

# The Relationship Between L1 Fluency and L2 Fluency Among Japanese Advanced Early Learners of English

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## Abstract

The aim of the present study is to investigate the relationship between first language (L1) fluency and second language (L2) fluency among advanced early learners. Previous studies have found a relationship between L1 fluency and L2 fluency among late learners, but no studies have examined the relationship among early learners. Furthermore, not many fluency measures were used in the previous studies. Twelve Japanese advanced early learners of English are involved in the present study, in which video-retelling performances were analyzed using 10 fluency measures. The results show that there are positive correlations between L1 fluency and L2 fluency in seven of the fluency measures. Following the results, the present study suggests that L2 fluency measurement using L1 fluency as a baseline should be developed.

**Keywords:** *fluency, first language (L1), second language (L2), measurement*

## Introduction

Fluency, which is one of the three components of second language (L2) speaking ability, along with complexity and accuracy, has a variety of definitions. When the word fluency is used for the L2, it is used in two senses (Lennon, 1990, 2000). In the broad sense, fluency means global oral proficiency, and in the narrower sense, fluency is one of the components of oral proficiency, which is related to a flow or fluidity in speech (Kormos & Denes, 2004). Lennon (2000) proposed a definition of oral fluency as “the rapid, smooth, accurate, lucid, and efficient translation of thought or communicative intention into language under the temporal constraints of on-line processing” (p. 26). Therefore, in the narrow sense, fluency means rapidness and smoothness in speech performances, and it involves efficiency of speaker’s cognitive processes. Another definition from a more recent study is that “Fluency in the narrow sense is usually described in terms of speedy and smooth delivery of speech without (filled) pauses, repetitions, and repairs” (De Jong, Groenhout, Schoonen, & Hulstijn, 2015), which focuses only on the temporal aspect of fluency. This paper uses this narrow definition which focuses on the temporal aspect of fluency.

The measurement of L2 fluency has been developed for many years. Lennon (1990) proposed some systematic ways to measure L2 fluency, such as speech rate and silent pause time. Kormos (2006) showed an overview of the measurements of L2 fluency, including speech rate, articulation rate, phonation-time ratio, mean length of runs, the number/length of pauses, and the number of disfluencies per minute. Although L2 fluency measurements have been developed, “researchers have not discovered universally applicable, objective measures of oral fluency” (Segalowitz, 2010, p. 39). There seem to be some causes of this problem. One of the causes is that, as Kormos (2006, p. 162) mentions, variables of fluency measurement are not consistent among researchers. For example, when counting the number of silent pauses, the minimal duration of a silent pause is considered to be from 0.2 second (Kormos, 2006) to 1 second (Ellis & Barkhuizen, 2005). Also, units for variables are not consistent. Some researchers use words per minute, but others use syllables per minute as an indicator of speed fluency. The second cause is the difference of task types. Several speaking tasks

are used in fluency studies, such as picture narratives, film-retelling, and interviews. Thirdly, the ways of counting syllables are different among studies. Most studies transcribe speech samples and count the number of syllables by hand, but some studies analyze the data using automated techniques for detecting the number of syllables. Finally, there might be an influence of first language (L1) fluency on L2 fluency. The present study focuses on this. If there is a relationship between L1 fluency and L2 fluency, L2 fluency measurement using L1 fluency as a baseline should be developed (Segalowitz, 2010; De Jong et al., 2015).

