The Effect of Shadowing Training on the Development of Second Language Fluency

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〔**抄録**〕

本研究は，英語を第二言語（L2）として学ぶ学習者を対象に，シャドーイングがL2流暢さの発達に及ぼす効果を検証した。門田（2012, 2015, 2018, 2019）は，Leveltの言語産出モデル（1989, 1999）に基づき，シャドーイングはL2リスニング力を伸ばすだけでなく，スピーキング力も向上させる役割があると提唱している。シャドーイングトレーニングを通して，調音と言語化に関わるプロセスが鍛えられ，より早い発話，より早いメンタルレキシコンへのアクセスが可能になる。参加者は16名の日本人女子大学生で，90分のシャドーイング中心の授業を11週間受講した。トレーニングの前後にシャドーイングスキルテストとスピーチに取り組んだ。前者では，1分間の会話を聞いてシャドーイングし，録音した音声を分析して，どのくらいの音節が正確に再生できたか調べた。後者では，録音したスピーチを3つの側面（発話の長さ，発音速度，発話速度）から分析した。その結果，シャドーイングスキルテストと発話速度において有意な向上が見られた。

1. Introduction

Being fluent in a second language (L2) is not absolutely necessary for successful communication, but it is desirable. L2 learners who can speak faster with few hesitations, repetitions, repairs and less pausing, are likely to gain more opportunities for interaction and receive more feedback from their interlocutors. These are surely helpful in developing their interlanguage. In this regard, it is important to investigate how L2 fluency can be promoted even in an EFL context,

where there are limited opportunities for input and output.

This paper explores to what extent shadowing training helps to develop L2 fluency. Kadota (2012, 2015, 2018, 2019) proposes that shadowing training could promote not only speech perception and listening skills but also speaking skills. The development of speaking skills would be of vital importance in Japanese English education in the future. The Courses of Study for elementary schools and junior high schools were revised in 2017 and for high schools in 2018. The ultimate goal of English education has remained the same: to have Japanese students acquire communicative competence in English. Still, a number of revisions were undertaken. One of the important changes was to divide English skills into five: listening, reading, speaking (interaction), speaking (presentation), and writing, instead of four. This change, together with a new policy to adopt commercial English proficiency tests measuring the traditional four skills as a part of college entrance examinations, seems to indicate that English teachers in Japanese classrooms have to place greater emphasis on developing speaking skills. Therefore, the development of L2 fluency will be more eminent in the future. Still, it appears that Japanese teachers may not know how to develop their students' oral fluency in English.

One effective approach would be the use of shadowing training in the classroom. In fact, shadowing is already a widely-used method of practicing reading and listening in Japan; however, Japanese English teachers may not understand what effect shadowing exactly has on their students' oral performance and how to implement shadowing training in such a way as to maximize its benefits. This paper attempts to explore the effect of shadowing training on the development of L2 oral fluency.

2. What is Shadowing?

Shadowing has been commonly used as a principle training method for simultaneous interpreters. Moreover, it has been widely used as one variation of oral practice in English classrooms in Japan. According to Tamai (2005), shadowing is defined as "an act or a task of listening in which the learner tracks

the heard speech and repeats it as exactly as possible while listening attentively to the in-coming information" (Tamai, 2005, 34). In shadowing practice, students have to reproduce sounds as accurately as possible while listening to the text. Shadowing entails not only the accurate reproduction of words and sentences but also the reproduction of prosodic features such as stress, rhythm, and intonation, as well as the location and duration of pauses.

There are a number of variations in the implementation of shadowing such as mumbling (shadowing by muttering), shadowing without voice (silent shadowing), or shadowing only some words and phrases (selective shadowing) (Hamada, 2017; Kadota, 2012; Tamai, 2017). In the present study, bottom-up shadowing (shadowing focusing on sound but without looking at the text), parallel reading (shadowing while looking at the text), and top-down shadowing (shadowing focusing both on sound and meaning) were all employed as training methods (Kadota, 2012).

Although not yet internationally prominent, shadowing has been extensively investigated in Japanese educational contexts. A large number of studies have examined the effect of shadowing on listening skills (Hamada, 2011, 2012, 2014, 2016; Kuramoto, Nishida, Isobe, & Shiki, 2010; Kuramoto, Shiki, Nishida, & Ito, 2007; Nakayama & Mori, 2012; Tamai, 1992, 1997, 2005) as well as articulation rate (Miyake, 2009) and English prosody (Mori, 2011). What was generally found in these studies is that shadowing is an effective method to improve listening skills and faster articulation speed. In particular, Tamai (1997) found that the participants who received shadowing training for five days, 90 minutes per day, revealed significant improvement in listening and shadowing skill tests. The shadowing skill test not only requires listening but also accurate reproduction of sounds people hear; therefore, this test can be also used for examining if shadowing has a positive effect on L2 oral fluency.

