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THE EFFECT OF LOANWORD STATUS IN JAPANESE ON THE LENGTH OF THE VOWEL INSERTED BETWEEN CONSONANT CLUSTERS IN L2 ENGLISH BY L1 JAPANESE SPEAKERS OF ENGLISH

A Thesis
Presented for the degree of
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in the Department of Modern Languages
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by
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ABSTRACT

In L2 phonological acquisition, the difference in phonotactics between two languages might result in misperception and non-target like pronunciation (Dupoux et al., 1999; Nogita & Fan, 2012). If a language does not allow consonant clusters (CC), the language speaker may perceive an illusory vowel between the two consonants in the cluster (e.g., Japanese, Dupoux et al., 1999) and also they may insert a vowel between two consonants (i.e., vowel epenthesis). Similarly, the pronunciation of loanwords when adopted is usually modified according to the phonological system of the recipient language (Kay, 1995). The current study investigates the effect of loanwords in Japanese on the length of the vowel inserted between CC which are illegal in Japanese phonotactics by comparing the pronunciation of loanwords and non-loanwords (henceforth, loanwords refer to English words which exist in Japanese as loanwords, whereas non-loanwords are the ones which do not). For example, trumpet is a loanword because it is widely used in Japanese as a loanword but pronounced as torampetto [to.ɾa.m.pe.t.to] whereas trash is a non-loanword because it is not used in Japanese as a loanword, rather gomi, the Japanese counterpart of trash, is used. The status of loanwords and non-loanwords seems to be different in learners’ mental lexicon (Nomura & Ishikawa, 2018). The potentially resulting differences in the length of inserted vowels will, therefore, be discussed in terms of the differences in the mental representations of loanwords and non-loanwords in a Japanese learner’s
mental lexicon. In order to determine L1 influence on these potential differences, the participants will be L1 Japanese/L2 English learners (JEL) and L1 Mandarin Chinese/L2 English learners (MEL). Two tasks are employed: a picture-naming task and a reading-aloud task. The results revealed that the status of loanwords in the mental lexicon of L1 Japanese speakers is different from that of non-loanwords, which caused a longer duration of vowel insertion. These results would suggest a pedagogical implication that loanwords should be treated in pronunciation teaching differently.
DEDICATION

The thesis is dedicated to everyone who provided me with positive energy through entire MA courses.
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CHAPTER I

LITERATURE REVIEW

1. Introduction

L2 learners filter their second language through their L1. This often results in non-target-like L2 perception and non-native like pronunciation in L2 production (Derwing & Munro, 2015). There are many reasons for this L1 effect to occur, e.g., different phonological inventories, different phonotactics (i.e., restrictions on the phoneme sequences in a language) between the L1 and L2 (Dupoux et al., 1999; Kay, 1995). The current study focuses on the difference in phonotactics between two languages, that is, how the different phonotactic rules between two languages affect L2 phonological acquisition. Past research shows that phonotactic differences seem to lead to misperception and non-target like pronunciation (Dupoux et al., 1999; Funatsu et al., 2008; Nogita, 2011).

In L2 perception, L1 Japanese speakers tend to perceive an illusory vowel between consonant clusters (CC), where there is in fact no vowel, whereas L1 French speakers do not (Dupoux et al., 1999). In this research, non-words, such as ebzo, were used. The L1 Japanese and L1 French participants listened to the non-word stimuli and judged if there was any vowel between CC (e.g., whether they perceived the stimulus as ebzo or ebuzo). Since Japanese
phonotactic rules do not allow any CC, L1 Japanese participants perceived an illusory vowel between CC, whereas L1 French participants had no difficulty in the task because French phonotactics allow CC.

In L2 production, there is also a tendency that L1 Japanese learners of L2 English insert a vowel between CC which are illegal in Japanese (Funatsu et al., 2008; Nogita, 2011; Nogita & Fan, 2012). The participants in these research studies read aloud loanwords in Japanese and non-words which contain CC and also did a repetition task, where they heard stimuli and produced them. The results revealed that L1 Japanese participants inserted a vowel in the reading-aloud task but not in the repetition task. The researchers concluded that L1 Japanese speakers can detect epenthetic vowels in CC and have the ability to produce CC (if they repeat after correct pronunciation) but are still not able to produce CC without inserting a vowel (if they do not repeat after correct pronunciation).

Therefore, the researchers inferred that the misperception or non-target like pronunciation of CC does not result from the acoustic perceptual inability, but from their misinterpreted word recognition (Funatsu et al., 2008). That is, L1 Japanese speakers assume there is a vowel between CC in their interlanguage phonological representation. Nogita and Fan (2012) also found similar results by using loanwords and non-words as stimuli and using the same tasks (i.e., a reading-aloud and repetition task). These researchers came to the conclusion that it was because of the Japanese orthographic system, "katakana", which is a phonetic script used to transcribe loanwords. "Katakana" reflects Japanese phonotactic preference for a (C)V structure [i.e., (optional consonant) vowel structure]. In sum, the differences in phonotactics between the
two languages of Japanese and English result in vowel insertion between CC both in perception and production by L1 speakers of Japanese in their L2 English.

Moreover, research studies (Funatsu et al., 2008; Nogita, 2011; Nogita & Fan, 2012) in the use of loanwords from English to Japanese and non-words as stimuli demonstrated that the mental representations of English words (both loanwords and non-words) in the minds of L1 Japanese speakers causes them to insert a vowel. This appears to be intertwined with the Japanese orthographic system, *katakana* (Nogita & Fan, 2012).

However, these researchers did not investigate the extent of vowel insertion in real words which are not loanwords in Japanese. Such non-loanwords might be less affected by Japanese orthographic system than loanwords and non-words. The current study, therefore, investigates the extent of vowel insertion between CC in the two types of real words: loanwords and non-loanwords (henceforth, loanwords refer to English words which exist in Japanese as loanwords, whereas non-loanwords are the ones which do not). The results of the potential difference in vowel insertion between loanwords and non-loanwords can be discussed in terms of their mental representations.

In addition to the difference between loanwords and non-loanwords, the current study investigates how different loanword adaptation systems among different languages may possibly affect the extent of vowel insertion. To this end, L1 Mandarin Chinese/L2 English learners (MEL) participate in this research. MEL have been chosen for two reasons: phonotactic similarity between Mandarin Chinese and Japanese and a different loanword adaptation system between the two. Firstly, both Japanese and Mandarin Chinese prefer the (C)V structure; that is,
their phonotactic rules do not allow CC as in English. Thus, their major strategy to compensate for the illicit CC in the onset position is vowel insertion (Lin, 2007).

