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The Utterance Position Effect in Japanese Stuttering

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Abstract

Cross-linguistic analysis of stuttering allows researchers to determine what aspects of stuttering are universal and what aspects are language-specific. Ujihira (2011), Smith and Howell (2013) and LaSalle and Huffman (2015) have all advanced cross-linguistic research fluency disorders by researching stuttering in Japanese. Continuing the research of stuttering in Japanese, this preliminary study had two objectives: (1) to investigate if there is a consistent utterance-initial or near-initial effect in Japanese individuals who stutter, and (2) to investigate the presence of stuttering on Japanese function words related to the utterance-initial position. Speech samples from 10 Japanese males who stutter between the ages of 3;11 and 48;2 years (Mdn age = 10;4 years) were analyzed for two different word-level measures: utterance position and word class. Preliminary results suggest that an utterance-initial effect (i.e. stuttering on or within the first word of an utterance) is not a characteristic of Japanese stuttering, with only two participants demonstrating statistical significance in binomial tests which compared the proportion of utterance-initial words to the proportion of disfluent words at the utterance-initial position. However, an utterance-near-initial effect (i.e. stuttering within the first three words of an utterance) may in fact be a characteristic of Japanese children who stutter with approximately 88% of disfluent events occurring within the first three words of participants ages 3;11 to 11 years.

Keywords: Stuttering, Japanese, Utterance Position Effect

1. Introduction

Stuttering is a disorder that disrupts speech fluency. It is characterized by a loss of control of speech production, which results in involuntary repetitions, prolongations and blocks. Furthermore, speech fluency may be disrupted by interjections and revisions of speech. Some of today's most important research related to stuttering examines the disorder across languages. Cross-linguistic research of stuttering is valuable because it allows us to identify what aspects of stuttering are universal and what aspects, if any, may be language-specific (e.g., Chou, Zebrowski & Yang, 2015; Howell & Rusbridge, 2011). The research and management of stuttering in Japan is an emerging yet relatively undeveloped field of study (Chu, Sakai & Mori, 2014). Studies that have examined stuttering in Japanese have further advanced our knowledge of fluency disorders (LaSalle & Huffman, 2015; Smith & Howell, 2013; Ujihira, 2011).

Ujihira (2011) has been the most prolific investigator of Japanese stuttering. Ujihira excluded whole-word repetitions from stuttering measures due to the agglutinating nature of Japanese (e.g., morphemes are bound together such as in "mamato," which combines "mother" and the conjunction "and"). Ujihira collected spontaneous conversational samples from Japanese and English speaking adults, and found that almost all stutters in the large corpus of Japanese stuttering instances (84% or 1119 / 1333) occurred on the first syllable of Japanese words. Then, Smith and Howell (2013), based on their results of eleven Japanese-speaking 3- to 6-year-old children who stutter and nine English-speaking peers who stutter, found that Japanese children stutter more on "content words" (i.e., nouns, verbs, adjectives and adverbs) than "function words" (i.e., articles, auxiliary verbs, conjunctions, prepositions, pronouns) while English-speaking children who stutter show the opposite tendency. All investigators of Japanese stuttering to date cite the agglutinating feature of the language of Japanese as to why function

words are used differently in Japanese and thus do not allow for the stalling-type disfluency (e.g., "I...I…I think" or "Yo…yo creo" or "Ich...ich…ich denke" seen in English, Spanish, and German).

LaSalle and Huffman's (2015) investigation of Japanese stuttering had two primary objectives: (1) to standardize Japanese speech sample measures in order to more easily compare research of Japanese stuttering to the existing body of research on stuttering, and (2) to investigate developmental trends of disfluency types in Japanese individuals who stutter (LaSalle & Huffman, 2015). The authors phonetically transcribed audio samples of 10 Japanese individuals who stutter, ages 3;11 to 48 years, and analyzed the samples for stuttering-like disfluencies (SLDs). One of the key findings of the study was a syllable to bunsetsu (the bunsetsu is the Japanese word-unit) conversion factor of 2.4 syllables per bunsetsu. These results help to establish a unit of measurement in which the stuttering of Japanese individuals can be compared with the stuttering of individuals who stutter in other languages. Standardization of measurements in Japanese stuttering needs continued work and the authors suggest areas of future research including research related to the loci of stuttering events in Japanese stuttering. Examining the loci of stuttering events in Japanese individuals who stutter would be particularly relevant considering recent suggestions for improving the efficiency of fluency assessment.

