

## L1 Japanese Attrition of a 5 Year-Old Bilingual Child

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The subject of this paper is a Japanese-English bilingual boy, Haruki, who was raised in Japan and then moved to Hawaii at the age of 5;5 for five months, during which time his stronger language, Japanese, suffered attrition due to a great decrease in exposure to it. Data on the process of the subject's L1 attrition and recovery after his return to Japan were collected through regular audio recordings of natural conversation, story-telling tasks, word games, fiction-making tasks, and conversations with a bilingual interlocutor, and then analyzed in terms of Mean Length of Utterance (MLU), errors, and codeswitching. As a result, the following three points became clear: 1) After two or three months in an English-speaking environment, the subject was unable to produce sentences in his L1 Japanese except for set phrases. However he recovered his pre-departure oral production capability within five weeks of his return to Japan. 2) The subject's performance level varied greatly according to the type of task being performed. During the latter part of his sojourn in Hawaii, he was able to produce single words for the word games, but not complete sentences for natural conversation and story-telling tasks. Moreover, priming (cf. Bock, 1986) affected the length of sentences he could produce. 3) The L1 attrition experienced by this subject did not appear to be caused by a loss of/change in his knowledge of that language, but rather, by difficulties in processing that language, knowledge of which for the most part remained intact. In the area of non-pathological language attrition, this type of observation of a subject's language processing ability, as well as his knowledge, is essential in order to gain a complete understanding of human language activity.

### < 5才のバイリンガル児による日本語の喪失 >

本稿は、日本で日英語を第一言語として育ったバイリンガル児（春希）の日本語喪失及び回復の報告である。被験者は英語圏（ハワイ、日本出国時5;5）で5ヵ月間過ごし、その間日本語に接する機会が少なかったためにその喪失が起こった。

本研究では、自然会話、語り、言語ゲーム（しりとり、反対語）、フィクション作り、バイリンガル話者との会話のデータを収集し、言語ゲームの結果、及び、産出された発話の平均発話長（MLU）、エラー、コードスイッチングを分析した。その結果、次の3点が明らかになった。（1）春希は、ハワイ到着後2-3ヵ月で決まり文句以外の文章を発話できなくなり、帰国後5週間で喪失以前の発話能力を回復した。（2）一度に一語を発する言語ゲームはできるが、文章を産出することができなかった（自然会話等）ことに加え、プライミング（Bock, 1986）の有無で発話できる文の長さが違うなど、課題によるゆれが大きかった。（3）春希の日本語喪失は日本語という言語に関する知識の消失、変化によるものではなく、言語処理する部分の異常によるものである。

脳障害によらない言語喪失の研究に、言語知識の変化の分析だけでなく、その言語処理能力を観察する視点を加えることは人間の言語活動の全体をとらえる上で不可欠である。

## INTRODUCTION

Many of us have observed how quickly children learn and lose languages once they are immersed in a new language environment. This can happen to monolingual children when they accompany their parents abroad; the move leads them to learn the language spoken in the new country and lose their L1 swiftly. It occurs with even greater speed in children who are already bi- or multilingual (Celce-Murcia, 1977; Celce-Murcia and Vialla, 1983; Kamada, 1994; Kamada, 1995).

We still do not know whether children are truly quicker language learners than adults, because it is obviously impossible to control all factors in order to make valid comparisons.<sup>1</sup> Nevertheless, initial impressions are that small children seem to be quick in producing a language that is totally new to them if it is spoken in their environment, and also quick in losing a language, even if they were quite proficient in it, once it is no longer used around them. This characteristic of child language is the focus of the present report.<sup>2</sup>

This paper will examine the attrition of a Japanese-English bilingual child's Japanese. Attrition is defined here as any regression observed in the subject's language of study from his base-line data. I have chosen to focus on attrition rather than acquisition primarily because attrition is a young subfield of language research offering new types of data, and thus offers perspectives different from those we already have from the abundant literature on child-language acquisition.

This article covers the pilot study of a larger project on L1 Japanese attrition, which is reported elsewhere (Yukawa, in press). The subject, Haruki, was a 5 year-old Japanese-English bilingual boy. This portion of the study focuses on the 5-month attrition and 2-month recovery process of the child's Japanese, especially his oral production. Japanese was the subject's L1 and was initially stronger than his English; however, it was subject to attrition due to his temporary move to an English-speaking country and was regained upon his return to Japan. The data from this subject suggest that he experienced extremely rapid attrition and recovery of his oral production ability, especially in terms of sentence production, and to a lesser extent, in his utterance of single words. The data also seem to suggest that Haruki's oral production loss was not caused by the destruction of his language system, but rather by the sudden development of processing difficulties with Japanese, the knowledge of which appeared to remain for the most part intact.

Before analyzing this data, I will give an overview of the research on language attrition upon which this study builds.

## LITERATURE REVIEW

Non-pathological language attrition at the intra-individual level, i.e., attrition caused by non-use of a language rather than a lesion in the brain, was acknowledged as a subfield of research only in the early 1980s. Since then a number of literature reviews have been made (Pan and Gleason, 1986; Weltens, 1987; Weltens and Cohen, 1989; Seliger and Vago 1991a). Since space limitations do not allow a thorough discussion of the available literature here, and since I have made a thorough review of this topic elsewhere (see Yukawa, 1997), in this paper I will discuss only those variables and issues most relevant to the present study, namely, the age and proficiency variables which influence attrition, and theories/models which explain the nature of attrition.

The term "nature of attrition" is used here to refer to two types of attrition in language production, i.e., 1) the disappearance of or deviance from the previously available language due to the destruction of/change in the knowledge of the language, and 2) similar attrition phenomena caused by difficulties in processing the language even though the subject's knowledge of that language remains intact. The former type of attrition has been the subject of non-pathological attrition research for the last two decades. Such research to date has yielded several theories which explain how normative language knowledge is modified selectively (Andersen, 1982; studies in Seliger and Vago 1991b). The latter type has rarely been the focus of attrition studies (except Grendel, 1993), although some psycholinguistic research (Green, 1986; Levell, 1989; de Bot, 1992; Williams, 1995) as well as pathological attrition literature



(Warrington and Shallice, 1979; Warrington, 1981; Hagiwara, 1985) suggest the existence of attrition caused by such processing failures.