On the other hand, the effect of shadowing on the development of speaking ability has not been fully explored yet. Still, several studies have examined how shadowing can help improve L2 learners' speaking fluency (Iino, 2014; Iino & Yabuta, 2013; Kaneko, 2012; Muraoka, 2017, 2018; Shimizu & Saiki, 2011).

Shimizu and Saiki (2011) explored whether synchronized reading and shadowing practice promoted speaking, listening, and fluency. The participants

were four foreign students who were studying Japanese at a Japanese university and whose listening ability was low. They engaged in shadowing practice once a week for four months. The study examined accuracy and fluency by using dictation tests; shadowing data was recorded seven times during the training sessions. The following five aspects were analyzed to investigate their influence on fluency: fillers, incorrect pronunciation, inadequate production, unnecessary production, and repetitions. The study found that, all four learners of Japanese showed gradual progress in both accuracy and fluency.

With a clearer research design, Kaneko (2012) examined whether pseudo-speaking tasks consisting of a series of non-communicative speaking tasks such as shadowing, elicited imitation tasks, and read-and-look-up tasks would lead to improvements in complexity, accuracy, and fluency. The participants were 46 Japanese university students; they were divided into an experimental group and a control group. The experimental group was provided with training sessions once a week for 20 to 25 minutes at the beginning of English classes 11 times in total. The sequence of the training sessions followed the order of shadowing 1 (top-down shadowing), shadowing 2 (bottom-up shadowing), elicited imitation, and read-and-look-up. Spontaneous speech was elicited through a semi-direct test, in which five questions were displayed on the students' computer screens and the participants had to answer them within 45 seconds without any preparation. The tests were given twice with an interval of about three months. Fluency was measured by two temporal variables: phonation-time ratio and speech rate. The analysis of the data found some improvements in complexity and fluency measures, even though the differences were not statistically significant. Accuracy was not improved. Kaneko argues that improvements in complexity and fluency could be interpreted as a result of involving pseudo-speaking training.

Iino (2014) explored whether shadowing practice could improve speaking skills better than oral reading practice. As a warm-up activity, the participants joined 30-minutes training for 14 times. During the training, an experimental group engaged in listening and shadowing practice; a control group listening and oral repetition. When analyzing oral data elicited from a picture description task, the study found a significant increase in vocabulary level and grammatical

accuracy in both groups, but the experimental group revealing a larger effect size compared to the control group. His study seems to imply that shadowing practice together with listening activities would be useful for improving L2 oral performance.

Muraoka (2017, 2018) investigated the effect of shadowing practice on L2 fluency. In the former study, eight Japanese female college students whose major were English communication participated in shadowing training for 13 weeks, 90 minutes each time. Oral tests (speeches) were provided three times to examine changes in their oral fluency. Fluency was measured according to six variables: speech rate, mean length of runs (MLRs), total length of pauses, self-corrections, repetitions, and filled pauses. The results of the analysis did not show any significant improvements in any measures. On the other hand, in the latter study, the same participants were engaged in additional 11-weeks shadowing training after the first 13-weeks training. The interval between the two training sessions was about one year. The data collection and analyses methods were almost the same as those in the previous study. Unlike the first study, the study found a significant improvement in MLRs in the second year, partially supporting the claim by Kadota regarding the positive effect of shadowing on L2 fluency.

Still, the findings are not consistent among these studies probably due to differences in the procedures to conduct shadowing training, materials, and data elicitation techniques adapted in each study. In sum, more research with a specific focus on shadowing and its effect on L2 fluency is necessary.

3. Second Language Fluency

3.1 Definitions and Measures

The most frequently cited definitions of fluency are those proposed by Fillmore (1979) and Lennon (1990). Fillmore (1979) examined the oral performance of L1 speakers and described fluency in terms of four abilities: the ability to talk at length with few pauses, the ability to talk in coherent and semantically dense sentences, the ability to talk appropriately in a wide range of contexts, and the ability to be creative and imaginative in talking. According to Fillmore,

fluency includes not only smoothness of speech but also appropriate and creative use of language with semantic density.