Traditional fluency assessment and analysis involves examining each consecutive word or syllable in a speech sample for SLDs. This approach is precise yet inefficient and impractical in clinical settings where clinicians may need to simultaneously interact with and analyze their clients' fluency (Logan & Gillam, 2010). Alternative approaches to fluency assessment involve examining the first three words of an utterance rather than every single word. The rationale behind this proposed methodology is that studies of English-speaking individuals who stutter

demonstrate that the majority of SLDs occur on the first word or within the first three words of an utterance (Buhr & Zebrowski, 2009; Logan, in press). The utterance-initial (stuttering on the first word) and near-initial (stuttering within first three words) effects have been observed in both children and adults but is particularly strong in children with studies suggesting that 80% of SLDs in children occur within the first three words of an utterance (Logan & Conture, 1995). Considering the propensity for stuttering events to occur early in an utterance, Logan and Gillam (2010) predicted that analyzing the first three words of an utterance rather than each word in the utterance would yield fluency measures strongly correlated with traditional word-based approaches. To test their predictions, the authors analyzed audio-recordings of 34 children who stutter and 34 children who do not stutter using traditional word-based analysis and alternative utterance-based analysis. Results confirmed the authors' prediction that alternative analysis yielded near perfect estimations of all word fluency performance. Findings of this study have significant clinical implications because utterance-based analysis requires 86% fewer coding demands and is thus far more efficient and practical in clinical settings than traditional word-based analysis (Logan, in press).

All participants in the Logan and Gillam (2010) study were native English speakers. Due to the need for cross-linguistic stuttering research previously mentioned, the following question arises: Are utterance-based fluency assessments that focus on examining the utterance-initial and near-initial positions appropriate for measuring fluency in all languages? Essential to answering this question is determining whether or not the utterance-initial and near-initial effects are universal aspects of stuttering. If utterance-initial or near-initial effects were a universal aspect of stuttering, then it would suggest that utterance-based fluency assessments could be used to measure fluency in all languages. The tendency for stuttering events to occur in initial or near-

initial utterance positions has been observed in multiple languages including English (Logan, 2016), Spanish (Watson, Byrd, & Carlo, 2011), Persian (Karimi & Nilipour, 2011), Norwegian, and Kanada (Dworzynski, Howell, & Natke, 2003), suggesting that utterance-initial and near-initial effects may be universal aspects of stuttering. However, more research must be done in other languages to confirm or refute this.

Japanese would be an important language to examine with regard to the potential universality of the utterance-initial and near-initial stuttering effect because of the low frequency of function words in Japanese (Ujihira, 2011). Researchers have demonstrated that English-speaking children stutter on or within function words more often than content words and that the frequency of stuttering on function words increases at the utterance-initial position (Richels, Buhr, Conture & Ntourou, 2010). Results of Richels et al. (2010) suggest that the high occurrence of stuttering on the first three words of an utterance in English-speaking children who stutter is largely influenced by the presence of function words. We would not expect to see this, however, in Japanese children who stutter since Japanese contains few function words. Considering this, we do not currently have evidence to suggest if the majority of stutters produced by Japanese children who stutter occur on the first word ("utterance-initial") or on the first three words ("near-initial") words of an utterance. Investigating an utterance position effect in Japanese stuttering would help support or challenge the suggestion that an utterance-initial or near-initial effect is a universal aspect of stuttering, thus advancing cross-linguistic research of stuttering and potentially resulting in more efficient fluency assessment across languages.

The purpose of this preliminary study was twofold: (1) to investigate whether or not there is a consistent utterance-initial and near-initial effect in Japanese individuals who stutter, and (2)

to investigate the presence of stuttering on Japanese function words related to the utterance-initial position.

2. Methods

2.1 Participants

This study used previously published data from LaSalle and Huffman (2015). These were audio recorded samples of 10 Japanese males who stutter between the ages of 3;11 and 48;2 years (Mdn age = 10;4 years). The 10 audio recordings used were selected from samples from 19 individuals who stutter, obtained from the International University of Health and Welfare at the Department of Speech and Hearing Sciences in Tochigi, Japan and shared with the University of Redlands. Nine samples of the originally submitted recordings from Tochigi were excluded due to low disfluency, atypical disfluency, and low intelligibility (LaSalle & Huffman, 2015).