### Age

A number of case studies (Cohen, 1989; Hansen-Strain 1990; Kauffman and Aronoff, 1991) and group studies (Olshtain, 1986, 1989) have concluded that the younger the child, the quicker and the more severe the language loss experienced. Hansen-Strain (1990) and Cohen (1989) examined L2 (Japanese) and L3 (Portuguese) loss in siblings, respectively, and found that the younger sibling lost his/her foreign language skills more dramatically and more rapidly than the older brothers and sisters. Olshtain's study examined a group of children between the ages of 5 and 14 who returned to their native countries after living in North America and acquiring English as their L2. Olshtain found that children in the lower age group (5-7) suffered more loss of their English than those in the older group (8-14).

To my knowledge, there is only one study in which an older child was reported to have experienced quicker attrition than a younger one. According to Kuhberg (1992), a 9 year-old Turkish child (L1 Turkish, L2 German, 9 years old when she moved back to Turkey from Germany) lost her German more quickly than a 7 year-old child who had the same basic linguistic background and went through the same German attrition process. Kuhberg attributed this to the "stronger pressure the older child had to give absolute priority to Turkish" (Kuhberg 1992, p. 145).

None of these studies, however, presents a detailed linguistic report of the pre-attrition proficiency of their subjects' languages. Since they all focus on second languages acquired naturalistically, they describe the length of stay in the foreign language environment, the language learning method, and then give a very brief description of the subjects' languages, such as "native-like proficiency". Therefore it is difficult to separate the age variable from the proficiency level.

### Pre-Attrition Proficiency

Literature in this area generally presents the tendency that the higher the proficiency level, the smaller the amount and the proportion of the total language knowledge lost. Evidence for this theory is provided by Bahrack (1984), de Bot and Clyne (1989), Godsall-Myers (1981), and Robinson (1985). Weltens (1989) presented a slightly different picture from the other group studies due to the high proficiency of his subjects: very little loss was found in either of the two different training levels. However, if we view Weltens' results within the context of a larger range of proficiency levels (including much lower proficiency groups than the ones in Weltens' study) and duration of attrition periods (e.g., as many years as Bahrack's study, which included 50-year attrition periods), they do not necessarily contradict the results of the other studies. Rather, they only depict the attrition procedure (i.e., very little attrition) of a specific population, namely, a highly proficient group.

Both Olshtain (1986) and Cohen (1989), in their discussion of older children's superior language maintenance, mentioned another significant variable, literacy skills, as a probable aid to maintaining proficiency in the language.

## Theories Which Explain Language Change

At the time when non-pathological language attrition started to be recognized as a subfield of linguistic research, Andersen (1982) made some predictions on the linguistic attributes of language attrition. These predictions were considered to be natural and plausible on the basis of previous language theories (L1 and L2 acquisition, pidgin and creole study, literature on language shift/maintenance, etc.). Generally speaking, Andersen predicted that the language suffering from attrition would be characterized by shrinkage of repertoires at all linguistic levels, especially in marked forms which are not commonly used. Andersen also predicted that the forms which do not exist in the other language used by the attriters and the forms which do not hold high functional load would tend to be lost. His predictions were compared with the results of non-pathological attrition studies published to date, and it was found that all of his predictions were borne out in reality except for the order of attrition (Yukawa, 1997).

Seliger and Vago compiled a volume on L1 attrition (1991b) containing a number of studies (Altenberg, Kauffman and Aronoff, Seliger, Vago, Sharwood Smith and van Baren, Silva-Corvalán, etc.). These studies present numerous types of impetus, both "internally induced" (Seliger and Vago, 1991a, p. 10) and "externally induced" (ibid., p. 7), for changes of language forms. (See Seliger and Vago's introductory chapter [1991a] in their volume [1991b] for details about "internally and externally induced forces".)

Briefly, internally induced forces include impetus towards simplicity, universality, rule transparency, and minimum processing capacity within the language. For example, Kauffman and Aronoff (1991) presented a case of L1 Hebrew attrition by a child (2;9-4;6) due to her 2-year long residence in the U.S. Towards the end of the subject's attrition stage, she created an idiosyncratic verb template, iCaCe(c), in which C indicates a consonant, such as in *inagev* (wipe). The subject used this stem erroneously for all linguistic environments. Since it is the colloquial third person masculine singular future form of the verb template, this form corresponds with the most productive template in children's speech in normative Hebrew (the most useful template for any Hebrew learner of limited competence to use if s/he cannot use other templates; the unmarked, default template). Thus this subject's attrition exemplifies internally induced rule simplification.

Externally induced forces refer to selective cross-linguistic influence, for example, a shift toward the use of fewer marked forms. An example of externally induced change was reported by Altenberg (1991). In this case, the subjects experienced selective attrition in their L1 German under the influence of their L2 English over 40 years. The study examined German syntax (word order), morphemes (gender and plural) and collocation of two verbs. The results indicated that word orders which are possible in English but not in German were judged by the subjects to be more acceptable than word orders which are not possible in either language. In addition, the results of both verb collocation and morpheme knowledge indicated that there was more attrition in areas of similarity between the L1 and L2 than in areas of dissimilarity. Both transfer in the word ordering and interference in the collocation and morphemes present evidence of selective attrition of a language under the influence of another language.

The literature includes a few more examples of internally and externally induced language change. Vago (1991) presented an example of intra-linguistic regularization in noun and verb paradigms of L1



Hungarian. Seliger in the above-mentioned volume (Seliger and Vago, 1991b) as well as Seliger (1989) presented L2 Hebrew influence on L1 English dative and relative clause constructions respectively. A similar transfer in dative constructions from L1 Hebrew to L2 English is reported in Olshtain (1989). Studies reported elsewhere (Redeke, 1979; Seliger, 1989; Major, 1993) also present evidence of language change due to cross-linguistic influence. (See Yukawa, 1997 for a more detailed review of the studies related to internally and externally induced forces for language change.)

### Language Production Models and Evidence for Processing Failure

Language attrition due to processing failure has been mentioned (e.g., Sharwood Smith, 1983; Seliger, 1996), but not discussed thoroughly in non-pathological attrition literature. However, erroneous production of the forms of which a speaker has perfectly correct knowledge can be observed in slips of the tongue (speech errors by normal native-speaking adults) in daily speech (Fromkin, 1973), in anomalous stress and intonation of simultaneous interpreters when they interpret speech into their L1 (Williams, 1995), and in pathological attrition where language knowledge is tested and shown to be intact but production presents problems (Warrington, 1981; Warrington and Shallice, 1979; Hagiwara, 1985). After explaining each type of evidence offered to date, I will present a summary of language production models that facilitate a recognition of the existence of attrition due to processing difficulties.