Lennon (1990) conducted the first study to examine if there are any quantifiable features of L2 fluency that can serve as reliable indicators of perceived fluency. According to him, there are two senses of fluency: a broad and a narrow sense. In the broad sense, fluency indicates general oral proficiency. L2 learners with high fluency often get a higher score; those with low fluency get a lower score. We can also simply state that someone can speak two or three languages fluently without specifying whether he or she can speak more fluently in one language than in the others, or how fluently he or she can speak it. In a narrower sense, fluency can be regarded as one component of oral proficiency which consists of other variables such as "*correctness, idiomaticness, relevance, appropriateness, pronunciation, lexical range,*" and so on (Lennon, 1990, 389). Therefore, it is possible to conclude that someone can speak a given language fluently, even if his or her grammar is not accurate.

The definitions above further reflect how L2 fluency has been measured. When L2 fluency is objectively evaluated in studies, the following temporal variables are generally explored (Kormos, 2006; Segalowitz, 2010, 2015): speech rate (the total number of syllables divided by speaking time), articulation rate (the total number of syllables divided by speaking time without pauses), phonation-time ratio (the percentage of time spent speaking within the total production time), MLRs (an average number of syllables produced in utterances between pauses of more than 200 milliseconds), the number of silent pauses per minute (the total number of pauses divided by the total amount of speaking time and multiplied by 60), the mean length of pauses (the total length of pauses divided by the total number of pauses), the number of filled pauses per minutes (the total number of filled pauses such as *uhm* or *er* divided by the total speaking time and multiplied by 60), the number of disfluencies per minutes (disfluency markers such as repetitions, restarts, and repairs divided by the total speaking time and multiplied by 60).

Among these measures, it was found that speech rate, the MLRs, and phonation-time ratio tended to predict L2 fluent performance (Derwing, Rossiter, Munro, & Thomson, 2004; Freed, Segalowitz, & Dewey, 2004; Fujio, 2011;

Kormos, 2006; Kormos & Dénes, 2004; Lennon, 1990; Taguchi, 2008; Towell, Hawkins, & Bazergui, 1996; Wood, 2001). On the other hand, filled and unfilled pauses as well as repetitions, restarts, and repairs may not be clear indicators of fluency (Kormos, 2006). For instance, Lennon (1990) found that there was an increase in self-corrections when examining the spoken performance of four advanced learners who stayed for six months in Britain. Furthermore, it was argued that pausing serves many functions such as deciding what to say next or how to express something (Chafe, 1980). Therefore, it is difficult to precisely interpret how pausing is related to fluency (Towell, et al., 1996).

The variables described above are important indicators of fluency and disfluency; however, they are not reliable variables since findings are not always consistent in the studies. This may be due to differences in ways to measure fluency and to elicit speech samples (Segalowitz, 2010, 2015). More precise definitions of fluency should consider not only actual properties of L2 fluency but also the underlying mechanism involved in generating such features. In this respect, Segalowitz (2010) proposes defining fluency in three ways: *utterance fluency, perceived fluency, and cognitive fluency.*[1)]

Utterance fluency indicates observable features of an utterance such as "the temporal, pausing, hesitation, and repair characteristics" (48). Perceived fluency refers to "the inferences listeners make about a speaker's cognitive fluency based on their perception of utterance fluency" (ibid). Cognitive fluency refers to the ability of a speaker "to efficiently mobilize and integrate the underlying cognitive processes responsible for producing utterances" (ibid). Here, *to mobilize* indicates such mental activities as planning what to say, selecting appropriate expressions, putting them in grammatical order, and articulating with vocal organ. All of these activities have to be integrated rapidly and efficiently within certain time constraint. Inefficiency in one process will impede the fluidity of the entire process of production. Precise illustration of the production mechanism for mobilization and integration will be presented in the next section.

In sum, many features contribute to L2 fluency. An examination of temporal features is especially important. Also, considering what cognitive processes are involved in fluent oral performance is significant to explore how L2 fluency can be developed from a cognitive perspective.

3.2 Speech Production Model and L2 Fluency

What cognitive mechanism is responsible for L2 fluency? How does shadowing operate on such a mechanism and promote L2 fluency in turn? The most well-known speech production model for monolinguals is proposed by Levelt (1989, 1999). According to him, language production consists of mainly four components: conceptualizer, formulator, articulator, and monitoring. Simply stated, the production process proceeds in the following way: first, the planning of the message occurs at the conceptualizer, which is connected to the monitoring. People check whether what they try to say is what they want to say through the operation of self-monitoring. Second, the formulator serves to put ideas into grammatical structures. The formulator is connected to a mental lexicon stored in long-term memory. The mental lexicon contains knowledge of meaning, syntax, morphology, and phonology. By accessing the mental lexicon, grammatical encoding firstly operates to produce "an ordered string of lemmas grouped in phrases and subphrases of various kinds" (Levelt, 1989, 11). Third, morpho-phonological encoding operates to produce phonetic or articulatory plan. Finally, the phonetic plan is utilized for the last process, the articulator. At this stage, phonologically encoded inner message is actually articulated with the vocal organs.