2.2 Procedures

This preliminary study enlisted the help of a native Japanese speaker at the University of Redlands in order to accurately translate and transcribe the audio recordings of our native Japanese participants and ensure that any linguistic nuances of Japanese present in the recordings were well documented. The native Japanese speaker was given access to all of the audio recordings.

Translation and transcription of the audio recordings was the first procedural step. First, the native Japanese speaker transcribed the audio recordings into Japanese orthography. These were subsequently translated and transcribed into English. The English translations were then given to the primary author who segmented them into C-units via Systematic Analysis of Language Transcripts (SALT; Miller & Chapman, 1993) conventions. The primary author was trained in SALT conventions. SALT conventions were used because they clearly mark utterance

boundaries, and for loci analysis, clear utterance boundaries are necessary in order to properly identify word position. Once the English translations had been properly segmented, they were given back to the native Japanese speaker who then segmented the Japanese transcriptions into the corresponding C-units. Next, the native Japanese speaker re-wrote the Japanese transcription into orthographical words. For example, for the phrase "No, I can't," she transcribed "Dekinai" rather than the Japanese symbol for that particular phrase. This was done in order to ensure that the primary author, who had no background in Japanese, could follow along when simultaneously listening to the audio recordings and reading the transcription. Additionally, the heritage Japanese speaker would underline orthographical words thought to contain disfluencies. For the purposes of this study fluency was defined as the forward flow of communication. Disfluency then was defined as any self-interruption to this forward flow. The following types of disfluency were coded:

(1) syllable repetitions (e.g., /ma ma mata/ (Eng., 'again'))

(2) bunsetsu repetitions (e.g., /ʃigɛn ʃigɛn/ (Eng., 'resources'))

(3) sound-only repetition (e.g., /u u uɾa/ (Eng., 'top'))

(4) audible prolongations (e.g., /kaɛtaɪʃ:::teiɾɯ/ (Eng., 'to wish to return'))

(5) inaudible prolongations or "blocks" (e.g., /*mam*to*omoteɪ/ (Eng., 'to think'))

Interjections were present but excluded because they often act like word units, which becomes problematic when analyzing disfluent events in terms of word position.

The primary author and the native Japanese speaker met and listened to the audio recordings together using headphones. Each sample was listened to a minimum of three times in order to confirm and identify other stuttering-like disfluencies that may have been missed. Neither the primary author nor the native Japanese speaker had any prior formal training in identifying disfluent speech, but the disfluencies identified in this study were compared to the

disfluencies identified in the LaSalle and Huffman (2015) study. An inter-rater reliability score of .87 was calculated by dividing the total number of agreements by the total number of agreements plus disagreements. Once the disfluencies were identified and accounted for, the samples were reanalyzed according to two word-level measures: word class and utterance position.

2.2.1 Word Class

Because one of the purposes of this study was to investigate the presence of stuttering on Japanese function words related to the utterance-initial position, the obtained samples were analyzed for word class, which meant determining whether words were content words or function words. Buhr and Zebrowski (2009), consistent with other authors (e.g., Howell & Rusbridge, 2010) defined "content" words as words with full lexical meaning — nouns, main verbs, adjectives, and adverbs — and they defined "function" words as words without full lexical meaning — pronouns, auxiliary verbs, articles, conjunctions and prepositions. The same definitions for content and function words were used for this preliminary study. Only words identified as disfluent were analyzed for word class. After disfluencies were identified, the native Japanese speaker indicated whether the disfluent words were content or function words by writing either a "C" for content or "F" for function above the orthographic word on the transcript.

2.2.2 Utterance Position

Utterance position was an essential word-level measure to analyze considering that the primary purpose of this study was to determine whether the utterance-initial or near-initial effect was a characteristic of Japanese stuttering. Only utterances containing disfluencies were included

in utterance position analysis. There were two sentence position categories for which the samples were analyzed: utterance-initial and utterance near-initial.