Normal native-speaking adults who are not suffering from any recognized sort of attrition (e.g., due to aging or non-use of the language) often make errors (Fromkin, 1973). The errors range from phonological to morphological and syntactic level mistakes: e.g., saying "cuff of coffee" instead of "cup of coffee" (Kess, 1991, p. 56), or saying "sliced the knife with a salami" instead of "sliced the salami with a knife" (from Fromkin, 1973 cited in Levelt, 1989, p. 247).

Simultaneous interpreters who are supposedly fluent speakers of more than one language are sometimes found to make errors in stress and intonation when they interpret into their L1. It is suggested that such errors occur due to the high processing demand (understanding the incoming language, interpreting the language into another language, and monitoring one's own output at the same time) (Williams, 1995).

In the area of pathological language attrition, Warrington (1981) and Warrington and Shallice (1979) suggest that "inconsistent performance" and the existence of "priming effects"<sup>3</sup> in aphasic patients, among other phenomena, indicate that such language disorder lies in impaired access to, rather than permanent loss of, linguistic knowledge. Similarly, Hagiwara (1985) found 30 aphasic patients who showed difficulties in producing case-marking particles had mostly intact knowledge of the same particles in a grammaticality judgement task.

These examples of phenomena commonly found in our daily lives and in certain populations (interpreters and aphasic patients) indicate the existence of problems in processing a language that are distinct from problems in knowledge of the language. Based on numerous data of speech errors and other psycholinguistic findings (e.g., aphasic literature), Levelt presented a language production model for monolinguals ("Speaking" model; 1989), and with that as a basis, de Bot (1992) attempted to conceive a bilingual production model. Green (1986) presented another model of speech control. What follows is a

brief presentation of these models, which it is hoped will further help us conceive of the possibility of language attrition caused by processing failures.

According to de Bot's model, bilingual language production contains at least three components: (1) the "conceptualizer"--which forms a preverbal message based on consideration of all the knowledge involved in the interactional situation at hand; (2) the "formulator"--necessary lexical items that are taken out of the lemma (i.e., lemma information, that is, all the information about a lexical item except phonological) and fed into the language specific formulator to convert the preverbal message into linguistic forms; and (3) the "articulator"--by which the speech plans are changed into actual speech. This model, based on firm empirical evidence, suggests how various types of language problems can be caused by disorder of one or more of these components of the production mechanism.

Green (1986), on the other hand, postulated that at least some cases of impaired linguistic performance are due to problems in controlling an intact language system, rather than to damage to the system itself. For Green the ideas of "activation" and "resources" are crucial to explain such cases. ("Resource" is not explicitly defined in Green (1986, p. 215), but he implies that it is a sort of energy which is consumed both in inhibiting and exciting a language system.) When a bilingual is speaking one language, that language is "selected". The other language may still be "activated", or, after a long period of non-use, it may have become "dormant". "Resources" are consumed both in inhibiting improper language and in disinhibiting proper language for the particular interaction. Green hypothesizes that human beings are endowed with a limited amount of such resources, and thus bilinguals may, at times, not have enough "resource" energy to keep both of their languages under control. Green claims that this model successfully explains cases that had been puzzling neurolinguistically, for example, a patient's "alternate antagonism" (a phenomenon in which a bilingual aphasic patient recovers only one of her languages on one day and the other on a different day) with "paradoxical translation" (a phenomenon in which a bilingual aphasic patient cannot translate into the language which she has recovered in spontaneous conversation) reported by Paradis et al. (1982).

Paradis (1985), however, assumed that the level of activation of one language over another determined which language offered more available items for the bilingual speaker. In his framework, availability was considered to be a function of recency and frequency of the item's activation.

With this understanding of models of attrition in bilinguals, I would like to move on to look at the L1 attrition experienced by the Japanese-English bilingual subject of this study.

## RESEARCH QUESTIONS

The current report addresses the following three research questions:

1. How much and how fast did the subject lose his oral Japanese production ability during the 5 months of his stay in an English language environment, and how quickly did he regain it upon returning to Japan?
2. In what types of language activities did the subject exhibit the greatest loss of Japanese? In other



of words, how much task variability--variability among contextualized versus decontextualized tasks and variability with linguistic priming versus no priming--was seen in his Japanese proficiency?

(1) It was predicted that Haruki would find it easier to produce Japanese utterances on here-and-now topics, such as in natural conversation, rather than in story-telling tasks or language games. It was also predicted that the use of linguistic priming (Bock 1986) would activate the subject's Japanese language and thus help it flow more easily than when no such priming was offered (Bock, 1986; also see note 3). The effects of priming have been reported in normal and pathological populations (Warrington, 1981; Warrington and Shallice, 1979); moreover, lack of recent and frequent activation of the target language is considered to determine the availability of the language in Paradis (1985). This research question was therefore formulated to test these predictions.

3. What was the nature of the attrition that the subject suffered? Did his attrition occur primarily because of the destruction of/change in his Japanese language system? And if so, what kinds of language change were observable? Or was it primarily due to difficulties in processing Japanese?

### SUBJECT

The subject is the present researcher's son, a 5 year-old Japanese boy who was born and raised in Japan except for one year (0;4-1;5) in Hawaii. He is a simultaneous acquirer of Japanese and English. He learned Japanese in the community and English at home. Both parents are Japanese teachers of English and have spoken to him in English at home since he was born. His attrition data were collected during the 5 months (5;5-5;10) he lived in Hawaii with his mother, who was studying there.

Immediately before he went to Honolulu and started to experience this change of language environments he was a competent native speaker of both Japanese and English. Japanese, however, can be said to have been his stronger language because of his richer input in Japanese (he went to a Japanese preschool for seven hours a day, five days a week), his preference to switch into Japanese when speaking English at home, and his higher literacy skills in Japanese (he was able to recognize and write most of the *hiragana/katakana*<sup>4</sup> characters, while he could write only a few letters of the English alphabet and could not yet recognize them all.)

All the same, Haruki's English was quite good. His English syntax was equivalent to that of a NS 5 year-old, and he experienced no trouble communicating with English-speaking adults and children. A month after his arrival in Hawaii (5;6), he began attending a public kindergarten five days a week, where he was exempted from attending ESL classes for foreign students. According to a standardized test given at the school, his vocabulary level was judged to be that of the average native speaking 7;7 year-old child.

During his five months in Hawaii he spoke English at school and had no Japanese-speaking classmates. At home he spoke English with a monolingual English-speaking couple (house mates) and with his mother as well, because English within the family had been the rule throughout his life. He used his Japanese only when he was sent to his Japanese-speaking baby-sitter for about 6 hours on Saturdays.