Several practical studies report that there is a relationship between L1 fluency and L2 fluency (Raupach, 1980; Towell, Hawkins, & Bazergui, 1996; Riazantseva, 2001; Derwing, Munro, Thomson, & Rossiter, 2009; De Jong et al., 2015). Derwing et al. (2009) examined speech performances of 16 Slavic speakers of English and 16 Mandarin speakers of English who had studied English for several years. They found a positive correlation between L1 and L2 fluency for both groups with respect to the number of pauses per second, speech rate, and pruned syllables per second. De Jong et al. (2015) also found the relationship between L1 fluency and L2 fluency. They examined fluency from 48 intermediate to advanced learners of Dutch (24 English native speakers and 24 Turkish native speakers). They analyzed silent pause duration, syllable duration, and the frequency of pauses and disfluency. They reported that there was a significant correlation between L1 fluency and L2 fluency for all these fluency measures. These studies suggest that individual characteristics seems to cause the correlations between L1 fluency and L2 fluency for any levels of learners. Towell et al. (1996) examined speech performances of 12 English-speaking advanced late learners of French before and after studying in France for six months. They found a positive correlation between L1 fluency and L2 fluency in terms of speech rate (strong correlation) and articulation rate (moderate correlation). They also reported that L2 fluency development among advanced learners seems to stop some way below their L1 fluency in terms of speaking rate and articulation rate. These results imply the relation between L1 fluency and L2 fluency might be caused by the limitation of L2 fluency development affected by the L1 fluency. If so, further study is needed to investigate the L1–L2 relationship among advanced learners with many fluency measures.

The present study examines the relationship between L1 fluency and L2 fluency among 12 Japanese advanced early learners of English (native speakers of Japanese who started to learn English at an early age and whose English is now at an advanced proficiency level). It is reported that early learners' speech rates are higher than late learners' (Guion, Flege, Liu, & Yeni-Komshian, 2000). Although Towell et al. (1996) found positive correlations between L1 fluency and L2 fluency among advanced late learners, no studies examined advanced early learners' speech performances. Furthermore, not many fluency measures were used in the previous studies. Therefore, the present study examines the relationship between L1 fluency and L2 fluency among advanced early learners using a greater number of fluency measures.

## Participants

The present study involved 12 Japanese advanced early learners of English (11 females and 1 male) aged between 21 to 48 ( $M = 28.5$ ). All the participants have high proficiency, with higher than TOEIC 900. They are either university students or English teachers in Tokyo. All the university student participants take their classes mostly in English, and all the teacher participants teach their classes in English at their workplaces. Therefore, they use English in their daily life. All the participants are early learners whose age of acquisition is under eight years old ( $M = 6.2$ ). They have

been to English-speaking countries and lived there continuously for more than four years ( $M = 6.3$ ).

## Materials

The present study used a film-retelling task using a video clip called “Lion’s Cage” from Charlie Chaplin’s (1928) silent film, *The Circus*. Participants described the story in their L2 (English) first, and four months later, they watched the same video clip and described the story in their L1 (Japanese). A four-month interval was set to avoid a repetition effect. Because Bygate (2001) reported that a repetition effect was observed after two months, the present study set the interval longer than two months.

## Analysis

The temporal variables used for fluency measurement in the present study are mostly the same as those in Kormos (2006). Ten variables (speech rate, articulation rate, pruned syllables per minute, mean length of runs, phonation time ratio, number of silent pauses, silent pause duration, number of filled pauses, filled pause duration, and number of disfluencies) were used. For the boundary of silent pauses, 0.25 second was used in the present study, following recent fluency measurement studies, such as De Jong et al. (2015).

For measuring speech rate, articulation rate, pruned syllables per minute, and mean length of runs, different units were used for English and Japanese. For measuring English fluency, a syllable was used as a unit. On the other hand, for measuring Japanese fluency, a mora was used as a unit instead of a syllable. This is because Japanese is a mora-timed language, and the basic prosodic unit in Japanese is mora (Kubozono, 1998). It is more practical to use mora instead of syllable, because it is much easier to count the number of morae than counting the number of syllables in Japanese, especially in relatively long spontaneous speech. If there is no necessity of direct comparison of L1–L2 data, mora should be suitable as a unit for fluency measurement in Japanese.

## Results

### Descriptive Statistics

Table 1 shows the means and standard deviations of L1 fluency and L2 fluency. All these five measures (1. pruned syllables or morae per minute, 2. speech rate, 3. articulation rate, 4. mean length of runs, and 5. phonation time ratio) are speed fluency. Fluency is higher when figures are greater. Except for phonation time ratio, the units are syllable or mora (L1: mora; L2: syllable), so the figures are not comparable between L1 fluency and L2 fluency.