Secondly, the loanword adaptation system is different between Japanese and Mandarin Chinese. Japanese mostly adapts loanwords based on sound modification by using *katakana* (Kay, 1995), whereas Mandarin Chinese uses both sound-based and meaning-based adaptation (Lin, 2007). In the meaning-based adaptation, the original sound completely disappears [e.g., in Mandarin Chinese, *computer* is *dian4 nao3* (the numbers represent tones), which literally means ‘electrical brain’]. Therefore, it can be assumed that the word, *computer*, appears as “English sounds” in the L2 English mental representation by L1 Mandarin speakers since the sound of the L1 counterpart and the L2 word are completely different. On the other hand, in Japanese, *computer* is *kompjiutaa* [ko.m.pjɯ.ɯ.ta.a], which has been adapted based on the original English pronunciation. Therefore, the word, *computer*, might be stored as *kompjiutaa*, in their L1 mental representation (Mental representation, phonological representation or phonemic representation are used interchangeably in this paper to describe the cognitive level representations of sounds which are not acoustic sounds but abstract sounds. These abstract sounds can be different in each individual’s mind and so do not correspond to actual acoustic sounds).

Since loanwords in Japanese are based on sounds, phonological information of both English and Japanese could come to Japanese learner’s mind in the process of lexical retrieval (see the section of cross-linguistic interference below for the detailed process of lexical retrieval). Either English pronunciation or Japanese pronunciation (or something in between) could win the competition of lexical retrieval depending on how each individual stores English words in their mental lexicon. Some learners could rely on Japanese pronunciation of loanwords
when they store English words because it is easy for them, while others could successfully
differentiate Japanese pronunciation and English pronunciation. These individual differences
could create different mental representations.

In this sense, Japanese speakers might be affected by their L1 to a greater extent than
Mandarin Chinese speakers when each L1 speaker produces loanwords. This difference might be
indicated by differences in phonotactic repairs of CC structures. That is, although the two
languages prefer vowel insertion as the major strategy for the production of CC, the different
loanword adaptation system might affect the extent of vowel insertion due to the differing mental
representations of loanwords in each language.

This thesis discusses the following: (1) the motivation of this study, namely the potential
of using loanwords as a starting point to teach pronunciation to L1 Japanese/L2 English learners
(JEL), (2) an overview of cross-linguistic interference in the process of lexical retrieval (3) an
overview of the L2 phonology of loanwords, (4) the three types of vowel insertion, (5) loanword
adaptation in Japanese and orthography, (6) loanword adaptation in Mandarin Chinese and (7)
mental lexicon of loanwords. Finally, research questions and corresponding predictions are
discussed based on the literature review.

2. The motivation of this study

The current study is motivated by the idea that the loanwords could serve as a potential
starting point to teach pronunciation to JELs as a means to raise awareness of the gaps between
Japanese and English pronunciation (Daulton, 2008). Since loanwords have been adapted
through phonetic and phonological adjustment from the source language to the recipient
language, loanwords are a good place to observe the different phonetic and phonological system
between two languages. In addition, since the meaning of loanwords is generally already built into JELs’ mental lexicon through their L1, JELs can focus only on the forms, which is facilitative for phonological development as it frees up the cognitive load and allows learners to notice pronunciation. This awareness and attention are important for learning (Noticing Hypothesis, Schmidt, 1990). Moreover, it is difficult for learners to pay attention to both meaning and forms at the same time (Vanpatten, 1990). In addition, since the meaning is important for comprehension, the teaching focus tends to be on the meaning rather than on the forms (Leow, 2001). On this point, loanwords can be great teaching material to raise awareness among learners, since they can allocate more cognitive load to notice pronunciation as the meaning can be generally understood.

However, knowledge of loanwords could also be detrimental for L2 phonological acquisition, since the pronunciation of loanwords has been transformed to be suitable for L1 phonology, which could affect the mental representations of these words. Mental representations of loanwords, which is highly likely affected by the L1 phonological system, could cause incorrect L2 pronunciation.

The current study will, therefore, explore how L1 knowledge of loanwords interfere with L2 production of corresponding original words so that the results could provide insight for pronunciation teaching. To begin with, the next section will review cross-linguistic interference in the process of lexical retrieval.

3. Cross linguistic interference

In the process of speech production, speakers retrieve the most appropriate word for a certain context from their mental lexicon. When they retrieve a certain word matched to their
intention, tremendous information is activated in their mind. Firstly, the process begins with conceptual preparation. Speakers first search for lexical concepts. Based on the lexical concept, the appropriate lexical form is retrieved from their mental lexicon. This process is done through a competition among a number of activated lexical representations. Following the competitive process, the phonological forms appear in their mind and the forms will be articulated (Spreading activation principle, Levelt, Roelofs, & Meyer, 1999).

This process is true to bilingual speakers as well. In the case of bilingual speakers’ speech production, however, two languages in their mental lexicon would compete unlike the case of monolingual speakers. There are some models for this: Language-specific model (Costa & Caramazza, 1999), language-non-specific model (Lev-Ari & Peperkamp, 2014; Sudarshan & Baum, 2019). The language-specific model claims lexical retrieval only takes place within a target language. If the target language is English, therefore, only English words compete with each other in the retrieval of an appropriate word. On the other hand, the language-non-specific model accounts for cross interlanguage interference. That is, when bilingual speakers try to retrieve a word, lexical retrieval occurs in two languages and not only within a target language.

Much research that has investigated this cross-linguistics interference analyzed reaction times in picture-word interference (PWI) tasks by bilingual speakers. A PWI task asks participants to produce a word described in the form of a picture and measures reaction times between the onset of picture appearance and production of the word. As well as a picture, the participants see distractor words which are considered to interfere or facilitate the lexical retrieval. These distractors are often semantically- or phonologically-related words. Sudarshan and Baum (2019) studied French-English bilingual speakers’ cross language interference. The
results revealed that when a picture is accompanied by phonologically-related distractors [i.e., when a picture is \textit{sandwich}, phonologically-related distractors would be \textit{saddle} in English and \textit{salle} (hall) in French; this example comes from Sudarshan and Baum (2019), pp. 541], regardless of the distractor languages, the reaction times became quicker (i.e., French word facilitated the retrieval of an English word). This indicates cross-linguistic lexical activation, supporting language non-specific models. Since phonological information is activated cross-linguistically, the phonological forms should be affected by a non-target language’s phonological information.