This case presents a course of attrition slightly different from previous attrition studies of small children due to two unique features of Haruki's language-loss situation. First, Haruki had a limited chance to use his Japanese for the 5 months of the attrition period, unlike Kauffman and Aronoff's subject (1991), whose L1 was also the target of the study but was used as the home language throughout the attrition period. Second, Haruki's other language (the other L1, English) was proficient from the beginning of the move to the new environment, whereas in most cases the language in a new environment is also a new language for the child. These factors were expected to accelerate rather than suppress the quick language shift in question.

## DATA

The following five types of data were analyzed in this study.

- 1) The initial 100 utterances of the subject's speech in a natural conversation with each of two monolinguals, N (in Hawaii) and A (after returning to Japan). N and A were both Japanese nationals and monolingual speakers of Japanese in Haruki's eyes, although in actuality, both had a low-intermediate level of English. Neither pretended to be unable to understand his English when he spoke some to them, though they often reminded him to speak in Japanese.
- 2) A story-telling task (cir. 10 minutes) in which the subject was asked to explain one book of the Berenstain Bear series (a picture book series published by Random House with around 30 pages in each book) to N/A. The initial 100 utterances (or, if it was less than 100 utterances, the whole story) were included for analysis.
- 3) Language games played with N/A: (1) *Shiritori* --a Japanese word game in which the players take turns supplying words which start with the final syllable of the previous word (15 minutes); (2) "Opposite Word" --the subject had to say the opposite of each word N/A supplied.

In addition to the main data types 1), 2) and 3) above, the following supplementary types of data were also collected:

- 4) The initial 100 utterances of the subject's speech in a natural conversation with N and S (an American English-Japanese bilingual) in Hawaii; and after returning to Japan, a conversation of equivalent length with A and the present researcher, Y (a Japanese who normally speaks to the subject in English).
- 5) A fiction-making task (cir. 6 minutes) in which Haruki co-authored a story with N/A. N/A read a hypothetical story (e.g., Haruki and his sister going to the zoo/ swimming pool) prepared by the present researcher, which consisted of 7-9 sentences. Each sentence that N/A read had information on only what Haruki's sister and others did in the story, but not what Haruki did (e.g., *Shoko-chan wa chiisai shawaa no aru puuru ni hairimashita*, which means "Shoko entered a small swimming pool with showers"). Immediately after this model sentence was read, Haruki created his part of the story describing what he himself did in this hypothetical situation (e.g., *Haruki-kun wa ookii nami ga aru*



*puuru ni itte...* which means "Haruki went to the big swimming pool with waves, and..."). N/A and Haruki repeated this type of exchange 7-9 times to create a complete story.

Type 4 data were collected in order to examine codeswitching patterns depending on the perceived English proficiency of the interlocutor. Type 5 data were added to examine inter-task variability in terms of the priming effects, i.e., to see if the subject would speak more Japanese and/or Japanese of higher complexity with priming sentences (in fiction-making) than without such sentences (in natural conversation and story-telling).

The three main types of data--1) natural conversation, 2) story-telling and 3) language games,--were collected once a month (five times in Hawaii and twice after returning to Japan), while additional data of type 1 (natural conversation) was collected weekly after the pair's return to Japan in order to record the rapid recovery of Haruki's Japanese. Table 1 shows the timetable of the data collection.

TABLE 1: Data Collection Schedule	
<b>[Arrival in Hawaii]</b>	
Session 1	One month after arrival in Hawaii
Session 2	Two months after arrival in Hawaii
Session 3	Three months after arrival in Hawaii
Session 4	Four months after arrival in Hawaii
Session 5	Five months after arrival in Hawaii
<b>[Return to Japan]</b>	
Session 6A*	One week after returning to Japan
Session 6B*	Two weeks after returning to Japan
Session 6C*	Three weeks after returning to Japan
Session 6D	One month after returning to Japan
Session 7A*	Five weeks after returning to Japan
Session 7B*	Six weeks after returning to Japan
Session 7C*	Seven weeks after returning to Japan
Session 7D	Two months after returning to Japan

Note: \* During these sessions, only natural conversation data were collected.

During one data collection session (Session 5), Haruki refused to do his story-telling task, pretending that he had never read the book he was supposed to explain. Thus there are no type 2 data for Session 5.

Type 4 data (bilingual conversation) were collected during Sessions 2, 3, 4, 5, 6D and 7D. Type 5 data (fiction-making) were collected at Sessions 3, 4, 5, 6D and 7D. All the data (except the type 4 bilingual conversation data for Sessions 6D and 7D) were collected without the researcher's presence. All the data were audiotaped with a portable Sony TCM-1000A cassette tape recorder.

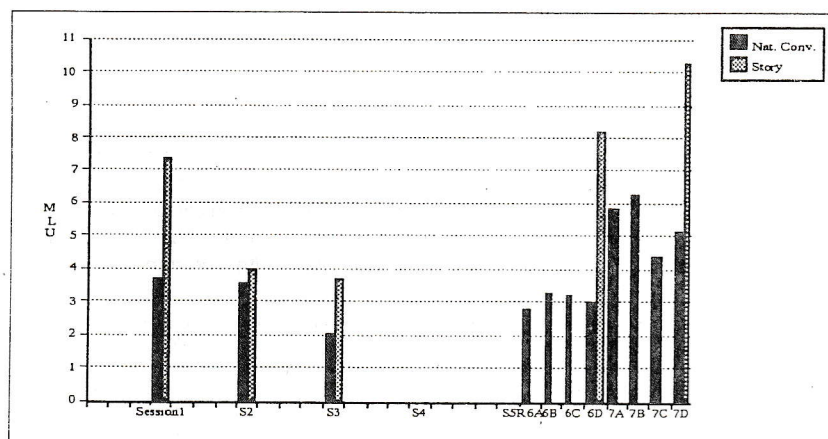
The mean length of utterances in morphemes (MLU) in Japanese, English words and phrases, and errors in data types 1 (natural conversation), 2 (story-telling) and 5 (fiction-making) were counted. English words and phrases in data type 4 (bilingual conversation) were also counted. (In counting MLU, Japanese fillers, i.e., *eettonee*, *eettone*, *ettonee*, *ettone*, *nee*, *sa*, *saa*, [the equivalent of uhh... and um...] and English words were excluded from the analysis.) Japanese as well as English words produced in the two language games were analyzed.

