



## The investigation of suprasegmental transfer by American learners of Japanese

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### Abstract

This research examines second language acquisition (SLA) of English speakers learning Japanese by investigating how acoustic features of the first language influence the learners' pronunciation. Acoustic features concerned here are phonetic elements of word prominence. Beckman (1984) claims English is considered a stress-accent language in which prominence is indicated by the combination of pitch and loudness, whereas Japanese is a pitch-accent language in which prominence is solely indicated by pitch. Based on these studies, both pitch and loudness seem to appear in prominence of the learners' pronunciation, whereas only pitch is involved in that of Japanese speakers', which indicates phonetic transfer.

The data consisted of recordings of ten Japanese words pronounced by six American learners and three native Japanese speakers. Pitch and loudness of all vowels in each word were measured using Praat. Correlation between the highest pitch and loudness within the words was examined to compare pronunciations between English and Japanese.

The result showed that correlation between pitch and loudness in the learners' pronunciation was higher than that in Japanese speakers'. This research contributes to the study of sound acquisition which is less common in SLA and helps learners of a pitch-accent language to become more proficient in pronunciation.

**Keywords:** SLA, suprasegmentals, transfer, pitch-intensity correlation, pitch-accent vs. stress-accent language

### 1. Introduction

One difficulty in learning a second language is that the suprasegmental prosodic features of one's first language influence the pronunciation of the second language. For example, the correlation of pitch and intensity<sup>1</sup> in word prominence is observed more in

American pronunciation of Japanese words than by Japanese native speakers. While I have observed this in my own experience and in a pilot study, there is not much work on this topic. Therefore, I have conducted a study examining language transfer from American English to Japanese and pitch-intensity correlation in second language (L2) pronunciation of Japanese words.

The paper is organized as follows. Section 2 provides background information about second language acquisition research related to suprasegmental studies. Section 3 is about the experiment that examines whether Americans have this pitch-intensity correlation in their Japanese pronunciation. Section 4 will contextualize these results within the broader literature.

### 2. Second language acquisition of suprasegmental knowledge

Language transfer (interference) arises when prior knowledge from the first language (L1) structure influences the use of the second language (L2). While it is generally agreed that language transfer occurs in interlanguage development as Saville-Troike [1] says, it is important to remember that language transfer is not always based on structural similarities and dissimilarities between the two linguistic systems as Klein [2] says. According to Klein [2], it is important to examine how the learners process these structural properties in production and comprehension. One reason for this is that a specific second language structure might be easy to perceive for the learner but at the same time difficult to produce. For instance, German lacks interdental fricative consonants [θ] and [ð] which are present in English (e.g., *think* [θɪnk], and *that* [ðæt]). German learners of English may realize that these sounds are uncommon in their L1. However, they might have difficulties in pronouncing them, and replace them by the sounds that are considered similar by German speakers: [d]. That is, German beginner learners of English may pronounce [dat] as *that* [ðæt] in English. This paper also supports this idea in that even though

the word forms that are used in Japanese are the same as English, the learners do not necessarily produce the Japanese words in the way Japanese speakers do. For example, *sushi* is a word in both Japanese and English, but the stress is different in each language: the first vowel in English (SUshi), whereas the second vowel in Japanese (suSHI).

For American learners, especially, Ayusawa [3] claims that Japanese pitch-accent contrasts and phrasal intonation are known to be challenging in both perception and production. This might be explained by the language categories indicated by Beckman [4] that English is a stress-accent language in which prominence is indicated by the combination of pitch, intensity, and Japanese a pitch-accent language in which prominence is determined solely by pitch. Therefore, this phonetic difficulty to acquire might cause English suprasegmental features to be transferred to Japanese, and that is shown by the correlation between pitch and intensity in pronunciation of Japanese words.