The utterance-initial position was defined as the first content or function word in an utterance. Following Buhr and Zebrowski (2009), in utterances beginning with revised or repeated speech or starter words such as "hey," "yeah," "well," and "okay," the function or content word following the revision, repetition, or starter word was counted as the utterance-initial word. For example, the utterance "*Ee, toku itte surutteiunomo nakanakataihennade"* begins with the starter word *"Ee"* which is similar to starting an utterance with *"Well…"* in English. In this case, *"toku"* is considered he first word of the utterance, not *"Ee."* The number of disfluencies occurring at the utterance initial position were tabulated and used for final analysis. Additionally, all one-word utterances were excluded from final utterance-initial position analysis.

The utterance near-initial position was defined as among the first three words of an utterance. The same rules pertaining to revisions, repetitions, and starter words applied in the initial-position analysis were used for utterance near-initial analysis. Thus, the first content or function word following a revision, repetition, or starter word served as the first word. Additionally, interjections present within the first three words of an utterance were neither counted as a word or disfluency. The number of disfluencies occurring on the first, second, or third word of utterances containing disfluencies were tabulated and used for analysis. All utterances that were three words or less were excluded from final utterance near-initial analysis.

2.3 Statistical Analysis

This study modeled its statistical analysis from Buhr and Zebrowski (2009). Binomial tests were used per each of the 10 participants in order to compare the proportion of total words

that were utterance-initial to the proportion of all disfluent words that were utterance-initial. A *p*-value of .005 was used to detect statistical significance and was adjusted from an original *p*-value of .05 using the Bonferroni method (i.e., overall alpha of 0.05 / 10 comparisons). Additionally, Spearman's rank correlation was used to demonstrate the relationship between word-level measures and age.

3. Results

3.1 Utterance Position

Results pertaining to utterance position are subdivided and discussed according to the initial position and near-initial position.

3.1.1 Initial Position

Figure 1 compares the proportion of initial words to all words and the proportion of disfluent utterance-initial words to all disfluent words. Results show that with the exception of participant 2, all participants' proportions of disfluent utterance-initial words of all disfluent words exceeded the proportion of utterance-initial words of total words. This does not however suggest that there is a consistent utterance-initial effect in Japanese stuttering. Binomial testing was used in order to compare the two proportions discussed above. Using the $p = .005$ significance level, only two participants (4 and 10) reached statistical significance. Results of binomial testing for all participants are displayed in Table 1. This indicates that for the majority of participants in this preliminary study the occurrence of stuttering was not highly related to the utterance-initial position. Raw data for disfluencies in the initial position are located in Table 2.

3.1.2 Near-initial Position

The percentage of disfluencies that occurred in the near-initial position was determined by dividing the number of disfluencies occurring in the near-initial position by the number of

total disfluencies. These percentages can be found in Table 3, along with the raw data for disfluencies in the near-initial position. Results demonstrate that there was a trend for younger Japanese children to show more of a near-utterance initial effect than did older individuals. For participants 1-6 (ages 3 to 11 years) the average percentage of disfluencies occurring in the near-initial position was 88%. For participants 7-10 (ages 15-48) this average percentage dropped significantly to 18%. Figure 2 shows a negative correlation ($r = -0.69$, $p = .03$) between age and the percentage of disfluencies occurring in the near-initial position.

3.2 Word Class

Table 4 shows the raw data for the number of disfluent content and function words for each participant. Of the 96 total disfluencies identified, only seven disfluencies occurred on function words. Of the seven participants from ages 3;11 to 15;11, two participants' samples (1 and 4) contained one disfluent function word each. Of the three adult participants, two participants' samples (8 and 10) contained disfluent function words. Participant 10's sample contained four disfluent function words, which accounts for more than half of all disfluent function words from all ten participants.

4. Discussion

One of the purposes of this study was to investigate if there is a consistent utterance-initial or near-initial effect in Japanese individuals who stutter. Preliminary results suggest that an utterance-initial effect, that is, stuttering on or within the first word of an utterance, is not a characteristic of Japanese stuttering, with only two of ten participants demonstrating statistical significance in binomial tests that compared the proportion of utterance-initial words to the proportion of stuttered words at the utterance-initial position. However, an utterance-near-initial effect, that is, stuttering within the first three words of an utterance, may in fact be a

characteristic of Japanese children who stutter with 88% (R = 67% - 100%) of disfluencies occurring within the first three words for 3;11 to 11 year-olds. The adolescent and adults Japanese speakers who stutter, however, showed only 18% (R = 0 – 33%) of disfluencies in the near-initial position. Further discussion will be divided into subsections discussing the word-level measures analyzed in this study. Limitations and suggestions for future study are also discussed.

