

# Effects of Pronunciation Practice of the English /æ/ Sound Utilizing the Japanese Contracted Sound [mjæ]: Type Frequency in Terms of Distributional Variety and the Effects of Practice with Increased Distributional Type Frequency

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## Abstract

It is generally observed that while Japanese-speaking learners of English feel they can pronounce *cat* and *cap* easily, they cannot easily pronounce *mat* and *map*. This article argues that the reason for this general observation may lie in the differences of applicability of the Japanese contracted sounds *kya* ([kjæ]) and *mya* ([mjæ]) in English pronunciation: while [kjæ] is readily applied in pronouncing *cat* and *cap*, [mjæ] is not easily applied in *mat* and *map*. This article also argues that the difference of applicability between these Japanese contracted sounds is caused by the differences in distributional variety of these respective sounds in Japanese: while [kjæ] has a rich variety, [mjæ] has only a limited variety. Based on this reasoning, it can be hypothesized that applicability of the [mjæ] sound in English pronunciation can be raised by practicing the sound with its increased distributional variety. Results of this practice through a quasi-experiment with Japanese university students are reported in this article showing the favorable but limited effects of the practice.

## 1. Introduction

It has been pointed out that Japanese-speaking learners of English can pronounce such words *cat* and *cap* relatively easily but they cannot pronounce words such as *mat* and *map* easily (Matsuzawa, 2004, p. 68). Actually, the first test of pronunciation of these words administered in a quasi-experiment with twenty-six Japanese university students, which will be elaborated in due part of this article, shows that while *cat* and *cap* are pronounced with the /æ/ sound more than 88% of the chances, *mat* and *map* are pronounced with the Japanese /a/ sound instead of the /æ/ sound 100% of the opportunities.

It may be reasonable to suppose that Japanese-speaking learners of English apply the Japanese contracted sound *kya* (/kja/) in the pronunciation of *cat* and *cap* and thus they feel

they can easily pronounce them. As a matter of fact, Japanese loan words from English which begin with *kya* are pronounced with the /kja/ sound (e.g. *kyatto*, *kyappu*), and, therefore, the sound is applied in pronouncing English words such as *cat* and *cap*. It must be stressed here that the /a/ sound in /kja/ tends to be pulled a bit forward after the /j/ sound and assumes the quality of the /æ/ sound (Makino, 2005, p. 29). Thus, phonetic description of /kja/ is [kjæ]. This means that Japanese-speaking learners of English usually pronounce *cat* and *cap* [kjæt] and [kjæp] rather than /kæt/ and /kæp/.

Although it may be a point of argument to decide to what extent the [kjæ] sound can be an acceptable alternative to the /kæ/ sound and, of course, it is a matter to decide empirically, it is at least possible to claim that the [kjæ] sound is a far better alternative than /ka/: /kat/ is no more acceptable pronunciation of *cat* than /mat/ is acceptable pronunciation of *mat*. It should also be noted that very accurate pronunciation of English is not needed for every learner of English. This is in harmony with the claim by Jenkins (2000, p. 17) that promoting mutual intelligibility is far more important than “pushing learners of English to attempt to approximate an L1 accent too closely,” recognizing the growing nature of English as an international language. This is especially the case with Japanese elementary school teachers who are expected to engage in “English activities” with their students since they are too busy to learn English pronunciation systematically.

*Kya* ([kjæ]) is not the only contracted sound in Japanese: it also has *mya* ([mjæ]) among others.<sup>(1)</sup> Then a question may arise why it is the case that while the Japanese contracted [kjæ] sound is applied in English pronunciation, the contracted sound [mjæ] is not. It seems possible to find an answer to this question by investigating the distributional differences of these two contracted sounds in Japanese phonological environments. This is to be discussed in the section to follow.

## 2. Phonological Distributional Differences of [kjæ] and [mjæ] in Japanese

In order to examine to what extent each of the contracted sounds [kjæ] and [mjæ] is used in various phonological contexts in Japanese, the number of different syllable sounds immediately following each contracted sound is counted by looking up the entry words in *Nihon Kokugo Dai-Jiten (Japanese National Language Large Dictionary) (2<sup>nd</sup> Version)*.