This production model conveniently illustrates how L1 speech is generated; however, it cannot be directly applicable to L2 speech production. For instance, Kormos (2006) argues that in L1 production, only speech planning and monitoring require conscious attention, whereas formulation and articulation are automatic. In L2 production, not only conceptualization but also formulation and articulation of messages might not be fully automatized for most L2 learners. Therefore, all production components, from message planning to articulation, may require some degree of attention in case of L2 production, which in turn affects fluency.

Regarding measures of L2 fluency, specific processing components of speech production are related to specific measures. For instance, repetition and filled pauses reflect planning function at the conceptualizer (Lennon 1900); articulation rate is related to the articulator, the MLRs to the formulator, and

speech rate to the working of the whole model (Towell, et al., 1996). Towell et al. (1996) argues that observed increases in these fluency measures can be taken as an indication of automatization in the components, both individually and collectively. The present study explores how shadowing practice helps enhance the functions of the formulator and the articulator as well as entire production processes. Thus, the MLRs, articulation rate, and speech rate are the target fluency measure examined in the study. Each definition and its relation to the production components is summarized in Table 1.

Table 1. Production Components, L2 Fluency Measures, and Definitions

Production Components	L2 Fluency Measures	Definitions
Formulator	mean length of runs (MLRs)	mean number of syllables produced in utterances between 0.4 pauses and above[2] (Derwing et al., 2004)
Articulator	articulation rate	total number of syllables produced divided by amount of time taken to produce them, excluding pause time (Towell et al., 1996)
Whole Components	speech rate	total number of syllables produced in a given speech sample divided by amount of time (including pause time). This is multiplied by 60 to yield a figure expressed in terms of syllables per minute (Towell et al., 1996)

4. Shadowing and L2 Fluency

Kadota (2012, 2015, 2018, 2019) argues that shadowing training can enhance the functions of the formulator, articulator, and monitoring in an important way. During shadowing practice, students have to reproduce sounds immediately after hearing them. The process of reproduction can be delineated in terms of the memory system. Incoming sounds first enter the sensory memory and are next processed into the working memory. In the working memory, information

will disappear within 15 seconds unless it is rehearsed. Therefore, in order to reproduce sounds, people need to rehearse what they hear by using a system in the working memory called the phonological loop. The phonological loop has the function of storing and processing linguistically encoded data. The phonological loop is regularly used when people memorize telephone numbers or peoples' names. The process of mentally vocalizing incoming data is called subvocal rehearsal. Subvocal rehearsal is usually conducted in memory without vocalization. Shadowing is a similar process to subvocal rehearsal, but it is done with voicing. That is to say, shadowing can exploit the function of subvocal rehearsal to the fullest.

When listening to English, students do not usually process all incoming input. Some of it is processed; but some will be ignored. On the other hand, during shadowing training, students have to engage in subvocal rehearsal vocally—that is, in order to reproduce what they hear immediately and accurately, they need to rehearse all the information they hear. Such a process of subvocal rehearsal can further reinforce the processing and storage of information, especially those related to English phonology, into the long-term memory. To transfer information into long-term memory, rehearsal in the working memory is necessary. More storage of English phonological knowledge in long-term memory through rehearsal can trigger the restructuring of the database related to English sounds. If the database for English phonological knowledge is developed, speech perception—the first step in processing auditory input—will become automatized. It is often the case that Japanese students have difficulty understanding English. This may be caused by their inability to perceive English speech in the first place. With an increased database of English sounds, it becomes easier to understand English. What is more, since students simulate speaking in English during shadowing practice, they can produce English sounds smoothly and effortlessly. This indicates that shadowing practice can strengthen the function of the articulator in speech production. If the process of the articulator is promoted through shadowing practice, rapid speech with fewer hesitations and pauses and with more native-like pronunciation and prosody will become possible.

How does shadowing enhance the operation of the formulator? In gener-

ating a message, L2 learners need to have much vocabulary knowledge to begin with. Vocabulary learning can be both incidental and intentional. However, especially in the context where English is taught as a foreign language, students are likely to learn vocabulary consciously. Conscious vocabulary knowledge has to be transformed into unconscious knowledge if it is to be used for authentic communication. This is because speech production entails multiple processes as explicated in Levelt's production model. Conscious vocabulary knowledge (declarative knowledge) has to be changed into procedural knowledge, which indicates automatically used knowledge in speech production (Schmidt, 1992). This process is called automatization or proceduralization.