4.1 Utterance Position

4.1.1 Utterance-Initial Position

Results of binomial testing demonstrate that the occurrence of stuttering for Japanese individuals who stutter is not related to the utterance-initial position. This is true across the lifespan. Although two participants reached statistical significance, the remaining eight participants did not exhibit an utterance-initial effect. This is not to say that these participants were never disfluent on the utterance-initial word, but rather that they were not disfluent at the initial-position with a greater-than-chance probability or significantly more frequent when compared to other utterance positions. One possible reason for this is the low incidence of function words in Japanese and consequently the low incidence of function words in the participants' samples. Furthermore, when function words do occur (e.g. the particle /to/ which serves as the conjunction "and") in Japanese they rarely occur in the initial position. In languages such as English, function words often appear in the utterance-initial position. We also know that English-speaking children who stutter tend to be disfluent in the initial position, which may in turn be the result of the frequent occurrence of function words in that initial position. The EXPLAN hypothesis suggests that when individuals are disfluent on function words they are committing the act of stalling, which Smith and Howell (2013) describe as a delaying strategy of

the forthcoming content word whose plan is incomplete. Central to the EXPLAN theory is the idea that content words constitute the primary difficulty for speakers while function words are conversely much simpler for speakers to produce. This causes speakers to use delaying strategies on function words (i.e. stalling) while planning to execute the proper production of content words (Smith & Howell, 2013). But Japanese offers no platform for stalling in the initial position since function words are rarely in the utterance-initial position and almost always follow content words in Japanese.

To summarize, the EXPLAN hypothesis offers two important factors to consider which may contribute to a lack of an utterance-initial effect in Japanese. First, function words are disfluent among speakers of English, Spanish, and German who stutter as a delaying strategy to plan and execute the production of content words. Since function words often occur in the initial position in English, stalling strategies are employed and thus a tendency to be disfluent on the first word of an utterance is established. Secondly, content words represent the primary difficulty for disfluent speakers, especially older speakers, and the content word heavy nature of Japanese makes it more likely that disfluencies are distributed throughout an entire utterance as opposed to related to one primary locus.

Alternatively, Namasivayam and van Lieshout (2008) suggested that the utterance-initial effect is the result of greater articulation and motoric planning demands that occur at the beginning of an utterance, not due to linguistic factors.

4.1.2 Near-Initial Position

The Japanese children (ages 3;11 to 11 years) in this preliminary study were disfluent in the near-initial position 88% of the time. This value is similar to the 80% of disfluencies in this position determined by Logan and Conture (1995) in a study comparing length, grammatical

complexity, and speaking rate between fluent and non-fluent speakers (ages 36 to 66 months). However, only 18% of disfluencies occurred at the near-initial position for the Japanese adolescent and adults who stutter (ages 15 to 48 years). This suggests that the near-initial effect may be a universal aspect of stuttering behavior in children. Consequently, this also suggests that utterance based fluency assessments focusing on the first three words of an utterance could be used for Japanese speaking children but not Japanese adolescents or adults. Considering that stuttering is still a relatively new and undeveloped area of study in Japan and that utterance-based fluency assessments are much more efficient and practical than traditional assessments, this finding could help progress and improve the efficiency of fluency assessment in Japan.

The most obvious reason for a consistent utterance near-initial position effect for Japanese children who stutter corresponds to mean length of utterance (MLU). While MLU was not specifically calculated for any of the participants in this study, a general observation was that utterances for participants ages 3;11-15;11 were much shorter than the three adults (ages 27 to 48 years). A shorter MLU increases the chance of finding a near-initial effect because for MLUs of four, five, or six, for example, the first three words (i.e. near-initial position) constitutes a minimum of half of that particular utterance so there is naturally a larger area in which to be disfluent. Consequently, longer utterances have less chance for near-initial effect to occur because the near-initial position comprises a smaller percentage of the utterance.

