

[論説]

The phonemes of Japanese and English — A contrastive analysis study —

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Abstract

Contrastive analysis is the systematic study of the linguistic systems of two languages with a view to identifying their structural differences and similarities. Examining the phonetic inventories of the languages of Japanese and English this paper will first define and give descriptions of the phonemes of the two languages highlighting how this contrastive analysis may bring benefits or otherwise within the EFL classroom.

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1. INTRODUCTION

Fries (1945:259) claims that "...the most effective materials (for teaching an L2) are those based upon a scientific description of the language to be learned, carefully compared with a parallel description of the native language of the learner."

This paper will analyze the two languages of Japanese and English in terms of their phonetic inventories and look at how, as Lado (1957) implies, a teacher who has made a comparison of the foreign and native language of the students will be better equipped to deal with their anticipated problems and consequently provide better teaching for them. The paper will first give brief descriptions of the phoneme and the concept of contrastive analysis, and then attempt to contrast the phonemes of Japanese and English and finally conclude with a discussion on the merits or otherwise of contrastive analysis.

2. THE PHONEME

Briefly a phoneme can be described as a minimal contrastive sound unit of a language. Differences between these sound units matter because substituting one with another will create a different meaning and word as for instance the words 'pit' and 'bit'. A native English speaker would be able to recognize these two words as being different sounds and can distinguish them with ease. These examples can be described as the realizations of an abstract unit called a phoneme. In

this case the phonemes /p/ and /b/. As Gimson (1994) states it becomes possible to establish the phonemes of a language via the process of commutation or the discovery of minimal pairs, that is, words which are different only in respect to one unit or sound segment.

According to Richards et al (1993) there are forty four of these meaningfully different units in RP (Received Pronunciation), 24 consonants and 20 vowels although it must be stressed that these vary significantly among different varieties of English. Different realizations of phonemes are called allophones. For example the phoneme /k/ can have the following sounds or phones (ways of being pronounced) [k] as unmodified, with a little aspiration as [kh], with a large amount of aspiration as [kʰ], or it can be released inaudibly as [kʰ̚].

Roach (2000:40) comments on the pronunciation of the word 'bad', which can be pronounced with full or no voicing and suggests "We have in this example two different ways of making b - two different realizations of the phoneme. One can be substituted for the other without changing the meaning"

To qualify as allophones of the same phoneme, two (or more) phones, that is sounds must meet two criteria. First their distribution must be predictable: we must be able to state where one or the other will occur, and those sets of contexts must not overlap. If this happens,

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the two phones are said to be in complementary distribution. Secondly, if one phoneme is exchanged for the other in the same context, that substitution must not lead to a difference in meaning.

McMahon (2002) explains that even if you say kitchen cupboard with the [k] first and the [c] second another English speaker would only notice that there is something vaguely odd about your speech but that crucially she will understand you.

3. Contrastive analysis Hypothesis

Contrastive analysis is the structural comparison of two languages with respect to their phonologies, morphologies, syntax, lexicon and pragmatics. C/A has its roots embedded in behaviorist theory and as Ellis (1985:21) states "According to behaviorist learning theory, old habits get in the way of learning new habits ...The notion of interference has a central place in behaviorist accounts of SLA". This interference has been termed 'proactive inhibition'. This is concerned with the way in which previous learning prevents or inhibits the learning of new habits. L2 learners are thought to transfer all grammatical properties into the target language from the L1. Lado (1957) states that where the two languages have the same properties acquisition will be successful but when they differ speakers will apply L1 rules to the target language. The learner therefore has to overcome proactive inhibition.

Contrastive analysis however found itself vulnerable to attack with allegations concerning the reliability of contrastive analysis to predict errors. Questions arose regarding the feasibility in comparing languages and whether contrastive analysis had anything to offer language teaching itself.

However the fact that the majority of ESL / EFL students of English speak with an accent that differs from the target language can tell us something about the fact that the phonological sounds of their native language have some influence on the production of their second language. Ioup (1984) found that English native speakers could identify different groups of non-native speakers based on their accent alone and that pronunciation was a more reliable indicator of native language background than written or syntactic evidence.

