased: he increasingly employed one-sentence utterances and one-word answers. Tomiyama's subject, Ken, also used long pauses, repetitions and self-repairs (1994), as well as paraphrases, approximation and avoidance, partially as the result of his lexical retrieval difficulty (1998). However, he also frequently codeswitched into Japanese, a strategy which was not employed by Yuta. Tomiyama (1994) reported that her other subject, Eugene, exhibited codeswitching patterns and timing similar to those of Ken. Yukawa (1997a) pointed out that the sentences of her early bilingual subject (L1-Japanese, L0-another, L2-English; age 5;5) became shorter as his language attrition progressed, resulting in one-word responses or reliance on routine phrases.

Thus, Yuta's strategies to compensate for his language attrition are quite similar to those used by previous research subjects, with the exception of codeswitching. Instead of codeswitching, Yuta described the words he could not remember using vocabulary he had retained. For example, when unable to recall the word "architect", Yuta said, "starts with 'a'... a person build buildings." One explanation for this may be that most of Yuta's conversational partners were native English speakers who did not know any Japanese. In any case, Yuta seemed to be comfortable employing this compensatory strategy.

## Productive Phonology

As mentioned above, Yuta had three English pronunciation problems at the time the family moved to Japan: 1) he pronounced words ending with "-er" as "uh" [ʌ/ə] rather than a clear [əɾ]; 2) he tended to make a [dʒ] sound instead of the [ʒ] sound in "pleasure"; and 3) he had a lisp, so he said [θ] instead of [s] when pronouncing "seven" and "soccer".

In considering the first of these problems, we should note that according to some studies in error analysis, there is some evidence that some Japanese students have difficulty understanding the difference between [əɾ] and the [æ] and [ə] sounds, or may drop the [əɾ] sound (Koike, 1993). Some Japanese students therefore confuse "had" with "hard" and "fa" with "far".

Likewise, research has shown that Japanese listeners find it difficult to tell the difference between the [ʒ] and [dʒ] sounds (Koike, 1993). In fact, when their ability to differentiate between these two sounds was tested, Japanese subjects averaged 30% incorrect answers (p. 103). Although both [ʒ] and [dʒ] are often used in Japanese, in contemporary usage the subtle difference between these two sounds has been lost. In words in which these sounds formerly were dissimilar, such as *kaji* [fire], which used to be pronounced with the [ʒ] sound, and *jishin* [earthquake], which was pronounced with the [dʒ] sound, they now sound the same.

Lisps, however, are a problem that sometimes occurs in small children due to immature jaw and dental development. Typical mispronunciations produced by a lisp are use of [θ] and [ð] in place of [s] and [z]. Usually these mispronunciations are corrected naturally over time. In examining Yuta's lisp, it was found that he used [θ] and [s] sounds correctly in the last pronunciation test, which was performed in March 2000. This means that Yuta's lisp had disappeared. Moreover, it should be noted that although the [θ] sound does not exist in Japanese, Yuta used this sound instead of an [s] sound in both Japanese and English contexts until March 2000. This also suggests that this problem was due to a developmental problem rather than a linguistic one.

In contrast to his pronunciation problem with [s] and [θ], which was developmental in nature, Yuta's difficulties with pronouncing both the [ʒ] and [dʒ] sounds and [əɾ] and [ʌ/ə] sounds can be attributed to language transfer, as they are both characteristic problems for Japanese speakers.

With reference to productive phonology, the most salient finding of this study is the fact that Yuta acquired two correct pronunciations—[əɾ] and [ʒ]—during his third visit to the U.S. According to the results of the pronunciation test which was performed after he had been living in Japan for 29 months and just after he had returned from his third short visit to the U.S., Yuta retained only the lisp; the other two pronunciation problems had disappeared. This finding suggests that Yuta acquired the two correct pronunciations in a natural setting in the U.S. rather than retrieving them, since he had these two problems before he moved to Japan. It might also be inferred that his improved pronunciation resulted from age or physical development. This suggests that Yuta not only retrieved some of his previous English proficiency but also acquired new skills during the period under observation.

Within six months of his acquisition of these two correct pronunciations, however, Yuta had lost them again. Then in the following four months, Yuta once again began to use the correct [əɾ] sound. This

process of acquisition, loss and retrieval suggests that the sounds he acquired during a visit to the U.S. hadn't been retained as well as sounds which he had acquired and retained in the U.S. before he moved to Japan.

## Syntax

### Answering negative questions

A previous study suggested that Yuta had acquired the rules for answering negative questions between September 1996 and January 1997, shortly after his first trip to the U.S. (Hirai, 1999). In the current study, Yuta answered negative tag questions incorrectly in his spontaneous speech in June 1997 – 15 months after his move from the U.S. Notably, Yuta did not retain the fluency he had acquired while in Japan. Over the five segments of the observation period in this study, his varying ability to handle negative questions in English correctly parallels the seesaw pattern of phonological acquisition and loss he displayed with the [əɾ] and [ɜ] sounds.