4.2 Word Class

Another purpose of this study was to investigate the presence of stuttering on Japanese function words related to the utterance-initial position. Results suggest that the low incidence of function words in Japanese (function words constituted only 6.4% of disfluent words for participants ages 3;11 to 5;3 in this preliminary study, which is especially significant considering

that function words constituted 59% of all disfluent words in Buhr and Zebrowski's 2009 study of English-speaking children who stutter) does decrease the tendency for Japanese children who stutter to "stall" in the utterance-initial position. Additionally, the high frequency of content words in Japanese results in a greater distribution of disfluencies throughout and utterance, which may also detract from an utterance-initial effect. Word class did not seem to have any effects on the near-initial effect, however, due to the fact that the Japanese children who stutter in this study exhibited a greater near-initial effect than English-speaking children who stutter in Logan and Conture's (1995) study. Comparison of the current results to Logan and Conture (1995) suggests that the utterance-initial effect is more dependent on word class and linguistic properties while the near-initial effect may relate either to MLU or greater motoric and articulation demands as suggested by Namasivayam and van Lieshout (2008).

4.3 Limitations and Suggestions for Future Study

The findings of this study are limited by the size of each participant's speech samples (LaSalle & Huffman, 2015). While this was beyond the authors' control, more constructive elicitation strategies would have helped this study as well. Many of the participants responded with one or two word responses, which resulted in the exclusion of more data because of the purpose of this study related to the loci of disfluent events and the methodology in utterance position analysis discussed in section 2 of this document. More constructive elicitation strategies may have yielded better responses and thus a better representation of the participants' speech. Additionally, the findings of this study are limited by the inexperience with analyzing fluency of the primary author and the native Japanese speaker. Fluency analysis in this study was compared to the analysis of a former graduate student who completed coursework in fluency disorders (LaSalle & Huffman, 2015).

This study was not able to compare English and Japanese speakers under the same conditions and relied on other studies for comparison data. Therefore, a replication study with age-matched participants and matched sample sizes should be performed in order to verify that the samples used in this study were large enough to in fact detect utterance-position effects. Additionally, future studies should investigate the left-branching nature of Japanese (i.e. modifiers come before subjects in a sentence) in order to determine whether or not that plays a role in the more even distribution of stuttering events across an utterance. Lastly, future studies related to stuttering in Japanese should investigate the influence of the agglutinative nature of Japanese on stuttering and whether bunsetsu that are more heavily agglutinated are stuttered more often.

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Tables and Figures

Table 1: The two proportions used for binomial testing as well as the results of the binomial tests displayed in *p*-values.

Participant	All Words: Proportion Initial	Disfluent Words: Proportion Initial	Binomial Testing P-Values
1(3;11)	0.33	0.8	0.097
2(4)	0.33	0	0.035
3(4;9)	0.26	0.3	0.118
4(5;3)*	0.3	0.67	0.002*
5(10;4)	0.29	0.5	0.06
6(11)	0.26	0.33	0.1
7(15;11)	0.28	0.43	0.008
8(27;9)	0.04	0.06	0.16
9(40;10)	0.15	0.27	0.448
10(48;2)*	0.08	0.19	0.002*

Table 2: Raw data for disfluencies in the initial position.

Participant	Total Disfluencies	# Disfluencies in the Initial Position	Proportion
1(3;11)	5	4	0.8
2(4)	3	0	0
3(4;9)	10	3	0.3
4(5;3)	15	10	0.67
5(10;4)	8	4	0.5
6(11)	3	1	0.33
7(15;11)	14	6	0.43
8(27;9)	17	1	0.06
9(40;10)	11	3	0.27
10(48;2)	16	3	0.19

Table 3: Raw data for disfluencies in the near-initial position.

Participant	Total Disfluencies	# Disfluencies in Near-Initial Position	Proportion
1(3;11)	1	1	1
2(4)	3	2	0.67
3(4;9)	6	5	0.83
4(5;3)	5	4	0.8
5(10;4)	6	6	1
6(11)	3	3	1
7(15;11)	6	2	0.33
8(27;9)	17	2	0.12
9(40;10)	11	0	0
10(48;2)	16	4	0.25

Table 4: Raw data for word-class measures.

Participant	Disfluent Function Words	Disfluent Content Words
1(3;11)	1	4
2(4)	0	3
3(4;9)	0	10
4(5;3)	1	14
5(10;4)	0	8
6(11)	0	3
7(15;11)	0	14
8(27;9)	1	16
9(40;10)	0	5
10(48;2)	4	12

Figure 1: Bar graph comparing the proportion of initial words to all words and the proportion of disfluent utterance-initial words to all disfluent words.