### **3. A study of pitch/intensity correlations in American learners of Japanese**

This study examines correlation between pitch and intensity of word prominence of L2 American English learners of Japanese. Phonetic language transfer is likely to occur in their pronunciation of Japanese words where English-like pitch and loudness may influence their pronunciation of Japanese. As both pitch and intensity are used to mark the prominence, the place of highest pitch and intensity should overlap in each word. Drawing on three facts above that (i) is based on the general notion of language transfer occurring in interlanguage development, (ii) language transfer is likely to appear when the learners' L1 is dissimilar to their target L2, and (iii) Japanese intonation is difficult for American learners to be acquired due to the suprasegmental prosodic differences between them. Saito and Wu [5] cites a claim made by Ellis [6] and claims that L2 development including intonation starts at the point of becoming conscious of differences in L2 input. However, it is much more difficult to become consciously aware of discrepancies in intonation than in lexical usage as Klein mentions [2]. That is, it can be difficult for L2 learners to become aware of suprasegmental differences (e.g., intonation) from their L1. With regard to L2 Japanese, Shport [7] claims that along with the pedagogical traditions and time constraints in a second language classroom, learners of Japanese are almost never explicitly taught pitch patterns. As a result, even advanced learners of Japanese rarely acquire the pitch-accent contrasts. In

addition, I had been auditing a first-year Japanese class at the University of Montana and found that the instructor explained the pronunciation of Japanese in terms of the sounds and their sequences in words without referring to its intonation. In my study, I presented a set of ten words in katakana and had Japanese learning English speakers read them. I then analyzed the pitch and intensity of their responses. I predict a correlation between pitch and intensity.

#### **3.1. Participants**

Six English learners of Japanese were recruited from a second-year Japanese class at the University of Montana. Only one of them was male and the rest were females. Their age ranged from 18 to 33 and all of them were born and grew up in the United States. Three of them were from Montana, and the rest were from Georgia, Colorado and Alaska. Although there may be some dialect variation, these differences are small in comparison with the difference between English and Japanese, so these learners should be relatively similar in their pronunciation. In addition, as long as I observed, none of the participants spoke strong accent, so I treat their English as standard one. Although all the participants are learning Japanese in a second-year class, learning experience of Japanese was varied; a year and a half as minimum and seven years as maximum.

Control group consisted of one male and two female native Japanese speakers who came to the University of Montana as exchange students. Their age range was from 20 to 23, and they were born in Japan and from Tokyo. Moreover, none of them have lived in America more than a year, thus their Japanese is assumed to be not strongly influenced by English.

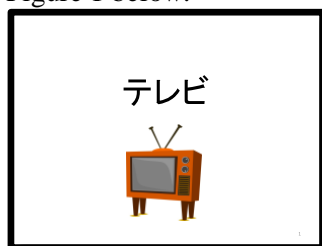
#### **3.2. Method**

First, the participants were asked to fill in the sheet of demographic survey which is about personal information including age, sex, country of birth, home city, native language, dialect and how long they have been studying Japanese. After that, a list of 10 Japanese words printed on a sheet of paper was given to them. Table 1 below represents the word list.

**Table 1:** 10 Japanese words used in the experiment

Word	Katakana	Romaji	Accent
TV	テレビ	terebi	TErebi
chair	いす	isu	iSU
bullet train	しんかん せん	shinkansen	shinKANsen
present	プレゼン ト	purezento	puREzento
sushi	すし	sushi	suSHI
credit card	クレジッ トカード	kurejittokaado	kurejittoKAAdo
Pikachu	ピカチュ ウ	pikachuu	piKAchuu
Montana	モンタナ	montana	montana
manga	まんが	manga	manga
karaoke	カラオケ	karaoke	karaoke

The words in the list except モンタナ ‘Montana’ and ピカチュウ ‘Pikachu’ were from the textbook that the participants had used in their first-year class and knew the pronunciation. I added the two words, モンタナ, which is loaned from English to Japanese, and ピカチュウ, which is borrowed from Japanese to English to examine whether the learners can use their knowledge that they learn in their class, and correctly pronounce such loanwords that they did not learn in a class. I made sure whether the participants knew all the words before recording and did not pronounce the words for them to avoid them mimicking my pronunciation. In fact, all the learner participants were familiar with every word on the list. After looking through it for several minutes, the participants were requested to pronounce each word that was shown with a picture which described the word on a computer screen. An example is shown in Figure 1 below.