Yuta corrected his own answers to negative questions several times in the recorded data. Such self corrections are represented by the figures in parentheses in Table 6. Although the percentage of uncorrected errors is not high, it could be inferred that Yuta had started to lose the English negative answering system that he had once acquired. Because the form of an English negative tag question is similar to a statement (e.g., "You can't dive, can you?"), Japanese-English bilingual children tend to react to the statement rather than to the tag question when they answer.

Compared with Yuta, the English monolingual subjects answered negative questions and negative tag questions correctly 100% of the time at this age. Moreover, Yuta's responses in Japanese to both negative and negative tag questions were correct 100% of the time. These results were interpreted as evidence supporting language transfer from Japanese to English.

### Sentence subject omission

In the current study, Yuta incorrectly omitted the subject *It's* or *It* in all five segments of the observation period. This could be interpreted as a strategy to keep the length of answers to a minimum. However, a study on a Spanish-English bilingual child found evidence of language transfer in terms of sentence subject omission. In Solis' (1986) study, the bilingual (L1-Spanish, L2-English) subject, a girl (3;8), included sentence subjects in her negative constructions in English 90% of the time and in Spanish 60% of the time. Although the occurrence of subject omission in Spanish is not limited to negation, Solis argued that "these results hinted the inclusion of subjects in the negative English, as well as negative Spanish constructions, could be a result of English influence on Spanish." Since analysis of non-negative constructions corroborated this hypothesis, the results were interpreted as suggesting an English-to-Spanish influence (Solis, 1986, p. 63).

Since Japanese and Spanish have optional subject omission, I feel that Solis' argument could be applied to Yuta's case. Although the percentages of Yuta's subject omission were small, some of his sentences were completely ungrammatical: for example, [It was] "Monday yesterday." Moreover, it

was found that Yuta omitted *It's* and *It* four times more often than the English monolingual subjects did. Therefore, I would suggest that these findings could be caused by Japanese influence on English rather than being merely the result of a desire to produce one-word answers.

#### **Use of *do* + NP**

During the observation period, Yuta's utterances showed little variety in sentence structure due to his strategy of "simplification". He started to employ the *do* + NP structure in his spontaneous speech after ten months away from the U.S., producing expressions like "Let's *do* this game" and "I *did* fishing", instead of using the verbs *play* and *went*. Expressions with *do* were also used by English monolingual subjects in this study. However, Yuta used *do* in ways which are not used by English monolingual subjects. For example, he said, "He *did* a team captain" (instead of *was* or *became*) and "He *did* supported shoes" (instead of *had*).

Yuta produced this kind of *do* + NP construction on an average of 5.3% of the time during the five segments of the observation period. By comparison, the English monolingual subjects produced *do* + NP constructions 1.9% of the time. In Tomiyama's (1998) study, Ken started to use this same *do* + NP pattern during his attrition process. Tomiyama suggested that "some of this may be an L1 transfer" (1998, p. 8).

Therefore, these results can be interpreted as showing that some of the behavior exhibited by Yuta might have been caused by Japanese influence on English rather than mere "simplification". In fact, the findings regarding negative questions, sentence subject omission and the *do* + NP construction all suggest that in the speech samples taken during Yuta's attrition period, there was Japanese influence on English--in other words, L1 transfer. Therefore, it can be said that the results of this study support the theory of cross-linguistic effects.

#### **Retrieval periods**

Four types of data highlighted the changes in Yuta's English language proficiency during the observation period. First, in all three areas of syntax which were examined, the number of mistakes Yuta made in the second and fourth segments of the observation period was lower than in the first, third and fifth segments. These results clearly indicate that the first, third and fifth segments can be seen as attrition periods, and the second and fourth segments as retrieval periods, as I predicted. The results also show that the number of errors in Yuta's language utterances declined after his second and fourth trips to the U.S. This clearly suggests that Yuta regained or relearned English to some degree through his trips to the U.S., which can be seen as "retrieval cues".

The second type of data came from the story-retelling tasks. Table 10 shows that the retelling tasks performed immediately after visits to the U.S. were much better than those carried out before the trips. In addition, Table 11 shows that the total length of pauses and number of repetitions Yuta made in the story-telling task performed in September 1999 were just over half those made in March 1999. The number of self repairs, however, was higher in the session immediately after the trip, probably because

the subject was trying to make his statements more accurate. His self corrections can be interpreted as a search for a certain target item, starting with an inappropriate form, but eventually arriving at the correct form (e.g., "comed" → "came"). These results can be interpreted as supporting the retrieval failure theory.

Yuta's scores on the PPVT (the Peabody Picture Vocabulary Test) also suggest the role of trips to the U.S. in cueing language retrieval. As outlined in the results section, Yuta's raw score and the gap between chronological age and age equivalent were significantly higher after his two visits to the U.S. However, because the PPVT was not administered during the pre-attrition stage, it is difficult to determine whether the high scores on the tests taken after Yuta's third and fourth visits to the U.S. show the degree to which his language was retrieved or the level of his language acquisition. It may also be suggested that his increased age played a role in his English retrieval. However, Yuta's raw score of 133 on the final test in this study performed in September 1999, compared to his score of 104 on the first test in January 1998, clearly suggests that Yuta did not merely regain his language ability, but rather, improved in proficiency in the receptive lexical area to some degree.