According to Kadota (2015), the process of subvocal rehearsal plays an important role in automatization. For newly acquired vocabulary knowledge to be internalized, it has to be processed and rehearsed in the working memory and has to be further transferred to the long-term memory. These processes are implemented by the use of subvocal rehearsal in the phonological loop as described above. However, there is a limitation on how much linguistic data people can rehearse temporarily in the working memory.

Referring to Baddeley (2002), Kadota (2015) explains that "the number of words and letters which can be rehearsed within two seconds is the span for one temporal storage of linguistic data" (Kadota, 2015, 149, translated by the author). As stated above, vocalized rehearsal of incoming sounds during shadowing training can lead to the development and restructuring of the English phonetic database in the long-term memory. As the English sound database evolves, the perception of English sounds will become automatized. Moreover, if the automatization of speech perception is accelerated, the span or amount of rehearsal within two seconds will expand. For example, students who could rehearse only two words within two seconds will be able to rehearse more words as their English vocabulary knowledge expands. Increased amounts of linguistic data rehearsed within two seconds indicates larger amounts of data transferred to the long-term memory, which in turn results in more acquisition and internalization of vocabulary knowledge. On the other hand, if the process of speech perception is not automatized, less linguistic data is rehearsed. This implies limited effect on L2 acquisition. Rehearsal of a huge amount of incoming linguistic data through

shadowing practice should help vocabulary knowledge, chunks, and grammatical information internalized in the long-term memory. In short, shadowing can promote the automatization of vocabulary knowledge through the reinforcement of the operation of subvocal rehearsal. Shadowing can reinforce the process of the formulator in L2 speech production.

Kadota (2015, 2018) further contends that shadowing training can enhance the monitoring function during speech production. Still, it is difficult to theoretically verify how monitoring contributes to L2 fluency—that is, self-corrections or repetitions are generally categorized as disfluency markers. It is a challenging empirical question to explore how these disfluency markers contribute to the development of L2 fluency. With this argument in mind, this study mainly focuses on qualitative changes occurring at the articulator and the formulator.

5. Method

5.1 Participants

The participants in the present study were 16 Japanese college female students, whose major was English. Their ages were 20 to 21 years old. Their English level ranged from high to low-intermediate based on their self-evaluation in a questionnaire and researcher's observation. Nine had experiences of studying in English-speaking countries for three or five weeks; however, more than half a year had passed since they came back to Japan. Nine engaged in shadowing training from April to July and seven from September to December in 2017. They were treated as one group since all of them engaged in the same length of shadowing training (11 training sessions at 90 minutes each); they used the same materials; and they went through the same training procedures. They agreed to participate in the study by signing a consent form. None of them had more than three absences during the 11 training sessions.

5.2 Materials

A textbook written by Kadota, Hase, Shiki, and White (2011) was used. This textbook consists of 14 lessons on various topics such as robots, motivation,

and intercultural communication. It is especially designed for developing English fluency through shadowing. Each lesson includes ten sections: (1) First Listening (listening without a text and answering a few questions), (2) Bottom-up Shadowing (shadowing without the text), (3) Performance Check 1 (recording shadowing and checking how many words they could correctly reproduce by themselves), (4) Vocabulary Check (learning new words), (5) Comprehension Check (answering some comprehension questions), (6) Grammar Check (an explicit explanation of a few grammar points by the instructor), (7) Parallel Reading (shadowing with the text), (8) Top-down shadowing (shadowing focusing on meaning without the text), (9) Performance Check 2 (recording shadowing and checking how many words were correctly reproduced in pairs) and (10) Repeating (repeating sentences in pairs). They completed all the sections each time but over different time spans. It was confirmed that they spent more than 10 minutes for (2) and (8), respectively, verifying that more than 20 minutes of shadowing practice was allotted every time. The training was conducted in their regular class with the aim of improving their English fluency. The participants worked individually on a computer using headphones.

5.3 Research Schedule

On Week 1, the participants took two kinds of oral tests as a pretest (shadowing skill test and speech). On Week 2, they learned why and how they would practice shadowing. From Week 3 to Week 13 (11 weeks), they engaged in shadowing training using the aforementioned textbook. On Week 13, immediately after finishing shadowing practice, they took the same oral tests as a posttest.