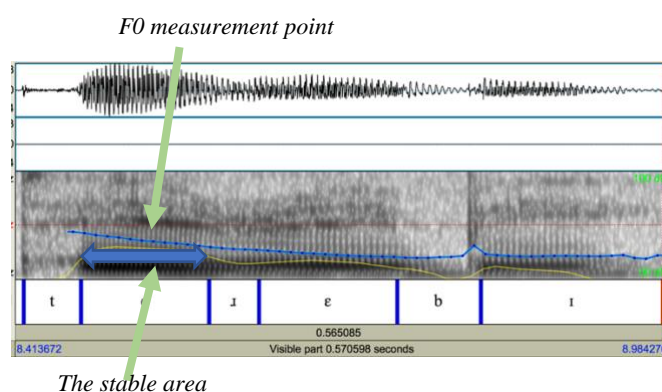
**Figure 1:** The slide which represents テレビ ‘television’ and its picture.

After each slide, a blank slide was shown and the subject pronounced the word again with no word and picture on the screen so that more natural intonation of Japanese pronunciation could be gained. Japanese native speakers also participated in the same experiment as control group. To avoid being influenced by pitch effect of pragmatics, words, not sentences, were chosen to be pronounced separately. Note that the learners do not necessarily locate the

word prominence correctly in these Japanese words. However, this research only focuses on correlation between pitch and intensity, not the acquisition of pitch accent, therefore the place where pitch is put is ignored in this study. I will discuss this in later section.

### 3.3. Tables

Phonetic analysis was conducted by using an acoustic devise called Praat by Boersma and Weenink [8]. Pitch ( $F0^2$ ) and intensity (dB) of each vowel in a word are measured by plotting the middle point of the stable part of the vowel (see the Figure 2 below). Then, how much the place of the highest pitch and intensity correlates is observed to see the phonetic language transfer, and how many times that correlation occurred in 10 Japanese words used in the experiment was listed (see the Tables 2 in the next section). Note that the annotation in Figure 2 is exactly what the participant A pronounced the word, not the Japanese pronunciation, so there are some phonemes that are not included in Japanese phonetics actually.



**Figure 2:** The sound wave of the participant A pronouncing テレビ ‘television’

### 3.4. Results

Tables 2 below shows number of words showing correlation between pitch and intensity. In Table 2a, the subjects were all English learners of Japanese, and everyone but Subject F was female. The correlation column shows how many words the highest pitch and intensity were observed in 10 Japanese words that were used in the experiment. For instance, the participant A had seven out of 10 words that had pitch-intensity correlations. This means that the highest pitch and the highest intensity were observed on the same syllable in the seven words. The Table 2b illustrates pitch-intensity correlation by Japanese native speakers. The subjects from b to d were all

Japanese native speakers in control group, and only the subject c was male and the others were female.

**Table 2:** Pitch-intensity correlation of Japanese words pronounced

(a) American learners		(b) native Japanese speakers	
Subject (n=6)	Correlation	Subject (n=3)	Correlation
A	7	a	5
B	5	b	4
C	8	c	4
D	7	MEAN	5
E	5		
F	6		
MEAN	6.33		

As shown in Tables 1, the correlation between pitch and intensity appeared more in the case of American learners of Japanese than that of Japanese native speakers with regard to the mean (6.33 in American learner's whereas 5 in Japanese native speaker's). Result of a T-test showed that the difference between the results of both groups was significant ( $P < 0.01$ ). Therefore, pitch and intensity tend to correlate in the pronunciation by American learners, whereas such a correlation is less likely to occur in that by Japanese native speakers. That is, suprasegmental transfer of higher intensity on prominence from English to Japanese tends to occur, since both pitch and intensity appeared more in the prominence in the learners' production like in English.

I considered why there is the correlation difference between American learners and native Japanese speakers, and one possible cause is Japanese *heiban*, which is specific to Japanese. As I mentioned, English is a stress-accent language and all the words have accent (prominence), on the other hand, Japanese is a pitch-accent language and the words are categorized into two types; those having an accent in the word, and those with no accent (no word prominence, called *heiban* in Japanese). Three words out of 10 had no accent, and the other 7 words having accent. The tables 3 represents the number of pitch-intensity correlations as well as the tables 2.

