

# DO NATIVE-LANGUAGE LOANWORDS AFFECT SECOND-LANGUAGE SPEECH PERCEPTION?

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## ABSTRACT

Japanese has many loanwords from English that have different syllable structure from the source words, e.g., /sutoresu/ from English *stress*. To investigate whether the abundance of such familiar loanwords interferes with accurate perception of the English source words, native Japanese listeners were asked to count syllables in spoken English words that varied in the degree to which familiar loanword counterparts existed in Japanese. Results indicated that perceptual accuracy was not affected by how familiar listeners were with the loanwords in Japanese, nor by how familiar they were with the English source words. This suggests that loanwords, which are related to the English source words yet phonologically divergent from them, do not necessarily interfere with the perceptual processing of the source words in English.

**Keywords:** second-language speech perception, loanwords, word familiarity, syllable structure

## 1. INTRODUCTION

Accurate production and perception of rhythmic and prosodic properties of a second language (L2) are often difficult for non-native speakers. For example, native Japanese learners have difficulty accurately producing complex syllable structures in English words [1, 3]. They often distort the syllable structure by producing epenthetic vowels within consonant clusters or after word-final consonants. Likewise, Japanese learners have difficulty accurately counting the number of syllables in spoken English words, suggesting that they also *perceptually* distort the syllable structure of English words [2]. These difficulties arise because, unlike English, Japanese does not permit complex syllables. It has in fact been shown that the more complex the syllable structure is (i.e., the more consonants the syllable contains), the poorer the listeners' performance [2].

Meanwhile, another possible cause of the difficulty in L2 syllable production and perception may be lexical in nature. Specifically, Japanese has

many loanwords from English that have different syllable structure from the source words, e.g., /sutoresu/ from English *stress*. Such loanwords occur very frequently in Japanese, and Japanese speakers are likely exposed much more often to the loanwords than to the source words. Loanwords are transcribed using katakana syllabary, which is different from the hiragana and kanji orthography used to transcribe other Japanese words. As such, Japanese speakers can easily tell if a word is a loanword nor not. Moreover, since most Japanese speakers undergo at least six years of English education in secondary school and college, they can often identify what the source word is if the loanword came from English. Given these circumstances, it is possible that Japanese speakers have established a link between loanwords and their source words, and that loanwords somehow influence how accurately Japanese speakers produce and perceive the source words.

The first purpose of the present study is to examine whether Japanese listeners' ability to count syllables in spoken English words varies as a function of familiarity with loanword counterparts of the English words. This was done by asking Japanese listeners to count syllables in English words that differed in the familiarity of the loanwords. The second purpose of the present study is to examine whether listeners' performance varies as a function of familiarity with the English words themselves. This was done by comparing performance among English words that differed in familiarity for Japanese listeners. Since syllable structure strongly affects listeners' performance (see [2]), comparisons were made across words that had the same syllable structure.

## 2. METHODS

### 2.1. Participants

A group of 30 native Japanese college students who had no prior experience living in English-speaking communities for more than three months and no speech or hearing disorders were recruited

for paid participation (16 males, 14 females, mean age = 21.7). The participants underwent at least six years of English education in second school and college, which focuses on grammar rather than oral communication. Most participants were psychology majors, and a few ( $n=3$ ) were English majors.

## 2.2. Stimulus materials

English words used in the present study were 1-4 syllables in length, and consisted of a number of "word sets". Each word set was carefully constructed so as to meet the following two conditions: (1) The words had the same syllable structure, i.e., the same sequence of vowels and consonants, e.g. *spring*, *spread*, *sprig*, all having a CCCVC structure. (2) Each set contained the following three types of words differing in word familiarity (see Table 1): (A) high source word familiarity / high loanword familiarity words: English words that were expected to be familiar to Japanese listeners, and whose loanword counterparts were also expected to be familiar to Japanese listeners (e.g., *spring*), (B) high source word familiarity / low loanword familiarity words: English words that were expected to be familiar, but whose loanword counterparts were expected to be relatively unfamiliar (e.g., *spread*), and (C) low source word familiarity / low loanword familiarity words: English words that were expected to be relatively unfamiliar, and whose loanword counterparts were also expected to be relatively unfamiliar (e.g., *sprig*). Comparison of word types A and B allows assessment of the effect of *loanword familiarity* on listeners' performance, while comparison of word types B and C allows assessment of the effect of *source word familiarity*. There were 57 word sets, and 189 words in total. Most word sets consisted of one word for each word type (A-C), but some word sets contained multiple words for a given word type. Table 1 shows sample word sets<sup>1</sup>.

All test words were read aloud by a female native speaker of American English. Each word was saved into a separate audio file (44100-Hz sampling rate and 16-bit resolution).