The extent of phonological information might vary depending on the type of words, for example, loanwords (cognates) and non-loanwords (non-cognates). Phonological information of the non-target language might interfere with production more when learners produce loanwords because they share similar semantic and phonological features with L1 words. Phonological information of loanwords seems to affect phonetic interference (Amengual, 2012). In addition, Sudarshan and Baum (2019) revealed that loanwords and non-loanwords affected naming latencies of PWI tasks differently: the naming latencies of loanwords were faster than those of non-loanwords.

In sum, the results indicate that the shared similar (but different) semantic and phonological information of loanwords seems to be activated more than that of non-loanwords when it comes to producing L2 lexical items corresponding to the original L1 words. The next section will review how loanwords are formed in order to infer how they might interfere with L2 production.
4. L2 phonology of loanwords

When words are adopted into one language from another, they undergo transformation on many levels. The most noticeable one may be the difference in pronunciation as the word undergoes transformation to fit recipient language phonology and phonotactics. These changes may include sound substitution, deletion, vowel insertion, etc. This section will review such processes of loanword pronunciation, focusing on Japanese.

4.1 Substitution

When a language borrows words from another language, substitution often occurs to make up for the different phonological inventories between two languages. Substitution is the process of altering a sound in the source language which does not exist in the recipient language into a sound which exists in the recipient language and is close to the original sound of the source language. For example, when Japanese speakers try to adapt English words, which have the dental fricative of /θ/ or /ð/, these sounds are substituted by /s/ and /z/, respectively since those phonemes do not exist in the L1 and since these sounds are sufficiently close to /s/ and /z/ to Japanese. As such, Japanese has words such as yunittobasu [jɯ.ni.t.to.ba.sɯ], modular bath (unit bath), and mazakon [ma.za.ko.N], momma’s boy (mother complex). Substitution also takes place for /v/ and /f/ which become /b/ and /ɸ/, their bilabial counterparts in Japanese, or for /r/ and /l/ which both become the same flap sound, /ɾ/, in Japanese. For example, Japanese has the words betonamu [be.to.na.mɯ], Vietnam, and furii [ɸi.i.i], free. As for /r/ and /ɻ/, both right and light are raito [ɾa.i.to].
4.2 Vowel insertion

Vowel epenthesis occurs to compensate for the illegality of consonant + consonant (CC) combinations when adopting words from English that possess consonant clusters as Japanese phonotactic rules do not allow CC and fix this violation by inserting a vowel to produce CVC(V) which is allowed in Japanese phonotactics. For instance, if L1 Japanese learners of L2 English (JEL) produce the English word *Christmas*, it would be pronounced [kɯ.ɾi.ɯ.mɑ sɯ], where /ɯ/ is inserted between /k/ and /ɾ/, between /s/ and /m/ and also after the final consonant /s/.

Research has shown that the cause of vowel insertion is not only because of phonotactic violation but also their mental phonemic representation (Durvasula & Kahng, 2016). Durvasula and Kahng (2016) showed that not only acoustic information of sounds and the surface phonotactics of languages but also phonemic representations affect speech perception. Since mental representations seem to be activated during speech perception, it might be true to speech production as well. The current study, therefore, investigates how not only phonotactics but also mental representations affect speech production. To see how phonotactic constraint and mental representations affect speech production, the next section will review three types of vowel insertion.

5. Three types of vowel insertion

Nogita and Fan (2012) categorized three types of vowel insertions: vowel intrusion, vowel epenthesis (Hall, 2006; Nogita, 2011), and misinterpreted L2 phonological representation (Nogita & Fan, 2012). Vowel intrusion is not a part of the lexical vowel, which means it does not
exist in learners’ mental representation of the word, but is inserted between a CC sequence due to the inability to produce the CC sequence. Vowel epenthesis is a part of the lexical vowel, which means it does exist in learners’ mental lexicon as part of the mental representation of the word. They realize it is not target-like but nevertheless they have difficulty in eliminating it so that they produce it by using their L1 phonotactic system. Thirdly, vowel insertion happens because of a misinterpreted L2 phonological representation. It is also a part of the lexical vowel, meaning that it exists in learners’ mental lexicon and they believe it is correct. Thus, they insert a vowel, believing they are correct.

The first two types of vowel insertion occur because of the phonetic and phonotactic constraints, whereas the third one occurs due to the L2 learners’ L2 phonological representation, which is misinterpreted by them. The misinterpreted L2 phonological representation could be affected by the Japanese loanword adaptation system because the word exists in the L1 and this L1 mental representation may reinforce the implementation of L1 Japanese phonotactics in the pronunciation of L2 English cognates. The next two sections will review loanword adaptation systems in Japanese and Japanese orthography and also loanword adaptation systems in Mandarin Chinese to see the difference between them, which could affect their L2 phonological representations.

6. Japanese loanword adaptation system and orthography

As reviewed in the preceding section, Japanese loanwords have undergone substitution and vowel insertion; this is represented by one of the Japanese orthographic systems, katakana. Katakana is one of three orthographic systems in Japanese and is a phonetic script used to transcribe borrowed words from English. Since all katakana represent a vowel or a combination
of a consonant and vowel (CV), through the process of loanword adaptation transcribed by *katakana*, when Japanese speakers see loanwords, there is no trace of the original CC sequence. Therefore, JELs might believe that even if they see the spelling of the original English word of a loanword, there should be a vowel between CC sequences. This in turn likely affects their L2 phonological representation in their mental lexicon which is connected to the third type of vowel insertion, misinterpreted L2 phonological representation (Nogita & Fan, 2012). In sum, the Japanese *katakana* orthographic system might play a large role in Japanese loanword adaptation and also possibly affect the L2 phonological representation of loanwords.