In our native language we are accustomed to using a familiar range of sounds, intonation, and pitch. These form and give rise to our phonological competence

in our language. On the whole, these are applied unconsciously. However, when we approach new sounds and tones in a different language, we tend to approximate production of those sounds based on the sounds which we already have at our disposal. "Thus, the pronunciation errors made by second language learners are considered not to be just random attempts to produce unfamiliar sounds but rather reflections of the sound inventory, rules of combining sounds, and the stress and intonation patterns of their native languages" (Ohata, 2004:2)

Since the students we teach, AUHW 1st and 2nd year students take courses in English communication, are all Japanese native speakers and the purpose of this paper is to examine the phonemes of the two languages, we can perhaps be expected to find similar problems in pronunciation with our students in respect to negative phonological transfer. Jenkins (2000:99) states it "... must be based on an understanding of the process of phonological transfer and its effects, and the extent to which it is realistic to expect speakers to replace transferred items with other forms." This phonological transfer forms the core of this paper.

4. THE JAPANESE LANGUAGE

It can be argued that for a language that is perceived to be difficult to learn the Japanese sound system is relatively easy. Bada (2001:5) suggests "...sound wise, Japanese provides relatively a greater ease for the English speaker learning Japanese than the English system would to Japanese speakers." Not taking into account language variation (accent and dialect) there are five vowels and 17 consonant phonemes in Japanese compared with the English language total of 20 vowels and 24 consonants would perhaps contribute to this and contrastive advocates would suggest that such differences would lead to greater negative transfer to the target language.

Thompson (1990) states the Japanese language is based on syllables rather than a phonetic system. It's based on 5 vowel sounds that can occur with a number of consonants. Thompson (1990) suggests that

the Japanese syllable structure is generally accessible, consonant clusters are not commonplace and the syllabic order in Japanese is generally consonant plus vowel, or vowel alone. Japanese Vowels can be short or long, and can be located in the initial, the medial and final part of words. Most Japanese beginners of English therefore tend to attach vowels after English words which end in consonants. For example salad becomes 'salada' and book becomes 'buku', catch, 'catchi' and egg, 'egu'.

With low level Japanese students of English the

vowel o tends to be inserted after the English /t/, /d/, /h/ as in the word initial clusters, drama becomes 'dorama' and white becomes 'howaito'. For final consonants tent becomes 'tento' and card 'kaado'.

Finally u can be inserted in all other environments such as 'kurisumasu' (Christmas) and 'burokku' (block). The same can be said to apply to consonant clusters (which are rare in Japanese) where vowels are added after every consonant within a consonant cluster, for example the word film becomes 'filumu' and swan becomes 'suwan'.

Hirayama (2003) gives examples of the insertion of i following /ʃ/, /tʃ/, /dʒ/ /v/ and/ k/ sounds.

/brʃ/ 'brush'	/burasi/ [bura_i]
/bitʃ/'beach'	/bitʃ/'beach'
/dʒʌdʒ/ 'judge'	/djaddi/
/keɪk/ 'cake'	/keeki/
/straɪk/ 'strike'	/sutoraiki/ (as in 'be on strike')
/breɪk/ 'brake'	/bureeki/ (of a car)
/stɪk/ 'stick'	/sutekki/ (the aid for walking)

4.1.1 THE VOWELS

Ohata (2004) claims that the major significant differences between the two vowel systems of Japanese and English are:

- 1) . The number of vowels and
- 2) . The tense / lax distinction.

Figure 1 clearly shows that there are more vowels present in English than in Japanese (figure 2). Vance (1987) points out that the five vowel system of Japanese can lead us to the assumption that students of English may have difficulty producing English vowels that are non-existent in their native language.

Figure 1. The English vowel sounds

Tongue elevation	Tongue position		
	Front	Central	Back
high	/i/ /ɪ/		/u/ /ʊ/
mid	/ɛ/ /e/	/ə/ /ʌ/	/o/ /ɔ/
low	/æ/	/ɑ/	/ɑ/

Figure 2. The 5 Japanese vowels.

Tongue elevation	Tongue position		
	Front	Central	Back
high	/i/		/u/
mid	/e/		/o/
low		/a/	

As the figures illustrate there are four front vowels in English whilst in Japanese there are only two. There are also five back vowels in English whilst in Japanese there are only two. In addition to these differences the English central vowels /ʌ/ /ə/ do not exist in Japanese.