5.4 Data Collection Method

For this study, the shadowing skill test and speech were used to assess how much improvement in L2 fluency was achieved through shadowing training. In the former test, the participants listened to and shadowed a short conversation taken from *Dialogue Basic 1200* written by Akiba and Mori (2012). This book sets a target to achieve 650 on TOEIC. The conversation was between one male and female, consisting of 103 words and lasting 56 seconds (110 words per

minute). The same conversation was used for both the pre- and post-shadowing skill test. The participants were not informed that the same shadowing skill test would be conducted after 11 weeks, nor did they look at the text for this test. Any positive change occurring in the shadowing skill test could be interpreted as improvement in the skills to listen and reproduce sounds as accurately as possible.

With respect to speeches, the participants gave speeches on three different topics: *my hobby*, *my spring* (or summer) *vacation*, and *my opinion* before and after the shadowing training. For analysis, the study used the speech on my hobby to explore how their fluency had developed. They were given one minute of planning time prior to recording and instructed to speak for two minutes at their own pace. They were instructed to begin their speeches with the title *my hobby*. For all recordings, the software *Windows Sound Recorder* installed in the students' computers was used with a microphone. The participants practiced recording their voices and saving their oral data before taking the actual tests. Regular shadowing training and data collection were conducted by the same researcher. These speeches were called Speech 1 (before shadowing training) and Speech 2 (after the training) hereafter.

5.5 Data Analysis

Data were analyzed in the following ways: for the shadowing skill tests, the words were first divided into syllables. Then, the researcher listened to the recorded shadowing and counted how many syllables were correctly and clearly produced. There were 152 syllables in total. One point was assigned to each correct production of syllables.

As to Speech 1 and 2, the speeches were transcribed and extracted within the first 30 seconds after the articulation of the speech title. The 30 seconds of speech data was first analyzed to examine the basic features of oral utterances such as total number of words and syllables, total speaking time and pause length (unfilled pauses) of more than 0.4 seconds, and the number of filled pauses. To explore changes occurring at the formulator and articulator and total production processing, the MLRs, articulation rate, and speech rate were calculated (see Table 1 for definitions).

To compare differences in mean scores in the shadowing skill tests and speeches, the paired-samples *t*-tests were performed respectively. The researcher checked if all scores obtained from the participants were normally distributed in the population. All the data sets satisfied normality, which is a necessary assumption for a t-test. The alpha value was set for .05 for further statistical analyses. For data analysis, *Praat*, a free software to analyze oral data developed by Boersma and Weenink at the University of Amsterdam and *SPSS* (ver. 25), a statistical software, were used.

The data analyses were conducted by one researcher. To ascertain the reliability of the data analyses, data coding and analysis was conducted twice, after an interval of about half a year. When discrepancies between the two analyses were found, the researcher listened to those parts carefully and made final decisions.

6. Results

6.1. Shadowing Skill Test

Table 2 and Figure 1 display the descriptive statistics for the shadowing skill tests. The mean scores, out of 152 points in total, increased considerably from the pre-shadowing test (86.38) to the posttest (101.06). In terms of percentages, the accurate reproduction rates of sounds increased from 56.83% (pretest) to 66.49% (posttest). This result indicates that the participants could hear and reproduce the sounds they heard more accurately in the post-shadowing test than in the pretest.

A paired-samples t-test was conducted to see if the participants performed differently in the pre- and post-shadowing tests. The results reveal a significant difference between the two tests: $t = -5.722$, $p = .000$, df = 15, 95% CI [– 20.16, – 9.22]. There was a medium effect size for the difference between the tests, $d = .055$. Still, this result generally suggests that the participants' shadowing skill improved significantly from the pretest to the posttest.

Table 2. Descriptive Statistics of Shadowing Skill Tests

	M (*SD*)	Range
Pretest	86.38 (27.28)	54 -138
Posttest	101.06 (25.94)	54 -137

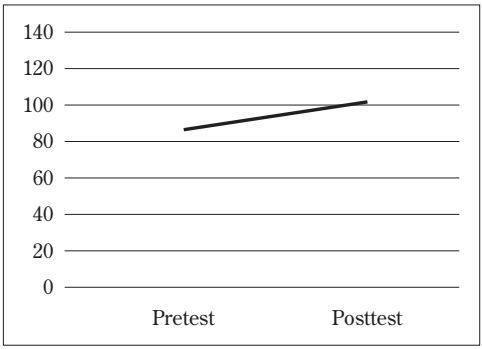

Figure 1. Descriptive statistics of shadowing skill tests.

6.2. Speech Data

6.2.1. Basic Features of Speeches 1 and 2

Table 3 shows the descriptive statistics for the following features: the number of words, syllables, pauses, and filled pauses (using *eh* or *umm*), and the total pause length and speaking time. On the whole, no prominent changes were observed. However, there were some increases in certain measures—the number of syllables and total speaking time—indicating that the participants could produce more syllables in Speech 2 than Speech 1 and their speaking time increased overtime. In a similar vein, the total pause length was somewhat reduced. These results appear to indicate there were small but positive changes in the participants' oral performances.