*Katakana* might, therefore, induce misinterpreted L2 phonological representations because orthography sometimes seems to affect pronunciation (Bassetti & Atkinson, 2015; Bassetti et al., 2018). For example, orthographic forms (spellings) in English affected L2 English speech production (Bassetti et al., 2018). The number of consonant letters in the spelling reflected consonant duration [i.e., *finish* vs. *Finnish* (both [fɪ.ˈnɪʃ])]. Also, similar effects were found on vowel duration [i.e., *scene* vs. *seen* (both [si.ˈnəʊn])]. Similarly, L1 Italian learners of L2 English seemed to transfer their L1 orthographic knowledge (Roman alphabet) to their L2 English pronunciation (Bassetti & Atkinson, 2015). In sum, although Japanese does not use the Roman alphabet as in English and Italian, the orthographic forms might have an effect on pronunciation to some extent as *katakana* represents Japanese phonotactics.

7. Mandarin Chinese loanword adaptation system

This section will review the reason why MELs (L1 Mandarin Chinese/L2 English learners) have been chosen as participants for the sake of comparison with JELs, namely due to the loanword adaptation system in Mandarin Chinese.
There are two reasons why MELs have been selected as participants: the preference for vowel insertion in adapting loanwords containing a CC sequence and a different system of loanword adaptation as compared to Japanese. Firstly, both Japanese and Mandarin Chinese do not have syllable structures as complex as those in English. That is, the two languages do not allow a CC sequence. As a result, in Mandarin Chinese, vowel insertion also occurs between a CC sequence to fix this phonotactic violation, particularly, in the onset position (Lin, 2007). Secondly, unlike Japanese, which, as reviewed above, mostly applies a sound- (syllable-) based adaptation by using katakana, Mandarin Chinese uses both sound-based and meaning-based adaptation (Lin, 2007). In sum, when it comes to loanword adaptation in these two languages, they fix loanword phonotactics to fit their L1 phonotactics in a similar manner, but the two languages differ in their loanword adaptation system, i.e., only sound-based versus both sound-based and meaning-based. This in turn could affect mental representations of English words which exist as loanwords in Japanese but do not exist as loanwords in Mandarin Chinese.

The two methods in the loanword adaptation system in Mandarin Chinese: sound-based adaptation and meaning-based adaptation are joined by a third method where both are combined. Sound based adaptation tends to be used for foreign proper names, such as Texas, de2 ke4 sa4 si1 (the numbers represent tones), while meaning-based adaptation is for new objects and concepts, such as computer, dian4 nao3, which literally means ‘electrical brain.’ Mixed adaptation is sometimes used, such as, laser, lei2 she4, which literally means ‘thunder shoot’.

As mentioned above, Mandarin Chinese, like Japanese, does not allow a CC sequence as in English. Therefore, vowel insertion likely occurs in the onset position in order to create the legal and therefore preferred syllable structure, i.e., CV syllable. On the other hand, in the coda
position, consonant deletion sometimes occurs such as, Netherlands, ni2 de2 lan2, where [dz] is deleted. Since vowel insertion is the major strategy to make up for the illegality of a CC sequence (Ruiqin, 2005), it would be safe to compare the extent and manner of vowel insertion in the onset position between Japanese and Mandarin Chinese. The next section will review the mental lexicon of loanwords.

8. Mental lexicon of loanwords

This section will review the different status of loanwords in L2 learners’ mental lexicon. Nomura and Ishikawa (2018) investigated the effect of loanwords (L1 representation) in a perceptual test which asked Japanese participants to judge whether a vowel is present or absent. Their stimuli were loanwords and non-loanwords. The results showed that Japanese participants misperceived vowel epenthesis more in loanword stimuli than in non-loanword stimuli. These research results imply that loanwords could affect L2 mental representation. However, they did not research the potentially different effects of loanwords and non-loanwords on L2 production. The current study, therefore, investigates the potentially different effect of loanwords and non-loanwords on L2 production by analyzing the length of vowel insertion. In addition, this research uses more familiar non-loanwords to JELs as stimuli unlike Nomura and Ishikawa (2018) who used infrequent words (almost non-words to JELs) as stimuli.

9. Research questions

The current study asks the following:
(RQ1) Do L1 Japanese learners of L2 English (JEL) insert a longer vowel between consonant clusters when they pronounce loanwords than when they pronounce non-loanwords?

(RQ2) Do L1 Mandarin Chinese learners of L2 English (MEL) insert a vowel between consonant clusters?

(RQ3) Do JELs insert a longer vowel between consonant clusters in loanwords than MEL do?

The predictions for each research question were formulated as follows:

(P1) JELs insert a longer vowel between CC sequences when they produce loanwords than when they produce non-loanwords, because loanwords are more likely affected by mental representations in the L1 mental lexicon than non-loanwords.

(P2) MELs insert a vowel between CC sequences because the CC sequence violates the phonotactic constraints in Mandarin Chinese.

(P3) JELs insert a longer vowel between a CC sequence at the onset of loanwords than MEL does if the words exist only in Japanese and not in Mandarin.
CHAPTER II

METHOD

1. Participants

Twelve JELs and ten MELs participated in this research. They are all international students at a large public state university in the South of the United States. They were recruited on campus. The Japanese group (N = 12) is relatively more cohesive in terms of their English learning background than the Mandarin group (N = 10). According to a language background questionnaire, the age of the Japanese participants ranges from 19 to 23 (M = 20.08, SD = 1.084, 95% CI = [19.39, 20.77]), whereas that of the Chinese participants ranges from 21 to 30 (M = 25.70, SD = 2.908, 95% CI = [23.62, 27.78]).

The length of residence in an English-speaking country for Japanese ranges from 3 to 9 months (M = 3.75, SD = 1.865, 95% CI = [2.57, 4.93]), while that for Chinese ranges from 3 to 48 months (M = 13.30, SD = 13.695, 95% CI = [3.50, 23.10]).

All of the participants reported that they have learned English in an instructed setting. Japanese typically started learning English from junior high school (i.e., from the age of eleven or twelve). They have been learning from 7 to 13 years (M = 9.17, SD = 1.946, 95% CI = [7.93, 10.40]). On the other hand, the ages of onset of English learning for Chinese speakers seem to vary (M = 15.50, SD = 3.026, 95% CI = [13.21, 17.79]).
2. Tasks and procedure

There are two tasks: a picture-naming task (5-10 minutes) and reading-aloud task (2-4 minutes).

2.1 Task 1: Picture-naming task

The first task is a picture-naming task, where the participants name what is shown in presentation slides (powerpoint slides) in English. Once the target stimuli were elicited, the researcher clicked a mouse and the next slide appeared. When participants had difficulty in retrieving words on the slides, the researcher provided the spelling of the word, offering the first letter of the word and then, the second and so on until they could utter the target words. The speech samples were recorded with a voice recording application on an iPhone 7.