Such differences can be argued to be the cause of pronunciation difficulties as such distinctions made by the change of tongue positioning between the four front and five back vowels are in contrast to making only two distinctions on tongue positioning in the front and back of the mouth as in Japanese.

Ohata (2004) reveals that the distinction between the tense and lax vowel sounds reveal significant differences between the two languages. This disparity could cause problems for English language learners.

According to how much muscle tension or movement in the mouth is involved in producing vowels, these vowels are labeled tense or lax. Vowels produced with extra muscle tension are 'tense vowels' and those without 'lax'. For example 'live' (lax) (liv) and 'leave' (tense) (li:v).

Giegerich (1992:97) suggests "The quality difference between the members of such pairs is usually described as a difference in 'tenseness', such that /i/ and /u/ are tense vowels and /ɪ/ and /ʊ/ are lax vowels"

These tense / lax vowels do not however exist in the five vowel system of Japanese, nevertheless as Vance

(1987) explains each of the five short vowel qualities also occurs long, as illustrated by the contrasting pairs of *ojisan* (uncle) vs. *ojiisan* (grandfather) and *tsuki* (moon) vs. *tsuuki* (air).

Ohata (2004:5) however warns " It should be noted that although long vowels of Japanese are sometimes analyzed as having the same quality as English tense vowels, this claim is difficult to support, because those vowels of Japanese are not always contrastive in nature as the English tense / lax vowel pairs" Examples of this can be found when Japanese students fail to distinguish between the pronunciation of vowels contrasted in the pairs live (liv) and leave (li:v), work (wɜ:rk) and walk (wɔ:k). Bada (2001:4) suggests a reason for this " ...Japanese speakers may tend to shorten English long vowels which do not exist in their native language phonological system. They may also be predicted to replace /ae/ with either /e/, /e:/ or /a;/ /ʌ/ with a rather open /a;/ and /ɒ/ and /ɔ:/ with /o/ or /o:/, these sounds being the closest counterparts of the vowels in Japanese". I have found within my own minimal pair work that students found it hard to differentiate between words such as raw and row with most students commenting that they sounded the same.

Ohata (2004:12) emphasizes these areas when he says " ...Japanese learners often produce the tense / lax vowel pairs of English almost identically as if they were the same vowels; for example, words such as "sleep", "taste" and "stewed" may be pronounced in

the same way as such words as "slip", "test", and "stood" are pronounced respectively"

Ohata (ibid) also claims that because Japanese lacks a mid central vowel /ʌ/ and a low front vowel /æ/ along with the additional difference of tongue positioning of the vowel /a/ (a low back vowel in English, a low central one in Japanese) students have a tendency to produce words like 'hat', 'hut' and 'hot' as the same vowel sounds which could be detrimental to communication with native and non-native speakers of English.

4.1.2 DIPHTHONGS

Kitao (1995) states that standard Japanese has no diphthongs as phonologically, two different vowels in a row are not considered a diphthong. Kitao (1995:117) explains "Each vowel is one syllable or makes one syllable in combination with a consonant. Vowels can be next to other vowels. Consonants, with the exception or /n/, cannot form syllables without a vowel." This can relate to a point made earlier regarding the negative transfer of Japanese speakers making salad into 'salada'. Kitao (1995) explains further that as Japanese is a syllabic language, there is a clear change between the two vowels, but English diphthongs form one syllable, and the tongue glides smoothly between them. He cites the English diphthongs [aɪ], [aʊ], and [ɔɪ] as problematic sounds even though Japanese has similar sounds which consist of two vowels, [a] [ɪ], [a][u], and [ɔ] [ɪ].