In addition, two separate paper questionnaires were prepared to obtain familiarity ratings for the 189 English source words and their loanword counterparts. In each questionnaire, the 189 English words or their loanword counterparts were listed in a random order, along with each word's

definition in Japanese. Loanwords were transcribed in Japanese katakana syllabary. For loanwords that existed in Japanese, they were transcribed as they are ordinarily. For English source words that did not exist as loanwords in Japanese, they were transcribed by analogy with existing loanwords.

**Table 1:** Top half: three word types (A-C) and their expected source word familiarity and loanword familiarity. Bottom half: sample word sets and their syllable structure (c=consonant, v=vowel). Each row comprises a word set.

Familiarity	Word type		
	A	B	C
Source wd	high	high	low
Loanword	high	low	low
Syll. struc.			
cvcc	<i>test</i>	<i>past</i>	<i>zest</i>
cvc	<i>bed</i>	<i>did</i>	<i>thud</i>
cvcvc	<i>hiking</i>	<i>baking</i>	<i>lining</i>
ccvccvc	<i>Christmas</i>	<i>greatness</i>	<i>fruitless</i>
cvccvccvc	<i>basketball</i>	<i>successful</i>	<i>disruptive</i>
cvccvccvcv	<i>helicopter</i>	<i>difficulty</i>	<i>benefactor</i>

## 2.3. Procedure

Participants were first given a brief text description of English syllables, after which they participated in 8 practice trials. Practice trials used words that differed from the test words. Practice trials were identical to the test trials except that participants were given immediate feedback about their response; if participants responded incorrectly, they repeated the same trial until they responded correctly. After the practice, participants performed 189 test trials. On each trial, participants heard an English word presented through headphones, and counted the number of syllables in it by clicking one of 10 buttons labeled "1" to "10" on the computer screen. Participants were able to listen to the stimulus multiple times, but they were discouraged from doing so. The 189 English words were presented once each in a random order. The test was self-paced; no feedback was given during the test.

Following the perception test, participants gave subjective familiarity ratings for each of the 189 English words and their loanword counterparts, on a 7-point scale from "1" (not familiar at all) to "7" (very familiar), by filling out the two questionnaires. The order in which participants filled out the two questionnaires was counter-balanced across participants.

### 3. RESULTS

One participant was excluded because she was found to have spent one year in an English-speaking community, and another participant was excluded because she misinterpreted the familiarity rating scale in the opposite direction. Data from the remaining 28 participants were analyzed.

Table 2 shows the mean source word familiarity, mean loanword familiarity, and mean syllable-counting accuracy for the three word types (A-C), based on all 189 test words. For type A words, mean source word familiarity (6.04) and mean loanword familiarity (6.66) were both high, as expected. For type C words, mean source word familiarity (1.95) and mean loanword familiarity (1.89) were both low, again as expected. However, for type B words, mean loanword familiarity (4.87) was somewhat higher than expected, while mean source word familiarity (5.83) was high, as expected. Mean perceptual accuracy was virtually constant across the three word types (approximately 65%).

**Table 2:** Mean source word familiarity, mean loanword familiarity, and mean syllable-counting accuracy for the three word types (A-C), based on all 189 test words. Standard deviations are in parentheses.

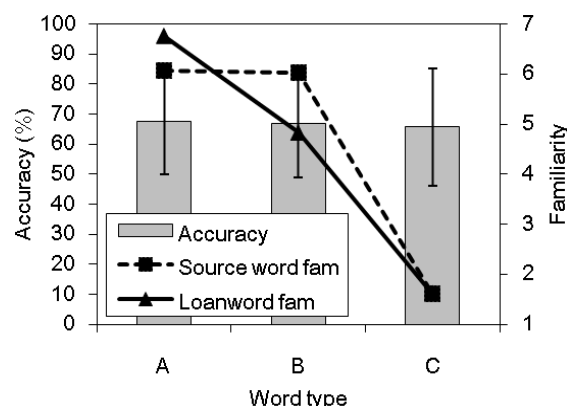
Word type	Source word fam.	Loanword fam.	Accuracy (%)
A	6.04 (0.65)	6.66 (0.46)	65.0 (18.0)
B	5.83 (0.94)	4.87 (1.07)	65.0 (20.0)
C	1.95 (0.97)	1.89 (0.79)	64.5 (18.3)

A closer look at familiarity ratings for individual word sets revealed that not all word sets followed the expected pattern of familiarity difference across the three word types as shown in Table 1. To conduct analyses only using word sets that followed the expected pattern, word sets that did not meet the following three criteria were excluded: (a) type A words with both source word and loanword familiarity higher than 5.0, (b) type B words with source word familiarity higher than 5.0 and loanword familiarity greater or equal to 3.0 and less than 6.0, and (c) type C words with both source word and loanword familiarity lower than 3.0. Of the 57 word sets (189 test words), 34 word sets (106 test words) met these criteria.