## RESULTS

### Speed of Attrition and Recovery

Figure 1 shows that the MLU in Japanese in natural conversation and story-telling fell sharply as the time Haruki had spent in Hawaii accumulated. Only on very rare occasions in Session 3 did Haruki's participation in the natural conversation comprise more than a single noun or simple "yes"/"no" response to the interlocutor's questions. During Sessions 2 and 3, toward the end of his 100-utterance segments, Haruki switched the language to English, although he switched back to Japanese after a while. Moreover, by Sessions 4 and 5, Haruki hardly used Japanese in the natural conversation or the story-telling at all. He spoke English throughout these tasks except for a very few utterances. Only two short Japanese utterances were found in the initial 100 utterances of the natural conversation for Session 4 and seven for Session 5. While N continued speaking to Haruki in Japanese and specifically requested that Haruki speak in Japanese at the beginning of each task, the subject continued to respond in English. It should be noted, however, that he engaged in the two-code conversation happily, exhibiting no difficulty in comprehending his interlocutor's Japanese at any point during the data collection period.

FIGURE 1: Haruki's MLU in Natural Conversation and Story-Telling Across Time



Haruki returned to Japan a week after the fifth data collection session, and from the following day he attended the same Japanese preschool he had attended before leaving for Hawaii. He spent most of the day there (9:00 a.m. to 4:00 p.m.) Monday through Friday. According to his preschool teacher's observation, Haruki spoke some Japanese words and even a few sentences to his friends on the first day back at the preschool.

From Session 7A on, Haruki's MLU in the natural conversation exceeded that of Session 1, suggesting that by the fifth week after returning to Japan he had regained the Japanese he had lost during the last



four months of his stay in Hawaii. When we look at the story-telling data, the MLU in Session 6D exceeded that in Session 1. This suggests that, in this task too, Haruki had regained within one month the syntactic complexity he had lost during his 5-month sojourn.

In sum, if we judge Haruki's Japanese speaking ability by the length of his utterances, we can say that he lost this ability completely during the first four months after leaving Japan (as evidenced in the natural conversation and the story-telling data), and regained it during the first five weeks after returning to Japan. This answers our first research question.

Two more pieces of data should be reported regarding the influence of Japanese input on Haruki's Japanese performance. After the data collection in Session 5, I asked N to show Haruki a Japanese cartoon on video, which he watched for half an hour. According to N, Haruki talked to himself in Japanese while he was watching the video, uttering words equivalent to English "go", "wonderful", etc., but this extra Japanese input did not alter the linguistic interaction with N afterwards.

On another day after the Session 5 data collection but before returning to Japan, I arranged to play a card game with Haruki and N. With some twenty pictures spread in front of us, we took turns describing one of the pictures in Japanese, and everyone tried to pick the target card up as quickly as possible. After 7 minutes of playing this game, Haruki ended it, saying in English, "I don't wanna play this any more. This is too difficult for me." He then returned to his two-code conversation with N.

Thus, providing opportunities for receptive activation of Haruki's dormant Japanese (via the Japanese video) and for productive activation (by forcing Haruki to say some Japanese words/phrases in the card game) did not activate his Japanese to a level at which he could speak Japanese in natural conversation afterwards. On the other hand, Haruki uttered Japanese words and even some sentences on his first day back at his preschool. Seven hours of immersion among his Japanese-speaking peers obviously served to activate his long-dormant L1. It also should be added that three months after returning to Japan, his parents had to remind Haruki to speak English at home, because his Japanese had become so strong again and started to invade the home, i.e., English, domain!

### Task Variability

As hypothesized in formulating research question 2, Haruki's performance varied greatly depending on the task, but not as had been expected. It had been predicted that natural conversations concerning highly contextualized here-and-now topics would be easier than language games, which provided no contexts for the language, and story-telling tasks, which dealt with someone else's daily life rather than Haruki's. However, the amount of Japanese Haruki could produce decreased -- to zero in the fourth month -- in both natural conversation and story-telling, whereas Haruki continued to play the two language games very well in Japanese, even during his last week in Hawaii. Although he expressed difficulty in retrieving words/phrases to describe the cards in the new game he was asked to play a few days before leaving Hawaii, as far as the monthly language games (*Shiritori* and Opposite Word) were concerned, he had no problem even during Session 5. (For the number of words Haruki produced in *Shiritori* and the Opposite Word game, see Tables 2 and 3.) The frustration level observed in Haruki during the language games was also much lower than during natural conversation and story-telling.

TABLE 2: Total Number of Words Haruki Produced in <i>Shiritori</i> Game (15-Minute Session)					
	Japanese Words		English Words		Total
	Number	%	Number	%	Number
Session 1	35	97.2%	1	2.8%	36
Session 2	40	87.0%	6	13.0%	46
Session 3	24	82.8%	5	17.2%	29
Session 4	38	92.7%	3	7.3%	41
Session 5	28	90.3%	3	9.8%	31
Session 6D	39	100.0%	0	0.0%	39
Session 7D	24	100.0%	0	0.0%	24

TABLE 3: Recollection of Opposite Words (During "Opposite Word" Game)							
Session	1	2	3	4	5	6D	7D
<b>Category 1 Words</b>							
<i>omoi</i> (heavy)	x	x	x	x	x	x	x
<i>ii</i> (good)	-	-	-	-	-	-	x
<i>onaji</i> (same)	-	-	-	-	-	-	x
<i>chiisai</i> (small)	x	x	x	x	x	x	x
<i>kirei</i> (clean)	x	x	x	x	x	x	x
<i>atsui</i> (hot)	x	x	x	x	x	x	x
<i>sukoshi</i> (a little)	x	x	x	x	x	x	x
<i>ushiro</i> (behind)	-	-	-	-	-	-	x
<i>omoshiroi</i> (interesting)	-	-	-	-	-	-	-
<b>Category 2 Words</b>							
<i>osoi</i> (slow)	x	x	x	x	x	x	x
<i>tsumetai</i> (cold)	x	x	x	x	x	x	x
<i>mae</i> (front)	x	x	x	-	x	x	x
<b>Category 3 Words</b>							
<i>takusan</i> (much)	-	-	-	-	x	x	-
<i>ue</i> (above)	x	x	x	x	x	x	x
<i>nagai</i> (long)	x	x	x	x	x	x	x
<i>takai</i> (high)	-	-	-	-	-	-	x