The result of this investigation has revealed a striking difference in phonological distributional richness between these two contracted sounds: while [kjæ] takes as many as forty-three different syllable sounds immediately after it, [mjæ] takes only six (Yamaoka, in press). These six words having the initial contracted [mjæ] sound are *myaa*, *myao-zoku*, *myaku*, *myasukofusukii*, *myanmaa*, and *myakkan*. Of these six words, *myaa* is the crying sound of a cat (*meow*), *myao-zoku* begins with a proper noun (tribe name: *Miao*), *myasukofusukii* is also a proper noun (name of a composer: *Myaskovsky*), and *myanmaa* is

once again a proper noun (name of a country: *Myanmar*), all of which are not expected to be used very frequently in daily conversation. Of the remaining two words, *myakkan* (*blood vessel*) is a kind of variation of *myaku* (*pulse*) and it may be very infrequent in use. Thus, it may be safe to say that the initial [mjæ] sound is used on a daily basis almost only in words beginning with *myaku* such as *myaku-haku* (*pulsation*), *myaku-dou* (*pulsation*), etc. including *myaku* itself.

What influence does this difference in phonological distributional variety have in the learning of English pronunciation? This is the theme to be tackled in the following sections.

### 3. Type Frequency in Terms of Distributional Richness

In his Usage-Based Model of language learning, Tomasello (2003) has introduced an important distinction between token frequency and type frequency. Both of these two terms are concerned with the frequency of a linguistic instance experienced by the learner. This distinction refers to the different natures of frequency: token frequency refers to the frequency with which the same specific instance appears in input and type frequency indicates the frequency with which different instances of the same construction appear in input. It is claimed that token frequency contributes to entrenchment of the instance and type frequency brings about abstraction and generalization of the construction.

Some examples may be in order here to show the different contributions of token and type frequency in language learning. English past irregular verbs appear individually and are learned item by item early in learning because they are all rich in token frequency. In contrast, English past regular verbs appear formalized in many different verbs and thus the general pattern of the past regular is learned since the pattern is rich in type frequency.

While token frequency and type frequency both refer to the frequency of occurrence of a linguistic instance itself, it may seem possible to extend the notion of type frequency to the richness of environmental contexts in which a linguistic item can appear. Some linguistic items may occur in a variety of linguistic contexts and others may occur only in a limited number of contexts. For instance, on the phonological level of English, the word initial cluster of sounds /sæ/ can take at least sixteen different phonemes after it, while the word initial cluster of sounds /zæ/ can only take four different phonemes after it.<sup>(2)</sup>

If a linguistic item appears in a variety of contexts like /sæ/ does, we may say that it has a high distributional type frequency. In contrast, if an item can appear only in a restricted number of contexts like /zæ/ does, we can say that it has a low distributional type frequency. This extended definition of type frequency in terms of distributional richness has predictions that high type frequency guarantees generalization of its distributional contexts and that low type frequency entrenches and freezes its distributional contexts.

It seems quite plausible that the idea of distributional type frequency can be applied to

the distributional differences of the two Japanese contracted sounds [kjæ] and [mjæ] in Japanese as discussed in the previous section: while [kjæ] is rich in distributional type frequency, [mjæ] is low.

#### **4. Distributional Type Frequency and Second Language Learning**

Distributional type frequency defined above describes the distributional richness of a linguistic item in a particular language. Then, it is an interesting question whether or not distributional type frequency in the native language of a second language learner exerts any influence in the learning of the target language. In this regard, it seems possible to explain the asymmetrical phenomena of the two Japanese contracted sounds [kjæ] and [mjæ] discussed earlier in this article in terms of distributional type frequency of them. In other words, we can suppose that, on the one hand, it is easy for Japanese-speaking learners of English to apply the [kjæ] sound in pronouncing English words because it has a high distributional type frequency in Japanese and generalization of its distributional contexts may also be extended to English. On the other, it is not easy for them to apply the [mjæ] sound in learning English because it has a low distributional type frequency in Japanese and its restrictive entrenchment of distributional contexts may also restrict the applicability of the sound in English.

Based on the argument so far, it may be conceivable that the applicability of the Japanese [mjæ] sound in English can be increased by raising its distributional type frequency. The reasoning goes as follows: while Japanese-speaking learners of English have the contracted [mjæ] sound in Japanese which can potentially be an alternative to the English [mæ] sound, the contracted sound is low in distributional type frequency in Japanese and thus its applicability is also restricted in learning English, but the applicability may be heightened by deliberately raising its type frequency. In the latter part of this article, results of a quasi-experiment focusing on this possibility are reported.