4.1.3 ALLOPHONES

It can be suggested that that the perceptual effects of the vowels in the neighboring syllables are minimal in Japanese. This means that unlike English, Japanese vowels do not seem to have positional allophones, except for /u/. Wells (2000) suggests that as phonemes are pronounced differently depending on the phonetic context in which they are found, they compromise a number of distinct allophones. He suggests that the learner can carry over into the L2 inappropriate allophonic rules of the L1. Instances of this occur when Japanese tackle words such as seat which tends to sound like sheet. This is a result of the Japanese [s] not occurring before [i]. It is instead replaced by a sound [ʃ]. 'Si' therefore becomes 'shi'. Wells (2000:12) suggests

"Hence in Japanese [s] and [ʃ] can be regarded as allophones of the same phoneme" Seat can sound like sheet and sit and city can sound like words which will be left to your imagination.

Other Japanese consonants that have special positional allophones before [i] are /z/ /t/ and /d/, which are replaced by Japanese speakers with [ʃ], [tʃ], and [dʃ] respectively. In this context the /t/ sounds like the 'ch' sound of English which leads to mis-pronunciation of words such as team which becomes 'chiimu', tick can become 'chick' and tease can become 'cheese'. These are perhaps extreme examples and limited to beginner level students of English. But in a sample of 80 of my very own students 90 percent were found to commit such errors when I gave them a spelling test where I found words such as sip spelt as 'ship', seat as 'sheet', tick as 'chick' and tease as 'cheese'. Ohata (2004:13) comes to a conclusion then that "...these problems are considered to be a clear illustration that Japanese students might be transferring the sound patterns of Japanese into English and producing allophonic consonants that are appropriate in Japanese but not in English" This is perhaps not a new idea as Lado (1957) asked the question what creates maximum phonological difficulty, and allophonic differences between the native and target language were fundamental in his predictions. He stipulated that the greatest difficulty lay in the learner assigning two or more allophones in the native language to different phonemes in the target language.

4.1.4. THE CONSONANTS

The English and Japanese consonants have been put into categories according to the way that we articulate them. Six groups can be distinguished here. Figures 3 and 4 show that there are clearly more consonants in English than in Japanese.

There are no affricates in Japanese and in the horizontal columns of figure 3 and 4, English can be seen to have a wide variety of fricatives and affricates which the Japanese consonant inventory lacks.

Bada (2001:5) argues that for Japanese learners of English the consonants may provide the biggest obstacle, as their various sounds, their placement within words and articulation are diverse. "...distinct place and manners of articulation of sounds is another

Figure 3. The Japanese consonants (from Ohata 2004)

Place of Articulation		Bilabial	Alveolar	Alveopalatal	Velar	Glottal
Manner of Articulation						
Stops	Voiceless	p	t		k	
	Voiced	b	d		g	
Fricatives	Voiceless	ɸ	s	ç		h
	Voiced		z			
Nasals		m	n			
Liquids (Approximants)			r			

Figure 4. The English consonants (from Ohata 2004)

Place of Articulation		Bilabial	Labiodental	Interdental	Alveolar	Alveopalatal	Velar	Glottal
Manner of Articulation								
Stops	Voiceless	p			T		k	
	Voiced	b			D		g	
Fricatives	Voiceless		f	θ	S	ʃ		h
	Voiced		v	ð	Z	ʒ		
Affricates	Voiceless					tʃ		
	Voiced					dʒ		
Nasals		m			N			
Retroflex Liquid					R			
Lateral Liquid					L			

phenomenon to have a certain impact on learners' language performance"

Let us focus then on some of the consonant phonemes of the two languages which may cause or be predicted to cause language learning difficulties.

4.1.5. LIQUIDS R and L

The most commonly cited phonemic difference between the consonants of Japanese and English is the /r/ and /l/ distinction. As figure 4 shows there is no /l/ phoneme in the Japanese language. Although the Japanese language has a liquid sound similar to both the English /r/ and /l/ sounds (see figure 3) as Ohata (2004) explains this liquid does not exactly correspond to the English liquid /r/ or /l/ but is regarded as

something that is between the two sounds. Therefore Japanese students can often be seen substituting /r/ for /l/ on one occasion and /l/ for /r/ on another. Because of this interchangeable use of both /l/ and /r/, words such as 'light' and 'grass' may sound like 'right' and 'glass'.

The point of exact articulation is not specified for the Japanese /r/ sound suggests Ohata (2004) and the Japanese /r/ states Allot (1991) closely resembles the 'r' in the English pronunciation of 'very'.