6.2.2. Fluency Measures

Table 4 shows descriptive statistics for fluency measures such as the MLRs, articulation rate, and speech rate. As seen in Figures 2, 3, and 4, averages increased from Speech 1 to Speech 2 in all measures. In particular, observable

improvement can be seen in the speech rate. These results appear to demonstrate that the formulator, articulator, and all other production components operated somewhat more efficiently in Speech 1 than in Speech 2.

The differences in MLRs, articulation rate, and speech rate between Speech 1 and Speech 2 were tested with paired-samples t-tests. Results are presented in Table 4. A significant difference was found in speech rate with a relatively small effect size. Statistical differences were not found in MLRs or articulation. Effect sizes for both variables were respectively small. Theses results indicate that, even though averages increased in all three measures, speech rate was the only fluency variable with statistically significant improvement.

Table 3. Basic Features of Speech Data (Averages)

	Speech 1 (n = 16) M (SD)	Speech 2 (n = 16) M (SD)
Number of Words	29.19 (7.51)	30.44 (7.44)
Number of Syllables	41.37 (11.58)	45.94 (12.37)
Number of Pauses	10.75 (2.72)	10.56 (1.86)
Number of Filled Pauses	0.69 (0.95)	0.87 (0.96)
Total Pause Length	15.28 (3.83)	14.00 (3.46)
Total Speaking Time	14.72 (3.83)	16.00 (3.46)

Table 4. Summary Results of MLRs, Articulation Rate, and Speech Rate

	Speech 1 M (SD)	Speech 2 M (SD)	95% CI	t-value	df	p-value	Effect size
MLRs	4.06 (1.51)	4.55 (1.77)	[–1.51, .54]	–1.011	15	p = .328	d = .29
articulation rate	168.96 (26.58)	171.76 (24.75)	[–15.53, 9.92]	– .470	15	p = .645	d = .11
speech rate	82.75 (23.16)	91.88 (24.75)	[–17.94, –.31]	–2.207	15	p= .043*	d = .38

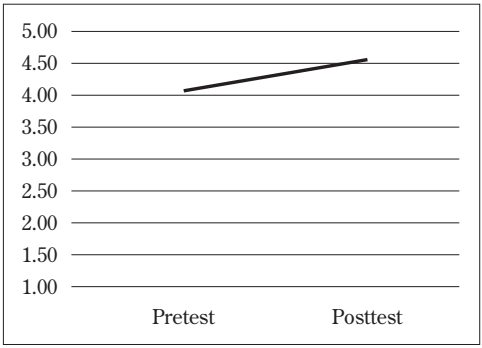

Figure 2. Averages of the mean length of runs (MLRs).

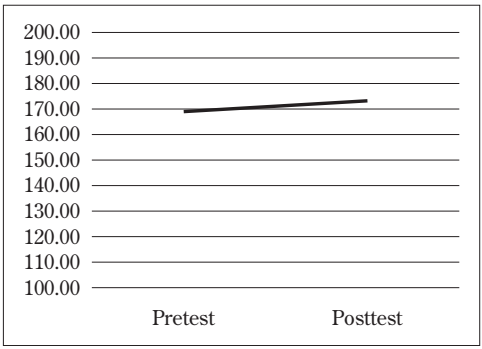

Figure 3. Averages of the articulation rate.

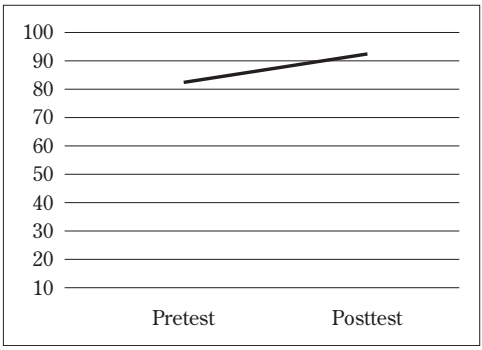

Figure 4. Averages of the speech rate.

7. Discussion

The present study explored the effect of shadowing training on the development of L2 oral fluency as proposed by Kadota (2012, 2015, 2018, 2019). In particular, referring to the production model by Levelt (1989, 1999), it examined to what extent shadowing training could enhance the operation of the formulator, articulator, and the entire production process.