**Table 3:** Pitch-intensity correlation of Japanese words (No Accent vs. Accent)

(a) American learners

Subject (n=6)	Correlation No Accent	Correlation Accent
A	2	5
B	0	5
C	3	5
D	3	4
E	1	4
F	1	5
MEAN	1.66	4.66

(b) native Japanese speakers

Subject (n=3)	Correlation No Accent	Correlation Accent
a	1	5
b	1	4
c	0	4
MEAN	0.66	4.33

That is for words with no accent, the mean pitch-intensity correlation was higher for American learners than native Japanese speakers. However, for words with accent, there was not a large difference between learners and native speakers. This indicates no accent form (*heiban*) were the most sensitive to L1 language interference. However, the words used in this experiment are too limited and T-test did not show a significant difference, thus more work is needed on this topic.

#### 4. Conclusions

In this paper, I investigated the suprasegmental language transfer from Japanese to English. My hypothesis was that based on Beckman's claim of Japanese and English being categorized into different suprasegmental types, American learners of Japanese pronounce a Japanese word with pitch-intensity correlation, which indicates the suprasegmental transfer. The research of six American English learners and three native Japanese speakers supports my hypothesis; the suprasegmental language transfer tends to occur from English to Japanese.

In addition to the pitch-intensity correlation, there was a tendency for American learners to place the most salient emphasis in Japanese on a different syllable from Japanese native speakers. In addition, in the case of loanwords both from English to Japanese and from Japanese to English, most of the American learners put the salient part to the same place where they place them in English. For example, all of them pronounced 'sushi' indicating the first vowel as the most salient part as they do in English, though the second syllable is more salient in Japanese. Therefore, there are multiple types of language transfer other than phonetic correlation that should be studied more in the future.

These results have application for L2 learning. As I mentioned in the section 3, intonation in Japanese is rarely taught in the language class as Shport [7] says. That is, most learners might not be aware of the difference between English and Japanese with regard to intonation. If this assumption is right, the result may support the claim made by Saito and Wu [5] that L2 development with suprasegmentals starts at the point of becoming conscious of differences in L2 input, since it can be explained that the participants seemed to use English correlation more to produce Japanese words because have not become conscious of Japanese having very different intonation system from English one regardless of their language learning experiences. Thus, it is crucial for learners to be aware of the differences in languages for the development of their L2. However, Klein [2] claims that it is much more difficult to become conscious of differences in intonation than lexical usage. It indicates learners might not be able to apprehend what is distant in Japanese from their L1 by themselves. Thus, language instruction plays an important role in acquiring proficiency in intonation. The teachers should not only focus on the Japanese phonemes themselves, but also explain that Japanese is a different language in terms of using mainly pitch not intensity. They are also advised to help the students to become cognizant of and pay attention to the intonation property in Japanese, which is important to become advanced level. These methods can be applied to other pitch-accent language teachers and learners such as Korean. That will help the learners of pitch-accent language who speak non-pitch accent language natively to reach a high-level of pronunciation proficiency.

In this study, data from six American English learners and three native Japanese speakers supports the hypothesis that the suprasegmental language transfer tends to occur from English to Japanese. Moreover, that prosodic transfer was observed regardless of how long the learners have been studying Japanese, which might indicate that the learners have not been aware of suprasegmental difference between English and Japanese in the first place. However, Japanese intonation is rarely taught in the language class as Shport [7] mentions, and it is more difficult for learners to comprehend the L2 suprasegmentals than

other structures in L2 as Klein [2] says. This preliminary experiment's result as well as the claim made by Shport and Klein, it is advised that learners would receive instruction regarding suprasegmentals in Japanese in order to assist them with becoming conscious of this aspect in Japanese. The differences of pitch range and place of the most salient part in a word are also mentioned, though briefly. More studies in this area will help understand this tendency. In sum, I hope this research gives an insight to other L2 researchers in exploring suprasegmental acquisition in learners of various languages for more advancement of the field.

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<sup>1</sup> Pitch is the perceptual correlate of the frequency of a sound, and intensity is the amount of energy carried by a sound wave as Trask says [9].

<sup>2</sup> According to Trask [9], F0 is fundamental frequency. It is typically the most prominent frequency produced by a vibrating body. F0 is fundamental frequency. It is typically the most prominent frequency produced by a vibrating body.