Tsujimura (1996) explains that in English both the /l/ and /r/ sounds are alveolar, the difference being that with the /r/ sound the air channel is in the middle of the mouth whilst with the /l/ sound it is on the

side of the tongue. In terms of articulation the English /l/ is usually pronounced with the tongue touching the alveolar ridge, but with the sides of the tongue lowered. /l/ can be seen to be a lateral sound while the American English /r/ sound is made with the tip of the tongue turned back. Both sounds however are voiced. Tsujimura (1996) suggests the alveolar liquid /r/ in words such as 'sora' (sky) and 'roku' (six) are quite different from the English counterpart of /r/ and /l/. Allot (1991) and Tsujimura (1996) both agree that this sound is similar to the American English 'd' sound.

Technically speaking with both of these sounds the tongue achieves very quick contact at the alveolar ridge. The technical term is a 'flap', phonetically transcribed as [r]. This leads Bada (2001:5) to conclude that "...learners with Japanese native language background may simply employ the NL /r/ in their English language output, ending up with a voiced alveolar flap /r/."

Tsujimura (1996:14) suggests the similarity of the English 'd' sound and the Japanese 'r' sound "... explains why native speakers of English learning Japanese are often unable to make a distinction between [r] and [d] in Japanese words "

4.1.6. FRICATIVES

As figures 3 and 4 show the major difference between the English and Japanese consonant phoneme inventories lies in the disparity of fricatives found in the languages. English has nine phonemes, while Japanese has only five. This fact can be a major source of problems for Japanese students of English. The phoneme /v/ is arguably a problematic area for Japanese learners of English as it does not exist in their language. Consequently Japanese lack the ability to distinguish the bilabial /b/ and the labio-dental /v/. As Ohata (2004:14) writes "While Japanese has a similar voiceless counterpart of the /v/ sound, it is a bilabial fricative, not a labiodental as in English. Because of the particular lack of /v/ sound, Japanese learners often substitute the voiced bilabial stop /b/ for /v/."

Hence the pronunciation of 'berry' instead of 'very'.

Bloch (1950) as cited by Vance (1987) suggests that the voiced labiodental fricative [v] occurs in recent borrowed words and Bada (2001) suggests that instances of the /v/ phoneme do not seem to cause

significant difficulty as they are used in loan words from western countries. He argues (2001:11) "...the teacher should no longer worry about these sounds "

However Tsujimura (1996) explains that labio-dental sounds are produced when the upper teeth and the lower lip achieve contact and she continues that "There are no labio-dental...fricatives in Japanese." Vance (1987:32) suggests "Most Japanese speakers have great difficulty pronouncing [v], and even those who can find it virtually impossible to discriminate [v] and [b] auditorily." Kitao (1995:138) found that listening tests regarding the /v/ and /b/ phonemes showed that students "...had trouble with /b/, and this may be because they confused it with /v/ or because they seldom use /b/ in Japanese".

Other fricatives that are not found in Japanese are the two English interdental fricatives [θ] and [ð] which are often substituted with the English alveolar [t] and [d]. These however may not prove to be too problematic. While it may prove to be very difficult for Japanese speakers to produce the interdental fricatives, it is probable that mispronunciation is unlikely to cause problems however since many dialects of English can be seen to have /t/, /d/ as allophones of the two phonemes in question.

The Japanese language does have a voiceless bilabial fricative [f] as in the word 'fune' boat or 'futon'. It is a rather weak voiceless fricative made with the lips (bilabial). Wells (2000:9) suggests when the word is anglicized this Japanese bilabial fricative becomes labiodental (made with the lower lip pressed against the upper teeth.) The Japanese labiodental is quite different from the voiceless labiodental fricative in English but is usually transcribed as the same [f].

Vance (1987:20) suggests "Sometimes the opening between the lower lip and upper teeth is so large or the airstream so weak that there is no audible supraglottal turbulence." This he suggests may well explain how [h] replaces [f] as in telephone hook (*fuku*) and although major differences are rare when words such as who are pronounced 'foo' this could be problematic.