Looking at the results of the analyses, it can be argued that shadowing training could improve L2 fluency to some degree for a number of reasons. Firstly, examining basic features of the participants' speeches, the study found that the number of syllables and speaking time moderately improved from Speech 1 to Speech 2; on the other hand, the length of pauses decreased. There was a relative tendency for the participants to produce more syllables at a faster speed and with fewer pauses in Speech 2 than in Speech 1.

Secondly, the scores of the shadowing skill test improved significantly from the pretest to the posttest, which is the same result as the study by Tamai (1997). The shadowing skill test involved both listening and the reproduction of the sound being heard. It can be suggested that the participants' oral production skill as well as listening developed to a certain extent. That is, they could understand what it was being said while listening and reproduce sounds they heard more accurately in Speech 2 than Speech 1. The articulation of sounds takes place at the articulator component, according to Level's model; therefore, it can be assumed that the operation of the articulator was enhanced through the eleven weeks of shadowing training.

Finally, speech rate as fluency measures improved from Speech 1 to Speech 2. The participants could produce significantly more syllables within 30 seconds including pauses in Speech 2 than in Speech 1. Since speech rate is argued to be related to the entire production process, it can be postulated that, through shadowing training, the operation of the entire production process was reinforced to a certain degree.

In sum, the present study generally found that shadowing was a useful method for improving speaking skill. This result was partially congruent with

the study by Muraoka (2018). The participants appeared to be able to go through the production processes in English more efficiently after they engaged in shadowing training for eleven weeks. If they continue participating in shadowing training, their L2 fluency might improve further.

Still, this conclusion should be carefully interpreted with a number of caveats. First, the present study did not include a contrast group. Even though there are valid theoretical grounds to presume the positive effect of shadowing training on L2 fluency, the results might not be attributed solely to shadowing practice per se. Second, this study was conducted within regular English classes, so the possibility that extraneous factors other than purely shadowing training were involved cannot be denied. Finally, since Speech 1 and 2 were about the same topic, *my hobby*, the repetition effect might have affected the results (S. Kadota, personal communication, May 26, 2019).

Future research should include a contrast group. Also, although the present study analyzed speeches on one topic (my hobby), those about different topics should have been analyzed. Such analysis is in the process. Furthermore, data elicitation tasks other than speeches could be used. Speeches do not involve interaction between participants; the adaptation of tasks wherein interaction is necessary may be desirable.

Still, the researcher believes that the class was effectively controlled each time; therefore, any effect from other factors might be minimal. Class control was properly retained mainly because of the textbook material used in the current study. It was specially designed for developing fluency through shadowing training and contained solid and flexible steps which students could easily follow and work on in each section. Even though shadowing was not an easy task, the participants concentrated and worked hard. There were performance check sessions wherein they recorded their shadowing and checked how many words were correctly pronounced the first time individually and the second time in pairs. Such opportunities for reflection incorporated within the training sessions seemed to help maintain their motivation to work on shadowing in earnest since they could see how much improvement they had made each time.

It can be presumed that little or a minimal effect found in the studies by Muraoka (2017, 2018), which examined the effect of shadowing training on

L2 oral performance, could be attributed to differences in the procedure for shadowing practice. That is to say, in both studies, the participants were simply instructed to practice shadowing for 30 minutes. These studies did not strictly control whether the participants engaged in bottom-up shadowing or top-down shadowing. Moreover, the time for reflection was not provided as in the present study. The participants in the previous studies might have showed better improvement with more regulated procedure.

8. Conclusion

The present study generally found that shadowing training could serve at least two purposes: (1) to improve listening skill and (2) to enhance oral L2 fluency. In the future, shadowing can be adopted not simply as one method of oral practice, but also as a profitable technique to improve speaking skills in Japanese English classrooms.

Japanese high school students will have to take commercial English proficiency tests measuring four skills in the near future. However, Japanese English teachers continue placing too much emphasis on teaching grammar and vocabulary, not seriously considering how to develop their students' communicative competence. In this regard, shadowing can be more widely used for the purpose of improving speaking ability. Moreover, the results of the analyses seem to suggest that how to implement shadowing training in class plays an important part. Steps illustrated in the shadowing textbook adapted in the present study are useful to follow. More research should be conducted to examine if and how shadowing training improves L2 fluency in the future.

Notes

1) Expanding on the concept of cognitive fluency proposed by Segalowitz (2010), Kadota (2012, 2015) proposed the term *psycholinguistic competence*, which indicates the ability

to process input using a stable and automatized system and at fast speed, completing the process within one second at most—usually 400-500 milliseconds.

2) According to Riggenbach (1991), short pauses of 0.4 seconds or less can be taken as being within the range of normal or fluent speech.

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