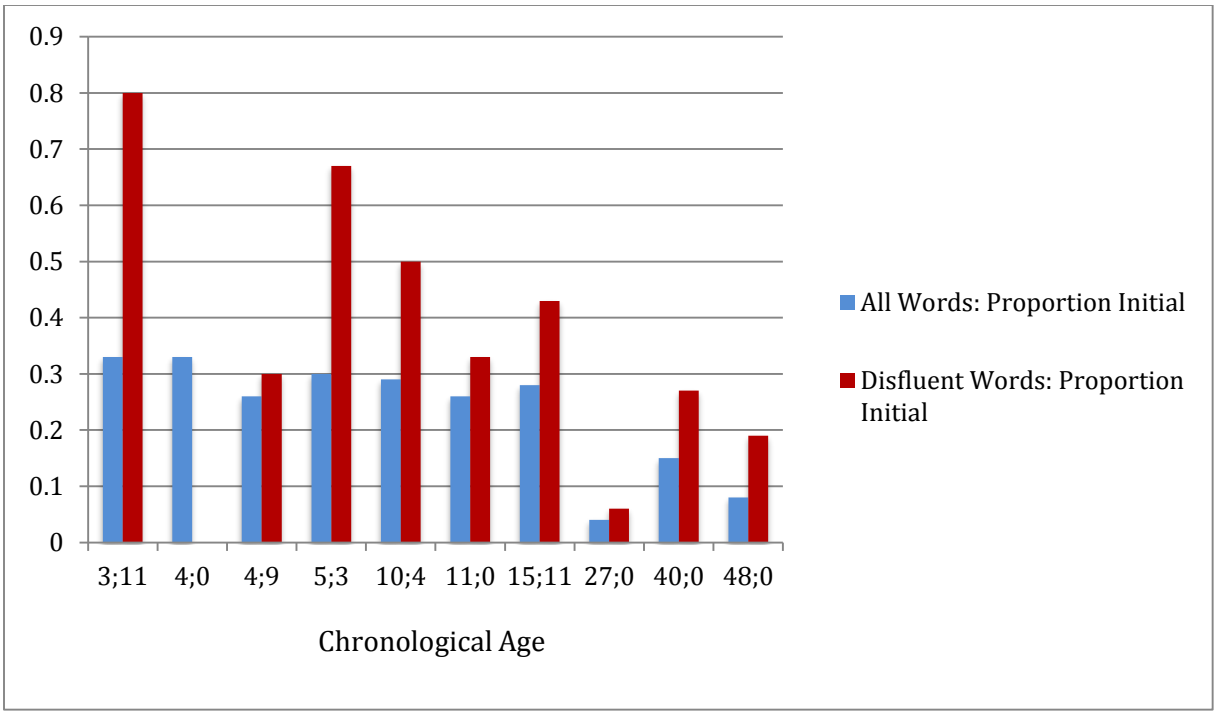
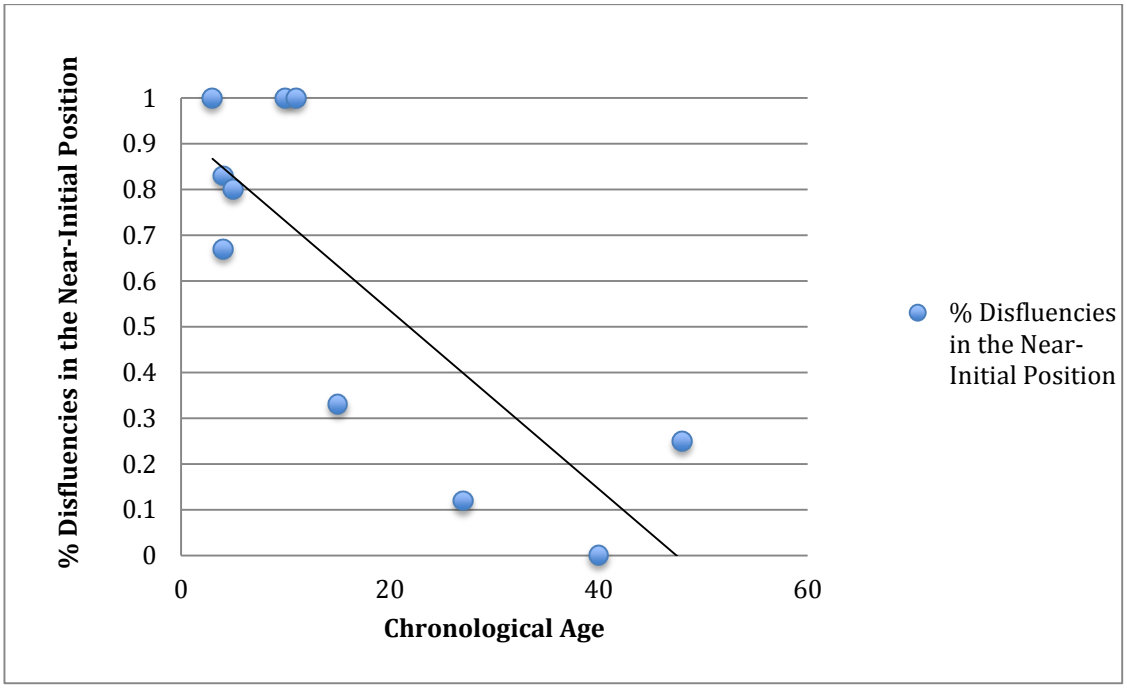