**Notes**

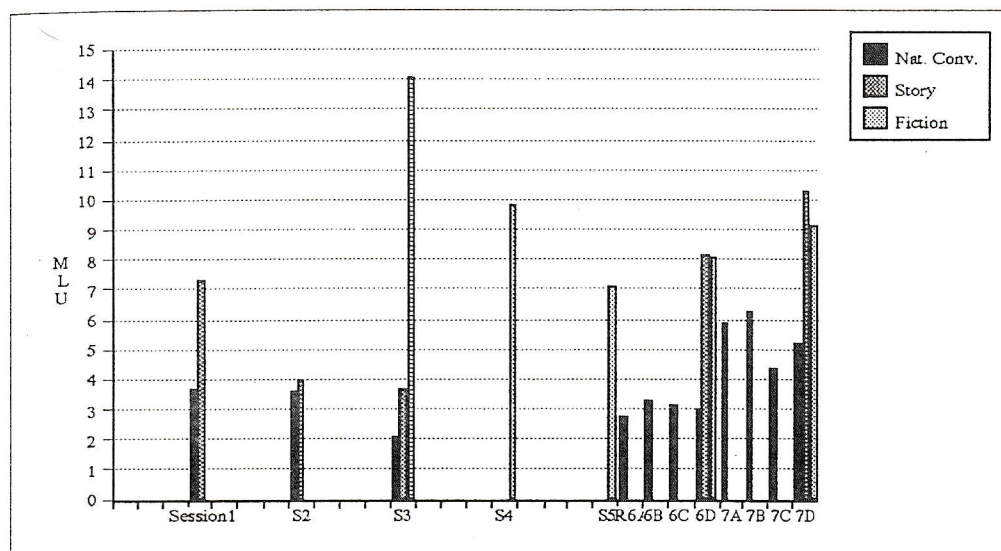
1. x = correctly recalled - = not recalled
2. The selection of the words was based on Murata (1982, p. 32). In Murata's study, the opposites of the words in category 1 were produced for the first time by an L1 Japanese acquirer earlier than those in category 2, which were acquired earlier than those in category 3.

Variability was also observed in the fiction-making task in contrast to natural conversation and the story-telling task. During the attrition stage, Haruki produced the most elaborate Japanese among the



three tasks in his fictitious stories. During Session 3 Haruki produced much longer sentences in the fiction-making task than in the natural conversation or the story-telling task (Figure 2). During Session 4 his sentences were shorter, but he was still able to speak some Japanese. (Note that he had stopped speaking Japanese entirely in the natural conversation and story-telling tasks by this time.) Even during Session 5 he tried to create a fictitious story in Japanese during the first half of the task, although his sentences were short and incomplete, and he resorted to English to complete the latter half of the story.

FIGURE 2: Haruki's MLU in Natural Conversation, Story-Telling, and Fiction Across Time



During the recovery stage (Sessions 6D and 7D), Haruki produced longer utterances in the fiction-making task than in natural conversation, but the variance between the fiction-making and story-telling tasks disappeared. The reason seems to be clear. The psychological scar caused by Haruki's awareness that his Japanese had deteriorated was so severe that he no longer enjoyed the task<sup>5</sup>. He did not use the script-making style (the written style of language with fully supplied case-marking particles and politeness markers such as *desu* and *masu*) to accomplish the task as he did in the attrition stage. He switched to the conversational style, and he made only a minimum contribution to the fiction-making. This style naturally shortened sentences that otherwise may have been much longer.

## Errors

During the attrition and recovery periods, a very small number of errors were observed in Haruki's data (0-4 errors in approximately 15-minute natural conversations, and 0-7 errors in about 10-minute story-tellings). (See Figure 3 for the number of errors and Table 4 for the actual errors and possible correct alternatives for them).

FIGURE 3: Haruki's Errors in Natural Conversation and Story-Telling Across Time

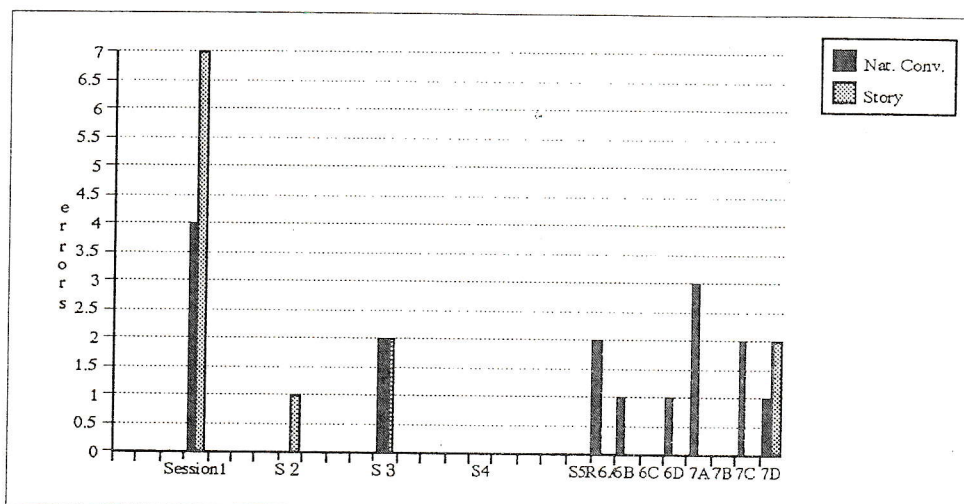


TABLE 4 : Haruki's Errors and Possible Correct Alternatives

Data Type	Natural Conversation	Story-Telling
Session 1	<i>kita toki kara*</i> [ni] zenbu atta <i>kutsuhaki*</i> [kutsushita] <i>shiiraakaa*</i> [sooraakaa] (2 times)	<i>shiitsu ni*</i> [o] kaketa <i>kitara dame no*</i> [na] tokoro <i>hanashi o yatte*</i> [shite] nee 3 times <i>hi o aketari*</i> [tsuketari] <i>rampu o*</i> [ni] gasu o irete
Session 2	--	<i>koitsu no kore ga*</i> [o] yabutta
Session 3	<i>aru*</i> [atta] <i>kore nukeyoo*</i> kana [hazusoo/nukesaseyoo]	<i>kono hito ga catfish ga nee aru*</i> [iru] ka shite* [dooka] tashikametemo] ne
Session 4	--	--
Session 5	--	--
Session 6A	<i>ano ojisan*</i> [ojiisan] <i>are kore kakanai*</i> [kakenai] ze	--
Session 6B	<i>soshitara boku tate haku*</i> [tsukau/motsu] ga	--
Session 6C	--	--
Session 6D	<i>ikura oshieta kara tte oshieru n</i> <i>da yo*</i> [?]	--