Pictures used in this task come from google images search. The order of pictures were not randomized. As well as the stimuli (consonant clusters in the onset position) analyzed in the current study, the stimuli which include word-final consonants were also presented (see Appendix A for the slides used in the current study).

2.2 Task 2: Reading-aloud task

The second task is a reading-aloud task. In this task, each participant was given a sheet which contains English words which are also used in the first task on the presentation slides (see Appendix B for the list of stimuli used in this task). The participants were asked to say the stimuli within a frame of Say, (stimuli) again (e.g., the participants said Say, trumpet again, Say, broom again…). The order of stimuli was not
randomized. The speech samples were recorded with a voice recording application on an iPhone 7.

2.3 Questionnaire

Following the two tasks, each participant filled in a questionnaire about their language background (See Appendix C). In addition, JELs were asked if they use the stimuli used in the tasks as loanwords when they speak Japanese.

Overall procedure began with a concise explanation of the current study to potential participants (i.e., exchange students whose first languages are either Japanese or Mandarin Chinese). Only those who showed willingness to participate in this study were recruited. They were not paid. On the days of data collection, the researcher met participants one by one. They signed the consent form. After explaining the procedure of the two tasks, they completed the tasks. After the completion of the tasks, they filled in a language background questionnaire (see Appendix C). Finally, Japanese participants were interviewed in order to confirm if they actually have heard or used the loanword stimuli before. The entire session lasted approximately twenty minutes.

3. Materials

Nogita (2011) used English words familiar to JEL (i.e., some were loanwords and others were not) and non-words as stimuli. Also, CC types used in the research were syllable-boundary consonant clusters (e.g. subject). Nogita and Fan (2012) revealed that the ability of syllabification was important for them to produce the consonant clusters located in a
word-boundary correctly. Since the current study does not control participants’ ability to syllabify words, the first condition of stimuli selection is within-syllable consonant clusters, so that participants do not necessarily have to have the ability to syllabify words, i.e., onset maximization.

In addition, stimuli in the current study are all nouns which can be put on presentation slides in the form of a picture. As such, an orthographic effect can be avoided as a picture-naming task and the task itself can be a more-meaning focused task. In addition, although past research (Funatsu et al., 2008; Nogita, 2011; Nogita & Fan, 2012) used non-words to avoid a lexical effect, the stimuli in the current study are all real English words, which are divided into two groups: loanwords and non-loanwords. Loanwords refer to English words which exist in Japanese as loanwords, whereas non-loanwords are the ones which do not. For the sake of comparison, loanwords and non-loanwords which are both familiar to JELs have been selected. Loanword stimuli are not loanwords for MEL; all the stimuli are non-loanwords for MEL. In the selection of the real word stimuli, the following criteria were considered:

(1) The phonetic environment in the target CC sequence should be similar in both the loanword and non-loanword as much as possible (e.g., following vowel quality, the stress position).

(2) The words should be familiar enough to learners to ensure they can guess and produce it from the pictures.

The stimuli chosen based on these criteria are in Table 1 (loanwords = 12, non-loanwords = 12).
Table 1
Loanword and non-loanword stimuli sorted by types of consonant cluster sequences

<table>
<thead>
<tr>
<th>Types of Consonant Cluster sequences</th>
<th>Loanwords</th>
<th>Non-loanwords</th>
</tr>
</thead>
<tbody>
<tr>
<td>/dr/</td>
<td>drone</td>
<td>eye drop</td>
</tr>
<tr>
<td>/tr/</td>
<td>trumpet</td>
<td>trash can</td>
</tr>
<tr>
<td>/br/</td>
<td>broccoli</td>
<td>bronze</td>
</tr>
<tr>
<td></td>
<td>brownie</td>
<td>brown rice</td>
</tr>
<tr>
<td>/bl/</td>
<td>block</td>
<td>cherry blossom</td>
</tr>
<tr>
<td>/gr/</td>
<td>grand piano</td>
<td>grandparents</td>
</tr>
<tr>
<td>/sw/</td>
<td>Switch</td>
<td>Switzerland</td>
</tr>
<tr>
<td>/sk/</td>
<td>Squat</td>
<td>squid</td>
</tr>
<tr>
<td>/fl/</td>
<td>NetFlix</td>
<td>back flip</td>
</tr>
<tr>
<td>/st/</td>
<td>stage</td>
<td>stairs</td>
</tr>
<tr>
<td>/pr/</td>
<td>protein</td>
<td>professor</td>
</tr>
<tr>
<td>/kl/</td>
<td>closet</td>
<td>clock</td>
</tr>
</tbody>
</table>
In an interview after the completion of tasks, all Japanese participants reported that they have used or heard the loanword stimuli in Japanese and that they have not used or heard the non-loanword stimuli in Japanese.

4. Analysis

The duration of inserted vowels between CC sequences were measured by using Praat. Since it is difficult to pinpoint the boundary between adjacent sounds due to the co-articulation of neighboring sounds, it was important to determine boundary points (Baart, 2010). Firstly, rough boundary points were located by the researcher by listening. Secondly, since this analysis focuses on vowels, in the case that the adjacent consonants are voiceless (e.g., /t/ or /s/ etc.), the boundary was determined by looking at whether the spectrogram of the vowel was dark or not. On the other hand, in the case that the adjacent consonants are voiced (e.g., /r/ or /l/ etc.), the boundary point was determined by looking at a difference in amplitude or in the shape of the sound wave. All the boundary points were measured at positive zero crossings, where the sound wave curve crosses the zero line and goes up (Baart, 2010).

When measuring duration, devoicing of vowels was taken into consideration as well because in Japanese devoicing occurs when high vowels (/i/ and /u/) are surrounded by voiceless consonants or preceded by a voiceless consonant and followed by a word boundary (e.g., in suki-desu, I like you, /ɯ/ between /s/ and /k/ is devoiced and also /ɯ/ at the end of the sentence is devoiced.). Although it is devoiced, since the spectrogram should still become dark (not as dark as the spectrogram of non-devoiced vowels) with the presence of even devoiced vowels
(Tsujimura, 2013), the way of determining boundary points is the same as usual vowels but requires just a little more care. However, the amplitude of devoiced vowels is significantly decreased.
CHAPTER III

RESULTS

1. Picture-naming task

Since the data was not normally distributed, the data was transformed by using a square root transformation. As a result of the transformation, histograms and Q-Q plots showed that the transformed data became normally distributed. A Shapiro-Wilk test also showed that the vowel duration of both loanwords and non-loanwords was normally distributed, \(W(12) = 0.886, p = .104\) (L1 = Japanese, loanword), \(W(10) = 0.938, p = .533\) (L1 = Mandarin, loanword), \(W(12) = 0.965, p = .851\) (L1 = Japanese, non-loanword), and \(W(10) = 0.952, p = .690\) (L1 = Mandarin, non-loanword).