**Table 1**  
*The Basic Statistics of L1 and L2 Fluency (Speed Fluency)*

No.	Temporal Variables	Advanced Early Learners N = 12	
		L1 Japanese [mora]	L2 English [syllable]
1	Pruned syllables or morae per minute (syllables or mora/min)	270.816 (57.584)	129.288 (22.766)
2	Speech rate (syllables or mora/min)	275.636 (56.228)	133.677 (23.094)
3	Articulation rate (syllables or mora/min)	443.824 (52.827)	215.870 (21.417)
4	Mean length of runs (the number of syllables or morae)	11.486 (2.544)	5.571 (0.612)
5	Phonation time ratio (%)	67.034 (8.508)	66.026 (9.865)

*Note.* Standard deviations are shown in parentheses. Units are mora or syllable for Nos. 1 to 4, and percentages for No. 5.

Table 2 shows the means and standard deviations of the fluency measurements categorized as either breakdown or repair fluency measurements (6. number of silent pauses per second, 7. average duration of silent pause, 8. number of filled pauses per second, 9. average duration of filled pauses, and 10. number of disfluencies per second). Because these measurements represent breakdown or repair profiles, fluency is higher when figures are smaller. The figures are comparable between L1 and L2 for these measures, because they do not include the number of syllables or morae.

**Table 2**  
*The Basic Statistics of L1 and L2 Fluency (Breakdown and Repair Fluency)*

No.	Temporal Variables	Advanced Early Learners N = 12	
		L1 Japanese	L2 English
6	Number of silent pauses/sec	0.398 (0.046)	0.399 (0.042)
7	Average silent pause duration	840.539 (270.946)	854.040 (252.158)
8	Number of filled pauses/sec	0.123 (0.106)	0.084 (0.075)
9	Average filled pause duration	459.984 (121.895)	494.476 (135.854)
10	Number of disfluencies/sec	0.026 (0.019)	0.038 (0.027)

*Note.* Standard deviations are shown in parentheses.

The difference between the L1 fluency and L2 fluency was statistically analyzed using *t*-tests for the fluency measures which are comparable between L1 and L2 (No. 5–No. 10). Homogeneity of variance was shown in all the measures by Levene’s test. There were no significant differences between L1 fluency and L2 fluency for any of these fluency measures.

## Correlations Between L1 Fluency and L2 Fluency

Table 3 shows the results of correlation analyses between L1 fluency and L2 fluency. Strong positive correlations between L1 fluency and L2 fluency were found in many of the fluency measurements. Strong positive correlations were observed for pruned syllables per minute ( $r = .848$ ,  $p < .01$ ), speech rate ( $r = .841$ ,  $p < .01$ ), mean length of runs ( $r = .720$ ,  $p < .01$ ), and phonation time ratio ( $r = .721$ ,  $p < .01$ ). Moderate correlations were also seen for silent pause duration ( $r = .586$ ,  $p < .05$ ), number of filled pauses ( $r = .679$ ,  $p < .05$ ), and number of disfluencies ( $r = .586$ ,  $p < .05$ ).

**Table 3**  
*Correlation Between L1 Fluency and L2 Fluency*

	Fluency Measures	Pearson's $r$
1	Pruned syllables/minute	.848**
2	Speech rate	.841**
3	Articulation rate	.557
4	Mean length of runs	.720**
5	Phonation time ratio	.721**
6	Number of silent pauses	.209
7	Silent pause duration	.586*
8	Number of filled pauses	.679*
9	Filled pause duration	.482
10	Number of disfluencies	.586*