Figure 2: Correlation between age and the percentage of disfluencies occurring in the near-initial position (r = -0.69, *p* = .03).



Appendix

The contents of this Appendix include excerpts from three transcriptions used in this preliminary study. The excerpts include both Japanese orthography and the corresponding English orthography and represent the form of transcripts prior to analysis. Azumi Mashimo drafted all transcripts.

Participant 9: 40-year-old male

Notes: A man is talking about his work as an instructor of playing the drums. The drums are Japanese traditional instruments and children can learn how to play it and they play on the local festivals.

S=Subject P=Partner

Japanese Orthography

S: Guraidesukene/ un,/ jissaihane,/ imantokoha,/ (omatsuritoka),/ un/ souiujimotono/ ibento/ de/ ee…

S: Yappari/ kodomodato/ ninzuga/ oitone/ dokka/ tsuretette mendomitettenaruto/ sugoiyapparinetemamo/ kakarushine…

S: Ima/ menbajitai/ ugokeru/ hito/ waee/ go/ nin/ ka/ roku/ ninka/ shika/ jissai/ fudankara/ kite/ sugu/ denwane/ shitekitekyoryokushite dekisounahito/ ga/ anmari,

S: Ee/ toku/ itte/ surutteiunomo/ nakanakataihennande,

S: Iukotomo/ kitkurenaishi.

English Orthography

S: Yeah, actually, now, we have a drum recital in local events…

S: If we took many children to somewhere and looked after them, we would have to take a lot of trouble…

S: Now, the number of the adults who can participate immediately when I phone for them is 5 or 6 people.

S: So, it's hard to go far away.

S: Also, they refuse to pay attention to the adults.

Participant 6: 11-year-old male

Japanese Orthography

P: Darega nani shiteru tokoro?

S: Gane, wo kundene, honwo kariteru tokoro.

P: Hon kariteru tokoro. Hon karitakoto aru?

S: Aru.

P: Tosyokande?

S: Un.

P: Donna hon kariteruno?

S: Untone, omoshiroihon kariteru.

English Orthography

P: Who and what is he/she doing?

S: He/she is borrowing a book.

P: Borrowing a book. Have you ever borrowed a book?

S: Yes, I have.

P: In the library?

S: Yes.

P: What kind of books do you borrow?

S: Well, I borrow something interesting.

Participant 1: 3 year 11 month-old male

Japanese Orthography

S= subject (whose name is Ryu) P= partner

P: Yoshi jyane korenanda?

S: Gohan!

P: Gohandane. Gohanha itumo dareto taberuno?

S: Ummto minade taberu

P: Minade taberuno. Minatteiunoha dare? …papato ato dare?

S: Papato…atowa. Papato to mamato ryuto mama… tojichan

P: Papato mamato ojichanto taberunoka. Sokka.

English Orthography

P: Well, then, what is it?

S: Rice!

P: Yes, it's rice. Who do you usually eat it with?

S: Well, I eat with everyone.

P: I see, you eat with everyone. Who do you mean everyone? ...Dad? and who else?

S: Dad, and… Dad, mom, Ryu, mom…and grandpa.

P: You eat with dad, mom, and grandpa, I see.