As for homogeneity, Levene’s test of equality of error variances showed that the variances for the vowel duration of both loanwords and non-loanwords was not statistically different, \(F(1, 20) = 1.374, p = .255\) (loanword) and \(F(1, 20) = 3.533, p = .075\) (non-loanword). Descriptive statistics are in Table 2 and Table 3.

Table 2 shows the raw data (i.e., before transformation), whereas Table 3 shows the transformed data. Table 2 says that, as for loanwords, Japanese participants inserted a longer vowel (0.184 ms) on average than Mandarin participants did (0.105 ms). On the other hand, as for non-loanwords, Mandarin participants inserted a slightly longer vowel (0.118 ms) on average
than Japanese participants did (0.106 ms). These results revealed that both Japanese and Mandarin participants inserted a vowel between CC sequences.

Table 2  
Descriptive statistics for word type (loanword vs. non-loanword) and L1 (Japanese vs. Mandarin Chinese) (before transformation, i.e., raw data)

<table>
<thead>
<tr>
<th>Word Type</th>
<th>L1</th>
<th>Mean (ms) (95% CI)</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Loanword</td>
<td>Japanese (N = 12)</td>
<td>0.184 (0.085, 0.282)</td>
<td>0.155</td>
</tr>
<tr>
<td></td>
<td>Mandarin (N = 10)</td>
<td>0.105 (0.040, 0.170)</td>
<td>0.091</td>
</tr>
<tr>
<td>Non-loanword</td>
<td>Japanese (N = 12)</td>
<td>0.106 (0.033, 0.179)</td>
<td>0.114</td>
</tr>
<tr>
<td></td>
<td>Mandarin (N = 10)</td>
<td>0.118 (0.080, 0.156)</td>
<td>0.531</td>
</tr>
</tbody>
</table>
Using the transformed data, a Mixed ANOVA was performed. Although there was not a significant main effect of word type on the vowel duration, the effect size was medium, \(F(1, 20) = 1.890, p = .184, r = .294\). There was a significant interaction between the word type and L1 and also the effect size was large, \(F(1, 20) = 7.723, p = .012, r = .528\).

2. Reading-aloud task

Since the data was not normally distributed like the data from a picture-naming task, the data was again transformed by using a square root transformation. As a result of the transformation, histograms and Q-Q plots showed that the transformed data became normally distributed. A Shapiro-Wilk test also showed that the vowel duration of both loanwords and non-loanwords was normally distributed, \(W(12) = 0.923, p = .316 \quad \text{(L1 = Japanese, loanword)}, \)
\(W(10) = 0.951, p = .680 \quad \text{(L1 = Mandarin, loanword)}, \)
\(W(12) = 0.940, p = .497 \quad \text{(L1 = Japanese, non-loanword)}, \)
and \(W(10) = 0.950, p = .671 \quad \text{(L1 = Mandarin, non-loanword)}.\)
As for homogeneity, Levene’s test of equality of error variances showed that the variances for vowel duration of both loanwords and non-loanwords were not statistically different, $F(1, 20) = 0.819$, $p = .376$ (loanword) and $F(1, 20) = 0.287$, $p = .598$ (non-loanword). Descriptive statistics are in Table 4 and Table 5.

Table 4 shows the raw data (i.e., before transformation), whereas Table 5 shows the transformed data. Table 4 says that, as for loanwords, Japanese participants inserted a longer vowel (0.163 ms) on average than Mandarin participants did (0.125 ms). On the other hand, as for non-loanwords, Mandarin participants inserted a slightly longer vowel (0.115 ms) on average than Japanese participants did (0.097 ms). These results revealed that both Japanese and Mandarin participants inserted a vowel between CC sequences.

Table 4
Descriptive statistics for word type (loanword vs. non-loanword) and L1 (Japanese vs. Mandarin Chinese) (before transformation, i.e., raw data)

<table>
<thead>
<tr>
<th>Word Type</th>
<th>L1</th>
<th>Mean (ms) (95% CI)</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Loanword</td>
<td>Japanese (N = 12)</td>
<td>0.163 (0.078, 0.249)</td>
<td>0.134</td>
</tr>
<tr>
<td></td>
<td>Mandarin (N = 10)</td>
<td>0.125 (0.040, 0.210)</td>
<td>0.119</td>
</tr>
<tr>
<td>Non-loanword</td>
<td>Japanese (N = 12)</td>
<td>0.097 (0.027, 0.166)</td>
<td>0.110</td>
</tr>
<tr>
<td></td>
<td>Mandarin (N = 10)</td>
<td>0.115 (0.030, 0.201)</td>
<td>0.120</td>
</tr>
</tbody>
</table>
Table 5
Descriptive statistics for word type (loanword vs. non-loanword) and L1 (Japanese vs. Mandarin Chinese) (after transformation)

<table>
<thead>
<tr>
<th>Word Type</th>
<th>L1</th>
<th>Mean (ms) (95% CI)</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Loanword</td>
<td>Japanese (N = 12)</td>
<td>0.351 (0.219, 0.487)</td>
<td>0.209</td>
</tr>
<tr>
<td></td>
<td>Mandarin (N = 10)</td>
<td>0.314 (0.193, 0.436)</td>
<td>0.170</td>
</tr>
<tr>
<td>Non-loanword</td>
<td>Japanese (N = 12)</td>
<td>0.252 (0.130, 0.373)</td>
<td>0.191</td>
</tr>
<tr>
<td></td>
<td>Mandarin (N = 10)</td>
<td>0.299 (0.178, 0.420)</td>
<td>0.170</td>
</tr>
</tbody>
</table>

Using the transformed data, a Mixed ANOVA was performed. Although there was not a significant main effect of word type on vowel duration, the effect size was medium, $F(1, 20) = 2.799, p = .110, r = .350$. There was not a significant interaction between the word type and L1, but the effect size was medium, $F(1, 20) = 1.502, p = .235, r = .267$. 
CHAPTER IV

DISCUSSION

The current study investigated how L1 phonotactic constraints and L1 knowledge (i.e., loanword) affect the quality of pronunciation by looking at the duration of inserted vowels between CC sequences. A reading-aloud task and picture-naming task were performed by L1 Japanese (N = 12) and L1 Mandarin Chinese (N = 10) speakers.