#### **5. Classification of English Words Beginning with Initial Single Consonants + /æ/**

Before going into the explanation of the quasi-experiment, it is necessary to classify English words having the /æ/ sound just after the initial single consonants into four classes according to whether or not corresponding similar contracted sounds are available in Japanese and whether or not the contracted sounds are applicable to English.

Table 1 shows the result of classification. Availability of corresponding similar contracted sounds is determined by checking the array of the Japanese contracted sounds and their applicability in English is judged on observational facts.

The five entries in Class I all have the corresponding similar contracted sounds in

Japanese (i.e. *kya*, *gya*, *cha*, *ja*, *sha*) and they are easily applied in English. Examples of Japanese loan words from English such as *kyanpu*, *gyappu*, *chatto*, *jamu*, *shanpuu* prove the applicability of the contracted sounds in English. The four entries in Class II all have the corresponding similar contracted sounds in Japanese (i.e. *pya*, *bya*, *mya*, *rya*) but they are not easily applied in English. Note that Japanese loan words belonging to this class are pronounced replacing the /æ/ sound by the Japanese /a/ sound (e.g. *pakku*, *batto*, *matto*, *rakku*), and the Japanese /a/ sound is also likely to be applied in pronouncing English words such as *pack*, *bat*, *mat* and *rack*. Class III has six entries with no corresponding similar Japanese contracted sounds and thus no applicability.<sup>(3)</sup> The five entries in Class IV are unique in that all begin with consonants which are not used in Japanese and consequently they have no corresponding similar contracted sounds and no applicability.

Table 1 *Classification of English Words Beginning with Initial Single Consonants + /æ/ in Terms of Availability of Similar Japanese Contracted Sounds and their Applicability*

Class	Combination of Word Initial Single Consonant and /æ/	Availability of Similar Contracted Sound	Applicability of Similar Contracted Sound
I	/kæ/, /gæ/, /ʃæ/, /dʒæ/, /fæ/	Yes	Yes
II	/pæ/, /bæ/, /mæ/, /læ/	Yes	No
III	/tæ/, /dæ/, /næ/, /sæ/, /zæ/, /hæ/	No	No
IV	/ɹæ/, /tʃæ/, /væ/, /θæ/, /ðæ/	No	No

## 6. The Experiment

In order to examine the effects of practice of [mjæ] with its increased type frequency, a quasi-experiment was conducted with twenty-six Japanese university students (mostly sophomores) majoring elementary school education in their eight normal English classes in the first semester, 2007. These students were those not absent from any of the eight classes.

Four different packages of materials for practice were prepared utilizing three Japanese words beginning with [mjæ]. The common basic idea of these activities is to raise the distributional type frequency of [mjæ] by starting with one of the three Japanese words and then extending it into different distributional types making use of English words.

Each of the four activities consisted of three to four words to be practiced following a Japanese word in the order presented below.

### Activity 1

[mjæku] → [mjæk] (*Mac*) → [mjæt] (*mat*) → [mjæp] (*map*)

### Activity 2

[mjæmma:] → [mjæm] (*mam*) → [mjæn] (*man*) → [mjæŋgou] (*mango*)

### Activity 3

[mjæswkoφswuki:] → [mjæs] (*mass*) → [mjæʃ] (*mash*) → [mjætʃ] (*match*)

#### Activity 4

[mjæku] → [mjæk] (*Mac*) → [mjæg] (*mag*)  
→ [mjæt] (*mat*) → [mjæd] (*mad*)

It should be noted that arrangement of words in each activity was made to make the transition of articulatory movements as smooth as possible. The smoothness was attained by keeping the same manner of articulation (stop) and transiting the place of articulation consistently from back to front (velar → alveolar → bilabial) (Activity 1), keeping the same manner of articulation (nasal) and transiting the place of articulation consistently from front to back (bilabial → alveolar → velar) (Activity 2), transiting the place of articulation gradually upwards along the alveolar ridge and changing the manner of articulation from fricative to affricate (Activity 3), and turning unvoiced stops to voiced ones (Activity 4).

Each of these activities was given in the first fifteen minutes of the regular class for ninety minutes. In each activity, the participants received instructions to put a stress on the /æ/ sound in each English word and not to put an epenthesis at its end while looking at a sheet of paper on which these words were printed with their pronunciation represented with phonetic alphabets. The participants were reminded that the stress mark on the /æ/ sound in each English word indicated that the vowel should be pronounced very strongly.