TABLE 4 : Haruki's Errors and Possible Correct Alternatives (Continued)		
Session 7A	<i>me o akeru*</i> [aketa] <i>manma de</i> <i>bin o nanka henna fune ni kawas*</i> [kaeru] <i>mahootsukai no yagi</i>	<i>demo ne imagoro*</i> [konogoro] <i>wa okashi wa nashi tte</i>
Session 7B	--	--
Session 7C	<i>demo ne fuku wa arau toki ni nurete</i> <i>shibometeshimau*</i> [shibondeshimau] <i>datte seroteepu tte sugu ni</i> <i>hodokereru*</i> [hazuseru]	--
Session 7D	<i>kaasan ga sonnani*</i> [tottemo] <i>sukina kotoba ya ze</i>	<i>datte kono fukuro no toko ga</i> <i>denwa no kodo to</i> <i>konkorogatte*</i> [kongaragatte] <i>nee</i> <i>yakyuu no kaburu no*</i> ['no' is not necessary] <i>yatsu to</i>

Note: [ ] = possible correct form

As seen in Table 5, Haruki made 16 errors altogether in natural conversation and the story-telling task during the attrition period, and 12 errors in total during the recovery period.

TABLE 5: Type and Number of Errors Made	
Attrition Period	
Type of Error	Number of Occurrences
Verb choice	7
Case-marking particles	4
Noun choice	3
Verb tense	1
Conjugation of nominal adjective	1
Total	16
Recovery Period	
Type of Error	Number of Occurrences
Verb choice	5
Noun choice	2
The genitive particle <i>no</i>	1
Verb aspect	1
Verb inflection	1
Adverb	1
Unknown	1
Total	12

It is difficult to find any pattern in these errors except to note that frequent errors were made in verb choice and case-marking. Although case markers were incorrectly used 4 times altogether, no particular pattern (e.g., preference for *ga* over other particles) is clearly observed in those errors. The same can be said with the errors in verb choice. As far as we can judge from these errors, it would appear that no restructuring of grammar occurred.

### Codeswitching

Type 4 data (bilingual conversation) were collected to examine Haruki's codeswitching patterns. I wanted to see if Haruki viewed his main data collectors N and A as people who knew English fairly well or not. Even though N/A always spoke Japanese with Haruki and with others in Haruki's presence and even asked him to speak in Japanese when he used English, Haruki may have somehow come to realize that N/A knew some English. If this were the case, his use of English words/phrases in data types 1, 2, and 5 (natural conversation, story-telling, and fiction making) should be interpreted to have occurred due to pragmatic language choice (using English for someone who knows English) as much as out of necessity (psycholinguistically no alternative other than using English). The data suggest, however, that Haruki differentiated N from S, the bilingual data collector. He used more English with S than with N, and thus must have viewed N as a monolingual Japanese speaker (or limited English user).

Bilingual conversation data were collected from Session 2 to Session 7D. During the attrition stage Haruki used more English words/phrases in bilingual conversations (Biling. C) than in monolingual conversations (Mono. C). During Session 2 he used English 9 times (19 words) in the Mono. C and 22 times (56 words) in the Biling. C. During Session 3 he used English 12 times (22 words) in the Mono. C and 35 times (121 words) in the Biling. C. Sessions 4 and 5 do not provide any information because Haruki spoke English all the time in all conversations. In the recovery stage, probably owing to the abundant Japanese input at his Japanese preschool and from his peers, Haruki rarely codeswitched into English in any type of conversation. The maximum amount of English used in any type of conversation was 2 occurrences with a total of 4 words.

Thus the data lead us to conclude that Haruki did know that there was a difference in the knowledge of English between the bilingual data collector (S) and the monolingual data collector (N) and made some effort not to use English with N. Despite such efforts, he could not avoid using some English during Sessions 2 and 3 and a lot during Sessions 4 and 5.

### DISCUSSION

Based on the results presented above, I will now try to answer the three research questions posed and discuss the significance of the findings.

The first aim of this study was to determine the speed and amount of the subject's L1 attrition and its recovery. The data show that the speed of these processes in the subject was extremely fast. Haruki's oral Japanese production decreased to zero in as short a time as four months and it reached its original complexity within five weeks. Let me note here that adult native speakers of Japanese would not be apt



to lose their mother tongue to the same extent when placed in the same situation. A language in which one has attained a high level of mastery and automaticity--in other words, either one's mother tongue or a second language in which one has native-like proficiency--has been shown to be more resistant to attrition (Hyltenstam and Stroud 1993; de Bot and Clyne 1989; Bahrack 1984). In the present study, Japanese was the subject's first and stronger language, and since he was five years and five months old at the time he moved to the L2 environment, he had acquired basic Japanese syntax, and a large vocabulary, and was a fluent and "automatic" speaker (McLaughlin, 1990; McLaughlin, Rossman and Mcleod, 1983). Nevertheless, his Japanese went through drastic change within a remarkably short period of time.

My second research question asked about the variability in production when conducting different tasks. A great difference was shown in the fiction-making data in comparison with the other two tasks (natural conversation and story-telling) and a great gap in the level of performance was observed between the language games and the conversation tasks. This means that the subject's oral production was facilitated by linguistic priming (i.e., during the fiction-making process), and that producing one-word utterances (i.e., in language games) was easier than producing longer utterances.

The third research question addressed the issue of the nature of the subject's language attrition. It would be difficult to say that Haruki's knowledge of the Japanese language changed during the course of this 5-month attrition process, judging from the paucity of his errors (Figure 3) and the fact that the examination of those errors did not provide any evidence of restructuring of Haruki's Japanese at any linguistic level. The literature review presented evidence of the existence of internally and externally induced impetus for moving toward greater regularity and simplicity, which was manifested as various erroneous but systematic language rules (e.g., an idiosyncratic verb template, less marked word ordering of dative/relative clause constructions, simpler noun and verb paradigms). However, Haruki did not systematically produce any deviant forms in his Japanese speech during the attrition period.

One subtle change was observed, however, in Haruki's metalinguistic knowledge. It is related to syllable formation in Japanese. Japanese is written in syllables, with one symbol representing each syllable (usually a consonant followed by one of five vowels, or one of these vowels standing alone). In the *Shiritori* game, the player must determine the last syllable of the word given to him/her (the last character with which the word is written) and provide a word that starts with that same syllable/symbol. In playing this game during Sessions 3 and 4, Haruki gave a total of seven answers which violated the rule, as shown in Table 6.