The results revealed that across the tasks, an interactive effect between the L1 (Japanese vs. Mandarin Chinese) and word type (loanwords vs. non-loanwords) was found in a similar pattern based on the effect sizes, although the effect from the reading-aloud task did not reach statistical significance. Across the tasks, loanword-stimuli cause Japanese participants to insert longer vowels than non-loanword-stimuli, whereas both stimuli do not create a significant difference in vowel duration for Chinese participants. These results indicate that the distinction between loanwords and non-loanwords has a large effect on the duration of the vowel inserted by Japanese, whereas the distinction does not matter to Chinese. These results will be discussed based on the research questions and predictions.

1. Answers for research questions
(RQ1) Do L1 Japanese learners of L2 English (JEL) insert a longer vowel between consonant clusters when they pronounce loanwords than when they pronounce non-loanwords?
Yes. There are two possible reasons for this phenomenon: phonotactic violation and misinterpreted L2 phonological interpretation. Firstly, phonotactic violation could cause a vowel insertion; JELs inserted a vowel between CC sequences in order to compensate for the illegality of Japanese phonotactic rules, e.g., no CC sequences are allowed in Japanese. The second possible reason is due to the misinterpreted L2 phonological representation (Nogita & Fan, 2012). Japanese speakers may believe that there must be a vowel between CC sequences because of (1) the phonotactic violation as mentioned above and (2) the status of loanwords in mental lexicon which might be reinforced by Japanese orthography of katakana.

Since katakana, which is a phonetic script, consists of a consonant and a vowel (or only a vowel), if they have heard or used English words in the form of loanwords in Japanese which are written in katakana, mental representations of the English words might be misinterpreted. Although the results of this study cannot disentangle these two possible reasons yet, if the results are to be interpreted in comparison with Chinese participants’ performance, the second reason, which is misinterpreted L2 phonological interpretation reinforced by katakana, could be the reason why Japanese insert a vowel longer and more frequent than Chinese. This will be discussed below as an answer and interpretation for RQ3.

(RQ2) Do L1 Mandarin Chinese learners of L2 English (MEL) insert a vowel between consonant clusters?

Yes. They inserted a vowel between consonant cluster sequences although the duration of the vowel was shorter and vowel insertion occurred less frequently than those of Japanese. Although the extent and frequency of vowel insertion was small, the fact that they inserted a
vowel at the onset position to some extent is in accordance with past research and phonotactic theory (Lin, 2007; Ruiqin, 2005).

Also, the distinction between the two types of stimuli (i.e., loanwords and non-loanwords) does not matter because all the loanword stimuli has been chosen based on loanwords from English to Japanese and all of them are non-loanwords for MEL (i.e., they are not transliterated into Mandarin). The results confirmed this because there were no significant differences between the two types of stimuli.

(RQ3) Do JELs insert a longer vowel between consonant clusters in loanwords than MELs do?

Yes. There was a large interaction effect between L1 (Japanese) and word type (loanwords). Since the distinction of word types (loanwords and non-loanwords) is only applicable to JELs (i.e., loanword-stimuli do not exist in Mandarin Chinese as loanwords, unlike Japanese.), there should not be any significant difference between loanwords and non-loanwords for MELs. The results confirmed this as discussed in RQ2.

On the other hand, as predicted, JELs inserted a longer vowel in loanwords than MELs did, although MELs inserted a longer vowel in non-loanwords than JELs did (the difference did not reach significant for non-loanwords). These results indicate that the distinction in word type has a different effect on Japanese speakers’ pronunciation of English, whereas it does not matter to MELs.

The different extent of the vowel duration between JELs and MELs might be due to misinterpreted L2 phonological interpretation. As discussed above in the answers for RQ1 and RQ2, when it comes to vowel insertion, both JELs and MELs seem to be influenced by the
phonotactic violation of the two languages. JELs, however, inserted a longer vowel than MELs did in loanword-stimuli. This difference, therefore, might be attributed to the misinterpreted L2 phonological interpretation (Nogita & Fan, 2012), which could be reinforced by katakana.

2. Cross linguistic interference of loanwords and non-loanwords

Phonotactic violation for the L1 should affect both loanwords and non-loanwords similarly because phonotactic constraints have nothing to do with word type, but in fact a difference was found between them. What is the difference between loanwords and non-loanwords? There are two potential differences: the different status in the mental lexicon and katakana representations.

Firstly, the status of loanwords and non-loanwords in the mental lexicon seems to be different (Nomura & Ishikawa, 2018). As Sudarshan and Baum (2019) revealed, the phonological information of loanwords is activated more than that of non-loanwords cross-linguistically. When it comes to retrieving words in one language, the corresponding loanwords from another language interfere with the retrieval. The results of the current study support this differing extent of cross-linguistic interference between loanwords and non-loanwords. In addition, the results suggest that loanwords and non-loanwords affect not only naming latency differently but also the quality of pronunciation (i.e., duration of vowel insertion in the current study).

Secondly, in Japanese, loanwords are described in katakana. Japanese speakers usually read and write the words in the form of katakana (CVCV structure). However, they do not encounter non-loanwords in the form of katakana, although it is possible for them to describe the non-loanwords in katakana, which English learners actually do (e.g., writing pronunciation of
English words in *katakana* in the columns of their English textbooks is common so that they can remember sounds of English words.). Thus, the potential difference between them which could reinforce the extent of vowel insertion is whether Japanese are accustomed to seeing the *katakana* form of these words in Japanese.

Past research shows that orthography could change the quality of pronunciation, although the research was about two languages which share the same orthographic systems (i.e, Roman alphabet, English and Italian, Bassetti & Atkinson, 2015; Bassetti et al., 2018). *Katakana*, therefore, might have potential to change the quality of English pronunciation too although the forms are completely different.