\* $p < .05$  \*\* $p < .01$

## Discussion

As shown in Table 3, the correlations between L1 fluency and L2 fluency are evident in many fluency measures (seven out of 10). Among these seven fluency measures, four fluency measures show strong correlations (pruned syllable per min, speech rate, mean length of runs, and phonation time ratio), and three measures show moderate correlations (silent pause duration, number of filled pauses, number of disfluencies). Thus, among advanced early learners, the relationship between L1 fluency and L2 fluency seems to be a general trend, rather than a specific phenomenon within some measures. The results from Towell et al. (1996) also found the relationship between L1 fluency and L2 fluency among advanced late learners. From these two results, it is suggested here that L2 fluency measurement using L1 fluency as a baseline should be developed in diagnostic fluency tests for advanced learners. For example, an advanced learner who speaks very slowly in their L1 probably has a very low speech rate in the L2. If L1 fluency is not considered, L2 fluency may be assessed as low for an advanced learner or not yet fully developed, although the learner's L2 fluency development might have already reached its full development when considering L1 fluency. Thus, there should be further studies which investigate adjusted L2 fluency measurement using L1 fluency as a baseline.

One thing which should be noted is that although speed fluency measures showed strong correlations between L1 fluency and L2 fluency (pruned syllables per minute:  $r = .848$ ; speech rate:  $r = .841$ ; mean length of runs:  $r = .720$ ; and phonation time ratio:  $r = .721$ ), breakdown and repair fluency measures showed moderate correlations between L1 fluency and L2 fluency (silent pause duration:  $r = .586$ ; number of filled pauses:  $r = .679$ ; and number of disfluencies:  $r = .586$ ). The differences of

the results between speed fluency measures and breakdown and repair fluency measures might be related to factors which affect the relationship between L1 and L2 fluency. As De Jong et al. (2015) suggests, individual speaking style such as the way people use silent pauses and filled pauses appear both in L1 and L2 speech productions, and that might cause correlations between L1 fluency and L2 fluency. Therefore, L1 and L2 correlations in terms of breakdown and repair fluency in the present study might be related to individual speaking traits. On the other hand, Towell et al. (1996) imply that the strong correlation of speech rate between L1 fluency and L2 fluency among advanced late learners might be related to the influence of the L1 fluency on L2 fluency when L2 fluency development reached somewhere near that of the L1. Therefore, the strong correlations between L1 and L2 in terms of speed fluency in the present study might be related to the limitation of L2 fluency development. If there are some different factors for the relationship between L1 fluency and L2 fluency, further study is needed.

Another thing which should be noted is that no correlation was found between L1 articulation rate and L2 articulation rate in the present study, although the other speed fluency measures show strong correlations between L1 and L2. Articulation rate is calculated as the total number of syllables divided by the total duration of speech excluding silent pause time. The reason for this is not clear, but the ways of producing syllables/morae might be different in English and in Japanese. In the present study, while analyzing data, a frequent use of drawls was observed in Japanese speech performances, and that might affect the relationship between Japanese articulation rate and English articulation rate. Den (2003) classified the prolonging of segments in Japanese spontaneous speech into six categories. Among them, the most frequent is initial monomoraic words, such as “de” and the second most frequent is final vowels of phrase-final function words such as “te” and “mo.” Drawls were also examined in French speech production by Raupach (1980). Raupach found in case studies that French speakers use more drawls than German speakers do in their native language. Similarly, drawls might be used more commonly in Japanese speech than in English speech. Therefore, some of the participants in the present study might have used many drawls in Japanese as a way of hesitation, but not in English. That would affect articulation rate, because use of drawls decreases articulation rate. Further studies are needed for the effect of use of drawls on articulation rate in some languages, such as French and Japanese.

## Conclusion

In conclusion, the present study examined the relationship between L1 fluency and L2 fluency among 12 Japanese advanced early learners of English using 10 fluency measures. The results show the positive correlations between L1 fluency and L2 fluency in seven fluency measures. Among them speed fluency measures showed strong correlations between L1 fluency and L2 fluency. Therefore, the present study suggests that L1 fluency should be taken into consideration for L2 fluency measurement especially for diagnostic language test among advanced learners. Further studies are needed to develop L2 fluency measurement based on L1 fluency.

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