Fig. 1 shows the mean syllable-counting accuracy along with the mean source word and loanword familiarity ratings for the three word types, based on the 106 test words that met the above criteria. The figure clearly shows that even though source word familiarity and loanword

familiarity vary substantially across the three word types, mean syllable-counting accuracy are very similar (67.6% for type A words, 66.7% for type B words, and 65.8% for type C words). A one-way ANOVA indicated no significant difference in accuracy across word type [ $F(2,103) < 1$ , n.s.].

**Figure 1:** Mean syllable-counting accuracy, mean source word familiarity, and mean loanword familiarity for the three word types (A-C), based on 106 test words that met the expected pattern of familiarity difference in Table 1.



To further examine whether word familiarity is at all related to perceptual accuracy, Table 3 shows pairwise correlations among accuracy, source word familiarity, and loanword familiarity based on all 189 test words. As the table shows, accuracy was not correlated with source word familiarity ( $r=.035$ , n.s.) nor with loanword familiarity ( $r=.005$ , n.s.). However, the two familiarity ratings were highly correlated with each other ( $r=.880$ ,  $p < .001$ ).

**Table 3:** Pairwise correlations among accuracy, source word familiarity, and loanword familiarity based on all 189 test words.

	Accuracy	Source fam.	Loan fam.
Accuracy	1.000	.035	.005
Source fam.	–	1.000	.880*
Loan fam.	–	–	1.000

\* $p < .001$

Given that perceptual accuracy seems to be unaffected by word familiarity, it is possible that accuracy was affected by other factors, e.g., those pertaining to syllable structure, cf. [2]. To examine this, Table 4 shows correlations between accuracy and factors related to the syllable structure of the source words, and the number of moras in the loanwords. Number of consonants was counted separately for word-initial, word-medial, and word-final consonants. Vowel type had three possible values: “1” for “short” vowels /ɪ

ε Λ ʊ ə/, “2” for “long” vowels /i: æ α: ɔ: u:/, and “3” for diphthongs. Correlations are shown for 1-syllable words ( $N=78$ ) and 2-syllable words ( $N=78$ ), for which sample size was sufficient.

**Table 4:** Correlations between accuracy and various factors. The first five factors pertain to the syllable structure of the source words. The last factor is the number of moras in the loanwords. “#”=“number of...”, “C”=consonant, “V”=vowel.

Factor	1-syllable words	2-syllable words
# initial C	-.490***	-.275*
1st V type	-.360**	.109
# medial C	-	-.042
2nd V type	-	-.038
# final C	.141	.016
# moras	-.555***	-.187

\*\*\* $p < .001$ , \*\* $p < .01$ , \* $p < .05$

For 1-syllable words, accuracy was significantly negatively correlated with the number of initial consonants ( $r = -.490$ ,  $p < .001$ ) and vowel type ( $r = -.360$ ,  $p < .01$ ), but not with the number of final consonants ( $r = .141$ , n.s.). Accuracy was also correlated with the number of moras in the loanwords ( $r = -.555$ ,  $p < .001$ ). For 2-syllable words, accuracy was significantly negatively correlated only with the number of initial consonants ( $r = -.275$ ,  $p < .05$ ).

#### 4. DISCUSSION AND CONCLUSION

Results from the present study indicate that native Japanese listeners' ability to count syllables in spoken English words is not affected by how familiar they are with loanword counterparts of those words in Japanese, nor by how familiar they are with the English words themselves. These results suggest that even though there are many loanwords in Japanese whose syllable structure diverge from the English source words, and even though Japanese listeners are presumably aware that the loanwords originated from the source words, these loanwords do not necessarily interfere with the perceptual processing of the English source words. This potentially suggests that the native-language mental lexicon is not activated when processing spoken L2 words, at least for the present task. However, it is possible that the presentation of native-speaker productions of the L2 words in the syllable-counting task may have suppressed potential influences of L1 loanwords. If, instead, the Japanese speakers were, for example, to pronounce the English words in a speech production task without a native-speaker

model, the presence of familiar loanwords may perhaps negatively affect their productions.

Additional correlation analyses revealed that perceptual accuracy was affected by some factors related to the syllable structure of the English words, but not by others. Specifically, accuracy declined as the number of word-initial consonants increased, for both 1- and 2-syllable words, but accuracy did not decrease as a function of the number of word-medial or word-final consonants. These results agree with previous findings, e.g., [2], and support the claim that the perceptual effects of speech sounds in different within-word positions are asymmetric, such that word-initial consonants exert a much greater effect on perception than do consonants in other positions

From a practical standpoint, results from the present study suggest, somewhat counter-intuitively, that the abundance of Japanese loanwords from English does not necessarily have a negative impact on Japanese speakers' perceptual skills in English. Further research is needed, however, to more fully understand how the L1 and L2 mental lexicons are related, and how they affect speech perception and production in L2.

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<sup>1</sup> A fourth condition (high loanword familiarity / low source word familiarity) was not included in the present study because the three conditions used here were sufficient to assess the effect of loanword familiarity and source word familiarity, and because an attempt was made to minimize the burden on participants.