Bada however (2001:5) suggests "The voiceless bilabial fricative English /f/ is a sound that does

not exist in Japanese, instead, Japanese has the /h/ phoneme with [h], [ç] and [ç̥] allophones; the [ç̥] allophone is the closest sound to the English /f/, pronounced with the lower lip not touching the top teeth." Based on this comparison that contrastive analysis gives us, it is possible to say that the English /f/ is not an easy sound for Japanese speakers. Bada (ibid :5) continues "Attempts to articulate this sound may end with a slightly velarized /h/. The English nasal velar /ŋ/, however, has a counterpart in Japanese: the syllabic nasal -n /ŋ/. This should enable learners to produce this sound in English without much difficulty "

Kitao (1995b) found similar evidence in pronunciation tests he conducted with Japanese English language students stating that even though /f/ is one of the five absent consonant phonemes in Japanese when compared to English it was not particularly difficult to produce. "It seems strange that /f/ was not particularly difficult" (1995b:140) he concedes. This would suggest that contrastive analysis used as a system for predicting errors would not necessarily be beneficial so how does C/A benefit language teachers and students?

5. IS CONTRASTIVE ANALYSIS BENEFICIAL?

James (1980:166) concedes "CA is not only problematic, but also fraught with controversy". Wardhaugh (1970:126) suggests that the Contrastive Analysis is only tenable in its 'weak' or diagnostic function, and not tenable as a predictor of error. "The weak version requires of the linguist only that he use the best linguistic knowledge available to him in order to account for observed difficulties in second language learning" and "reference is made to the two systems (L1 and L2) only in order to explain actually observed interference phenomena"

At present, there seems to be no one who entertains or supports contrastive hypothesis in its strong sense. But the existence of various forms of transfer is perhaps obvious, and we cannot refute the fact that a learner's knowledge of his first language influences the way in which he approaches and learns a second language. Perhaps no where stronger than in phonology, especially in regard to the ever present foreign accent that a learner of English exhibits.

It can be argued that native language influence on the acquisition of L2 pronunciation has never been seriously questioned or contested unlike the debate over whether the L1 has a influential role in the acquisition of L2 syntax and grammar (see Dulay and Burt 1973, who found that 85% of learner errors were developmental and 3% due to L1 interference)

Does this mean the general criticism and generalization of the contrastive hypothesis can be applied to theories in phonological acquisition as well?

Even those that are critical of the validity of the contrastive analysis hypothesis admit that the learner's NL influences the acquisition of L2 phonology.

Richards (1971:204) suggests that "studies of second language acquisition have tended to imply that contrastive analysis may be most predictive at the level of phonology, and least predictive at the syntactic level" . Dulay and Burt (1974:105) also state a case for the benefits of contrastive phonological analysis when they state " ...most of the valid (contrastive analysis) evidence is phonological"

The aim of contrastive phonology is to contrast the phonetic sets of both languages and establish the differences. These may lie in the pronunciation of a phoneme that occurs in both languages or in the absence of certain phonemes in one of the languages, the basic premise being that if the L2 contains properties that the L1 does not then learning difficulties will arise. But perhaps this is too simplistic a notion. Cook (2001) suggests that factors such as markedness, talent, the critical period along with memory and social and environmental factors have all been investigated and have a part to play in second language acquisition.

There also exists a school of thought which maintains that similarities between the L1 and L2 can give insight into pronunciation problems. Fledge (1987) suggests that L2 sounds which are similar or equivalent to the sounds of the L1 are difficult to acquire as the learner perceives them as being the same or the counterpart of their native language sounds, and consequently do not create a new phonetic category for the L2 sounds.

6. CONCLUSION

Contrastive analysis is a controversial method and

as Richard et al (1993) state at its peak it was more successful in phonology than in any other areas of language. As contrastive analysis declined in the seventies other theories such as interlanguage and error analysis were seen to replace it and in recent years the hypothesis has been applied to discourse systems under the banner 'contrastive discourse'.

James (1980:142) eludes to the notion that for teachers "...linguistics seems to have little to offer for the solution of their practical problems." Is contrastive analysis therefore a practical aid for practical problems?

In its diagnostic function it can certainly aid teachers, in terms of anticipating errors, and creating awareness of problems. In theory it sounds practical and useful but in practice there are some hurdles to overcome but the nucleus of the method can be a benefit to teachers and students.

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