The participants initially listened to the model pronunciation of the words by their teacher once and then they produced each word after the model while looking at the sheet. Then they received a different sheet of paper on which the same words were presented with pictures respectively describing the words and they listened to the model pronunciation once and then they imitated the model once. After that, the participants received a third sheet of paper on which only pictures describing the words were printed and they engaged in pair work of listening and producing these words looking at the sheet of paper.

Importantly, type frequency of the [mjæ] sound increased from its original six to eleven in these four activities and the participants experienced the sound in these varied contexts both receptively and productively. In order to examine the effects of the activities, three pronunciation tests were given to the participants. The first test was given before the treatment and it contained *cat, cap* (Class I, known to the participants), *mat, map* (Class II, *ma*-type) and two other words *canopy, camas* (Class I, unknown to the participants). The second test administered after the four activities contained *mat, map, man, match* (Class II, *ma*-type, practiced), *marry* (Class II, *ma*-type, non-practiced), *Paris, bad* (Class II, non-*ma*-type, non-practiced), *sad, happenings* (Class III, non-practiced) and *rap, fact* (Class IV, non-practiced) as well as *cat, cap* (Class I). The third test conducted two weeks after the second test included *mat, man* (Class II-1, *ma*-type, practiced), *magic, manners, matter* (Class II, *ma*-type, non-practiced), and *fact* (Class IV, non-practiced).

The three pronunciation tests were of the same format and were given to the participants in the same manner. They were invited individually to a quiet room and handed

a sheet of paper on which four short conversations between two persons were printed with respective pictures depicting the scenes. (See Appendix A) They were requested to read the conversations aloud. Each of their oral reading of these conversations was tape-recorded.

These three tests were intended to examine the followings issues:

- (1) Whether or not the Japanese contracted sound [kjæ] is applicable to Class 1 words unknown to the participants (*canopy, camas*)?
- (2) Whether or not and to what extent practice of [mjæ] with its increased distributional type frequency is effective for Class II *ma*-type words actually practiced (*mat, map, man, match*)?
- (3) Whether or not the effect of practice of [mjæ] is extended to Class II *ma*-type words which were not practiced (*marry, magic, manners, matter*)?
- (4) Whether or not the effect of practice of [mjæ] is extended to Class II non-*ma*-type words beginning with sound combinations other than *ma* (*Paris, bad*) and to Class III words (*sad, happenings*) both of which were not practiced?
- (5) Whether or not the effect of practice of [mjæ] is extended to Class IV words which were not practiced (*rap, fact*)?

All of these tests and activities (including Fifth Activity for general review) were given in the following order on the respective dates:

First Test: 19<sup>th</sup> and 26<sup>th</sup> of April, 2007

First Activity: 22<sup>nd</sup> of May, 2007 (*Mac* → *mat* → *map*)

Second Activity: 24<sup>th</sup> of May, 2007 (*mam* → *man* → *mango*)

Third Activity: 29<sup>th</sup> of May, 2007 (*mass* → *mash* → *match*)

Fourth Activity: 31<sup>st</sup> of May, 2007 (*Mac* → *mag* & *mat* → *mad*)

Second Test: 5<sup>th</sup> of June, 2007

Fifth Activity: 12<sup>th</sup> of June, 2007 (General review)

Third Test: 19<sup>th</sup> of June, 2007

## 7. Results and Conclusions

The results of the experiment are shown in Table 2. From Table 2, we can get the following answers to the five issues presented above:

- (1) The Japanese contracted sound [kjæ] is applicable to Class 1 words unknown to the participants (*canopy, camas*). Note although the percentage of pronunciation with /æ/ is not high for *camas*, 23% of the participants pronounced the word /kémæs/.
- (2) Practice of [mjæ] with its increased distributional type frequency is effective for Class II *ma*-type words actually practiced (*mat, map, man, match*).
- (3) Effect of the practice is moderately extended to Class II *ma*-type words which were not practiced (*marry, magic, manners, matter*).