In the seven cases of rule violation (out of a total of 70 Japanese words he produced for the game), it was observed that Haruki divided the last syllable, which consisted of one consonant and one vowel, into a smaller unit--namely, a phoneme. Thus, after he heard a word such as *midori* (green), instead of responding with a word which starts with *ri*, the last syllable (written symbol) of the word, he divided *ri* into the phonemes *r* and *i* and used only the consonant as the phoneme to begin his word with, and then produced the word, *rampu* (lamp).

TABLE 6: Errors in <i>Shiritori</i> Game Answers	
Data Collector N's Word	Haruki's Response
<i>midori</i> (green)	<i>rakuda</i> (camel)
<i>midori</i> (green)	<i>rampu</i> (lamp)
<i>oshiri</i> (seat)	<i>rampu</i> (lamp)
<i>inu</i> (dog)	<i>nanbiki</i> (how many [animals or insects])
<i>kiri</i> (fog)	<i>rampu</i> (lamp)
<i>mane</i> (mimicking)	<i>nani</i> (what)
<i>mekuri</i> (flipping)	<i>rassoo</i> (meaning unknown)

According to the rules of the game, he should have produced words like *ringo* (apple) or *rika* (science) which begin with the syllable *ri*, rather than just the consonant /r/ combined with another vowel. Cross-linguistic influence from English may have been at work here, as the smallest unit in English is the phoneme. Haruki seemed to be using the English unit of analysis in those seven cases to analyze the given words.

Nonetheless, I would like to argue that the change in Haruki's Japanese cannot be equated with the loss of his Japanese language system. Rather, it appears to be a reflection of remarkably strong processing difficulties. This perspective seems to adequately explain the most significant attrition phenomena observed in the present subject's case, which are: (1) during the time period when he was unable to produce Japanese sentences in some tasks, he still retained receptive skills (i.e., he understood the interlocutor's Japanese), and he was capable of producing Japanese in other tasks; (2) he was able to "regain" his Japanese very quickly; (3) we have no evidence that his language system changed, since no consistent patterns of errors were made in natural conversation and the story-telling task.

Although Haruki's Japanese was an L1 and of high proficiency, it seems to have suffered from a very sudden surge in processing difficulties. Priming, which is claimed to help activation of the target lexical items and sentence structures, did appear to exert a dramatic influence on Haruki's Japanese production during Session 3, but the same priming and other means of activation (i.e., video watching and the card game described above) were not sufficient to improve production during Session 5. It was not until he returned to Japan and immersed himself in Japanese preschool life that Haruki's dormant Japanese became fully reactivated without any hinderance from such processing difficulties.

## CONCLUSION

This study has confirmed the common observation that once constant input and output opportunities ceased to be provided to a child (in this case 5;5-5;10) he would drastically decrease production in that particular language, especially production of long utterances. By examining the speed and the task



variability of the attrition as well as observing the errors the subject made, the study further suggested that the perspective of processing failure, rather than the concept of change (or the loss) of the language system, seems to better explain the most salient characteristics of this particular attrition process. Such phenomena could be drawn out of the data because the subject possessed fluent English ability on arrival in Hawaii, while the opportunity to use Japanese was severely limited.

The reason, therefore, why young children are "quick to forget" is not simply the fact that they cannot read, which deprives them of more input from the language under attack (Olshtain 1986), or that they are not aware of the advantage of being bilingual. A more subconscious, psycholinguistically oriented force, namely, a sudden increase in difficulties in language processing, seems to prevent young children from producing the language not spoken in the environment even when the language system of the attriting language may well be intact. Considering the "processing" perspective separately from the transformation of "the language system" therefore offers another dimension to the analysis of non-pathological language attrition.

Further questions regarding small children's processing failure remain. For example, we do not know up to what age children's processing abilities of a language may go up and down this quickly at the mercy of input. Another question concerns more details on the areas in which processing becomes difficult. Recall that Haruki could retrieve one word at a time during the two language games, even when he was unable to do other tasks that required him to produce phrases. He also showed relatively more frequent errors in verb choice and case-marking. We need to ask if any linguistic level or linguistic item is particularly difficult to process. Or is the difficulty just a matter of the total quantity to be processed at one time? These are some of the questions that must be dealt with, and which my on-going research will address.

#### NOTES

1. For mutually contradictory claims, see Asher and Price 1967; Olson and Samuels 1973; Tahta, Wood and Lowenthal 1981; and for a review of the relationship between age and SLA, see Larsen-Freeman and Long 1991, pp. 157-67, Long 1990 and Long 1993.
2. The high speed of language acquisition and loss is not the only language-related feature of children. Nor may it be totally isolated from other psycholinguistic mechanisms of their languages. Small children seem to be different from the rest of the population in other aspects as well, such as their language learning strategies (Bley-Vroman 1989), and the high ultimate attainment they can achieve if they continue to learn a given language with sufficient input; i.e., native-like attainment in L2s is common up to age 6, but not after (Johnson and Newport, 1989; Hyttenstam, 1992).
3. Priming is a technique to induce activation of lexical items via semantic/phonological links or activation of syntactical forms via structural links in one's brain. It is done by presenting subjects with lexical items which are related in some way to the target items or with a syntactical structure the same as/similar to the target construction before the target items/structures are elicited (Anderson, 1983; Collins and Loftus, 1975; Posner, 1978).
4. *Hiragana* and *katakana* are the two sets of phonetic symbols used in written Japanese. One character represents a mora in Japanese. A mora is a rhythmic unit which overlaps with a syllable except when a syllable includes a final [N] (as in *mon* /moN/ [gate]), in double consonants such as *kakko* /kaQko/ (parenthesis), or when a vowel is elongated (such as in *koori* /kooi/ [ice]). In these cases, Japanese count the nasal consonant [N], the non-nasal consonant [Q] or the elongated vowel as a separate mora, thus, for example, *mon* is counted as one syllable but two moras. See Shibatani 1990, Chapter 8 for a full discussion of Japanese phonology.

5. It was evident through his own comments that Haruki had full awareness of his Japanese loss. On the evening of the day of the third data collection, three months after arrival in Honolulu, he said to the present researcher in English:

(In order to speak Japanese) I have to search for every word in the brain. It takes two or three hours to search for the words I want to say. Then I have to cross out the words I don't want to say. I get so tired.

He also expressed his fear that he would not be able to regain his Japanese when he returned to Japan.

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