However, the *katakana* orthographic system cannot be the sole reason. This is because Japanese children do not learn how to read and write *katakana* until the first grade in schooling and thus, they learn loanwords through listening. When they learn through hearing loanwords, they presuppose there is a vowel between consonant cluster sequences due to Japanese phonotactic constraints. After they have learned how to pronounce loanwords, they learn how to write the loanwords in *katakana* at school. *Katakana*, therefore, is not the only cause for vowel insertion but seems to reinforce their incorrect mental representations, i.e., incorrect production.

In sum, English loanwords and non-loanwords for Japanese speakers have a different effect on the quality of pronunciation (i.e., the extent of vowel insertion) because of the different status in mental lexicon which is highly likely to be affected by *katakana*.
In conclusion, loanwords cause Japanese speakers to insert a longer vowel than non-loanwords. There are two possible reasons for this: phonotactic violation and misinterpreted L2 phonological interpretation (Nogita & Fan, 2012). Firstly, Japanese speakers insert a longer vowel since CC sequences are illegal in Japanese phonotactic rules. The second possible reason is misinterpreted L2 phonological interpretation. Although both JELs and MELs inserted a vowel, probably because of the misinterpreted L2 phonological interpretation (different mental representations from native-forms), JELs inserted a significantly longer vowel in loanword-stimuli than MELs did. This occurred because the status of loanword stimuli used in the current study is different between Japanese and Mandarin Chinese, i.e., they are loanwords for Japanese, which means that they potentially alter their mental representations than non-loanwords, whereas the loanword stimuli are non-loanwords for Mandarin Chinese speakers, which means that there should be no potential difference between the two types of stimuli in their mental representations. Although MELs inserted a longer vowel in non-loanword-stimuli than JELs did. The vowel duration for non-loanwords in each participant group did not reach a significant difference. This result reinforces the interpretation of the different status between loanwords and non-loanwords in mental lexicon, because although non-loanwords did not induce
the different extent of vowel duration between JELs and MELs, loanwords induced a significant
difference in the extent of vowel duration between the two.

As a pedagogical implication, since loanwords potentially change mental representations
in Japanese learners’ mental lexicon, which could lead to incorrect L2 pronunciation, when it
comes to teaching pronunciation, loanwords could be a good starting point to raise awareness on
the different phonotactic rules between English and Japanese. As well as the differences in
phonotactics, they can become aware that katakana representations do not represent English
pronunciation properly. Also, as well as raising awareness of segmental sounds, awareness of
suprasegmental features (e.g., stress) can be raised by using loanwords, because the stress
position of Japanese loanwords and English original words is often different. Loanwords could
be one of the effective teaching materials to teach stress as well as using minimal pairs or
wordplay suggested by Schaefer, Darcy and Abe (2018).
CHAPTER VI

LIMITATION AND FURTHER RESEARCH

There are some methodological limitations for this study. The first one is the participants’ proficiency. The proficiency was not controlled in the current study because finding any participants for this study per se was difficult. In addition, Chinese participants reported that they have been in English-speaking countries longer than Japanese participants. This might be why Chinese inserted a shorter vowel than Japanese. The second limitation is word frequency. Loanword-stimuli are known to Japanese because they are used in Japanese as loanwords, but some of the words are too difficult for Chinese to retrieve. This might also affect the results. Despite these limitations, it can be stated that there is a difference between the status of loanwords and non-loanwords in mental lexicon. Thirdly, the data were analyzed only by the researcher. It would be better to have more analysts at least partially so that the reliability of the data increases. Finally, since spellings are informed to participants by the researcher when they had difficulty in retrieving words, if they were given two letters (e.g., if a word is trumpet and they were given t and r), it might provide a clue that there is no vowel between them. Thus, it should have been avoided and instead the other characters could have been given to them (e.g., t, X, X, X, p, e, t, where X is not explicitly clarified).
Despite these limitations, it can be stated that there should be some difference between the status of loanwords and non-loanwords, which would lead to the change in the different length of vowel insertion.

Further research should control not only individual differences mentioned above (i.e., proficiency and length of residence) but also learners’ aptitude, such as inhibitory control (Darcy, Mora & Daidone, 2016). Inhibitory control is the ability to suppress irrelevant information to an online task. In other words, in L2 production, inhibitory control plays a role to suppress L1 knowledge when it comes to producing L2. Thus, the ability might affect the extent of vowel insertion. The higher inhibitory control learners have, the shorter vowel insertion would be (or no vowel insertion). If these individual differences are controlled, the results would have more reliability.

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https://doi.org/10.1177/0023830918780141


https://doi.org/10.1017/s1366728999000334


Durvasula, K., & Kahng, J. (2016). Illusory vowels in perceptual epenthesis: The role of phonological alternations. *Phonology, 32*(3), 00-00. https://doi.org/10.1017/S0952675715000263


Leow, R. P. (2001). Do Learners Notice Enhanced Forms While Interacting With the L2?: An
Online and Offline Study of the Role of Written Input Enhancement in L2 Reading.


https://doi.org/10.1016/j.wocn.2014.09.001


https://doi.org/10.1017/S0140525X99001776


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LIST OF APPENDICES
Appendix A

Picture-naming task
Appendix B
Reading-aloud task

Say, _____ again.

Spoon
Banana
Avocado
Winter
Parents
Tiramisu
eyedrops
Switch
Trumpet
Broom
Trump
Screen
Broccoli
Grandpiano
Bronze medal
Block
Cherry Blossom
Trash can
Grandparents
Taylor Swift
Switzerland
Fridge
Swan
Squat
Bread
Squid
Brownie
Drone
Protein
Netflix
Flips
Brown rice
Flags
Stage
Coat
Stairs
Disneyland
Professor
Cheese
Chinese
Japanese
King
Spring
Clam
Palm
Vietnam
Juice
Goose
Starbucks
Thousand
Water drop
Book
Peacock
Closet
Clock
Goat
Bed
Microwave
Stove
Orange
Appendix C
Language background

Name____________________

1. Age (in years):

2. Country of origin:

3. Country of residence:

4. First language (s):

5. Second language (s):

6. How long have you been learning the second language(s)?

7. How have you been learning or learned the second language(s)?

8. In which languages did you receive instruction at school?

   Primary/Elementary School: Secondary/Middle School:
   High School: College/ University:

9. If you have lived or traveled in other countries for more than three months, please indicate the name of countries, the length of stay, and the purpose.

10. Do you often use loanwords when you speak your first language(s)?
VITA

Education
B. A. Education, 2018, Waseda University, Tokyo