Table 2 Percentage of Pronunciation Including the /æ/ Sound

Word Class	Target	1 <sup>st</sup> Test	2 <sup>nd</sup> Test	3 <sup>rd</sup> Test	Note
Class I (Known)	<i>cat</i>	100%(52/52)	100%(52/52)		
	<i>cap</i>	88%(46/52)	92%(24/26)		
Class I (Unknown)	<i>canopy</i>	79%(41/52)			
	<i>camas</i>	35%(18/52)			/éɪ/ : 23%(12/52)
Class II <i>ma</i> -Type (Practiced)	<i>mat</i>	0%( 0/52)	73%(38/52)	69%(18/26)	
	<i>map</i>	0%( 0/52)	81%(42/52)		
	<i>man</i>		75%(39/52)	81%(21/26)	
	<i>match</i>		69%(36/52)		
Class II <i>ma</i> -Type (Non-practiced)	<i>marry</i>		58%(15/26)		
	<i>magic</i>			69%(36/52)	
	<i>manners</i>			40%(21/52)	
	<i>matter</i>			42%(22/52)	
Class II (Non-practiced)	<i>Paris</i>		0%( 0/26)		
	<i>bad</i>		15%( 4/26)		
Class III (Non-practiced)	<i>sad</i>		8%( 2/26)		
	<i>happenings</i>		0%( 0/26)		
Class IV (Non-practiced)	<i>rap</i>		8%( 2/26)		
	<i>fat</i>		8%( 2/26)		
	<i>fact</i>			0%( 0/26)	

(Denominators of fractions in parentheses indicate the numbers of opportunities of producing the target words and numerators show the numbers of production with the /æ/ sound.)

(4) Effect of the practice is not extended to Class II non-*ma*-type words (*Paris*, *bad*) nor to Class III words (*sad*, *happenings*).

(5) Effect of the practice is not extended to Class IV words (*rap*, *fat*, *fact*).

From the results, we can conclude that (1) practice of [mjæ] with its increased distributional type frequency is effective for Class II *ma*-type words actually practiced, (2) the practice is also moderately effective for Class II *ma*-type words which were not practiced and (3) the practice is not effective for either Class II non-*ma*-type words, Class III words, or Class IV words.

These findings meet with the general claims made by proponents of the Usage-Based Model that language learning proceeds item by item and that it is only later and gradually



that generalization of any kind begins to appear.

### Notes

- (1) There are eleven contracted sounds ending with the /a/ sound in Japanese (i.e. *kya*, *sha*, *cha*, *nya*, *hya*, *mya*, *rya*, *gya*, *ja*, *pya*, *bya*). According to Hattori (1979, pp. 132-3), all these contracted sounds have the glide /j/ sound before /a/. Thus, the /a/ sound in these contracted sounds assumes the quality of /æ/.
- (2) /sæ/: *Sabuth*, *sacu*, *sacurdotal*, *sacuhet*, *sadu*, *saffron*, *sag*, *saluad*, *salmon*, *sand*, *sank*, *sap*, *sarabuand*, *sashu*, *sat*, *savuage*; /zæ/: *zag*, *Zambuia*, *Zanzibuar*, *zap*
- (3) Note that, in Japanese, *nya* is pronounced [ɲæ] rather than [næ] and *hya* is pronounced [çæ] rather than [hæ].

### Acknowledgment

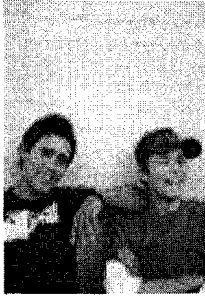
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Appendix A Second Pronunciation Test

1.



1.

A: Do you know the man?

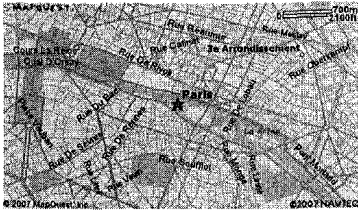
B: The man in a cap?

A: Yes.

B: Of course. I'm going to marry him.

He loves rap music!

2.



2.

A: Show me the map on the desk.

B: Sure.

A: Oh, this is a map of Paris.

3.



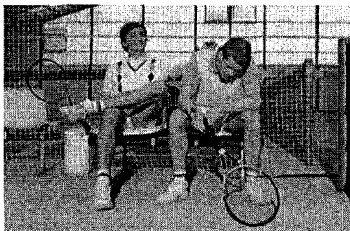
3.

A: Look at the cat on the mat.

B: Oh, it's a fat cat on a blue mat!

A: Yeah, she may be remembering  
the happenings of the day.

4.



4.

A: How was the tennis match?

B: It was a close match. But I lost it.

A: That's too bad.

B: Yes. I'm sad.