Among psychologists, there is general agreement that information once learned is not lost. It becomes inaccessible with disuse, but is retrievable with the right cues. Through relearning and the reintroduction of previously known material, old knowledge will become reactivated to a level that makes it retrievable (Hansen, 2001). Therefore, it is safe to assume that the first three types of data produced in this study indicate that Yuta relearned his English proficiency after his trips to the U.S.

The fourth measure of change in Yuta's language was the oral recognition test. Out of the ten words he had previously produced, Yuta recognized eight, or 80%. Both of the words he missed were verbs. In Cohen's (1989) study, his younger subject (9 years old) identified all but one of 17 (94%) words he had previously produced, and the older one (13 years old) identified 11 out of 14 words (78.6%). Cohen concluded that the results for his younger subject would support the interpretation that the desired words were inaccessible for productive use at that time, rather than lost from memory. The results of the older subject, however, suggested some decay or interferential unlearning of these words. As for the subject in my study, it is difficult to determine which case he parallels.

However, it is interesting to note that in Cohen's study, the words missed by both subjects were all verbs, as were the two words missed by my subject. In other words, all nouns were recognized by all three subjects. There is general agreement that there are different levels of memory. A high level of activation is needed for recall (production), but a low level is sufficient for recognition. The results of my study support the idea that in the lexical area, especially nouns, words are not lost from memory, but rather, the level of activation has merely become low. Thus, the data gathered from Yuta using Cohen's procedure for creating an oral recognition test partially supports the retrieval failure theory.

When all four types of data gathered on the changes in Yuta's language competence are considered, competence restructuring, i.e., intra-linguistic forces, was recognized in the area of syntax, and performance failure was recognized in the lexical area, especially nouns. It is significant to mention that in my study, it can be said that both competence restructuring and performance failure were recognized in specific areas.

### Other findings

Perhaps the most important question to ask is whether Yuta is losing his English proficiency now that he is living in Japan, or is losing his English proficiency on the one hand, but is also acquiring English to partial degree on the other. Based on the results of this study, I argue that although Yuta is losing his English proficiency, he is also acquiring new English skills. Also, the fact that he is growing older and gaining more intellectual linguistic sophistication might be playing a role. This question will be considered in further research.

### CONCLUSION

The findings of this study suggest the following five conclusions. First, in measuring the absolute speed of attrition, it was determined that attrition was evident ten to eleven months after the move to Japan. Moreover, even after 44 to 48 months of decreasing English usage, Yuta responded spontaneously and comfortably in English conversations, despite lexical retrieval difficulties and a deterioration in fluency. Thus, in contrast to the subjects in other studies, Yuta's attrition was slow. Perhaps the combination of L1 literacy, a somewhat higher age than previous subjects, and possibly the length of L2 exposure both before and after moving to Japan and his motivation to maintain his English, as well as his four visits to the U.S., contributed to slowing the pace of attrition.

Second, language attrition was recognized neither in listening skills nor productive phonology, but only in speaking skills. Significant change was especially evident in the following three syntactical areas: answering negative questions, omission of sentence subjects and use of the *do* + NP construction.

Third, these syntactical changes were due in part to simplification and in part to Japanese influence on English, that is, L1 transfer as a coping mechanism in response to L2 language attrition. Thus, the results of this study support the theory of cross-linguistic effects.

Fourth, three types of data gathered after Yuta's second trip to the U.S. suggest that Yuta regained or relearned his English proficiency after his trips.

Evaluation of hesitation phenomena during a story-telling task and the results of an oral recognition test administered after the subject's fourth trip to the U.S. partially support the retrieval failure theory. The oral recognition test results, in particular, can be interpreted as supporting the retrieval failure theory as it relates to the lexical area for nouns. In addition, Yuta's short visits to the U.S. can be seen as effective "retrieval cues".

However, transfer from the subject's L1, Japanese, was seen to affect his English production. Retrieval failure, or performance failure, occurs when the attriter's previous language ability, which seems to have been lost, is not restructured nor decayed, but rather is unable to be retrieved. Conversely, competence change occurs when the linguistic knowledge itself is restructured. In Yuta's case, both competence restructuring and performance failure were recognized in certain cases.

A surprising fifth finding became obvious from the PPVT and productive phonology data. The results suggested Yuta not only retrieved his former English proficiency, but also acquired new English skills even after his language attrition had started. They also suggested that a subject's increased age plays a

role in acquiring vocabulary and pronunciation or correcting grammatical errors using metalinguistic knowledge. Yuta's newly acquired proficiency in productive phonology, however, proved difficult to retain. This contrasts with the insignificant loss of the productive phonology he acquired before moving to Japan. This phenomena will be considered in continuing research in phonology, syntax and other areas.

This is only one case study; nonetheless, it is a longitudinal case study which assessed language attrition in a relatively accurate manner by collecting various types of data to examine an individual's linguistic behavior. This type of study can be a viable tool for further attrition research, adding to our knowledge of language attrition and language transfer.

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