

A Contrastive Study of the Sound Patterns of Japanese and English by a Distinctive Feature Analysis (I)

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(Received on Sept. 12, 1980)

Abstract

The distinctive differences between one's native tongue and his target foreign language plays a crucial role in foreign language learning. This paper describes these distinctive differences in the light of the latest theory of the distinctive feature analysis and the results obtained are incorporated into the teaching of English sounds for the Japanese.

1. The main point you have to care about in learning the sound systems of foreign languages is the distinctive differences between your native language and your target foreign language. All else can be ignored as minor differences. Let us see what is distinctive and what is not.

2. Roman Jakobson introduced into phonological theory the idea of regarding a phoneme as a bundle of distinctive features from the stand-point of acoustic phonetics (this was originally derived from the idea of Trubetzkoy of the Prague School.) He incorporated the notion of binary opposition (whether a feature is + (present) or - (absent)) into phonology. Later this idea was adopted in Generative Grammar. Chomsky and Halle in *The Sound Pattern of English* (1968) (henceforth SPE) revised the Jakobsonian system of features and worked out their own system of articulatory based features.

Let me summarize SPE's revision of Jakobsonian features below. Revisions were made on the features "diffuseness", "compactness", and "gravity". According to SPE:

(1) Features specifying the position of the body of the tongue are now the same for vowels & consonants.

(2) In the characterization of vowel articulations, the features "high", "low", "back" correspond to the earlier "diffuse", "compact" and "grave" respectively. In consonants the same three revised features correspond to palatalization, velariza-

tion, and pharyngealization (in the manner discussed above).

- (3) The feature "anterior" mirrors precisely the feature "diffuse" in consonants.
- (4) The feature "coronal" corresponds most closely to the feature "grave" in consonants but with the opposite value. Except for the palatals (k_i , etc.), consonants that were classified as non-grave in the earlier framework are coronal in the revised framework, whereas those that were classified as grave are noncoronal. The palatals, which in the earlier framework were non-grave, are noncoronal.¹⁾

Some problems arise in this SPE type feature system. The first problem is the characterization of vowel height. Making use of SPE features 'high' & 'low', three vowel heights can be distinguished, namely:

high V	mid V	low V
$\left[\begin{array}{c} + \text{ high} \\ - \text{ low} \end{array} \right]$	$\left[\begin{array}{c} - \text{ high} \\ - \text{ low} \end{array} \right]$	$\left[\begin{array}{c} - \text{ high} \\ + \text{ low} \end{array} \right]$

However when there are four vowel heights in a language, what becomes of their characterization in SPE framework? We have to introduce another feature, [tense] in order to distinguish four V heights, e. g.:

close V	half-close V	half-open V	open V
/i/	/e/	/ε/	/æ/
$\left(\begin{array}{c} + \text{ high} \\ - \text{ low} \end{array} \right)$	$\left(\begin{array}{c} - \text{ high} \\ - \text{ low} \\ + \text{ tense} \end{array} \right)$	$\left(\begin{array}{c} - \text{ high} \\ - \text{ low} \\ - \text{ tense} \end{array} \right)$	$\left(\begin{array}{c} - \text{ high} \\ + \text{ low} \end{array} \right)$

Yet if the language has a true four-way contrast in vowel height which the introduction of the feature [tense] still fails to capture, how can we characterize it. Wang (1968)²⁾ suggested using the feature [mid] instead of SPE's [low]. This enables us to distinguish four vowel heights as follows:

close V	half-close V	half-open V	open V
/i/	/e/	/ε/	/æ/
$\left(\begin{array}{c} + \text{ high} \\ - \text{ mid} \end{array} \right)$	$\left(\begin{array}{c} + \text{ high} \\ + \text{ mid} \end{array} \right)$	$\left(\begin{array}{c} - \text{ high} \\ + \text{ mid} \end{array} \right)$	$\left(\begin{array}{c} - \text{ high} \\ - \text{ mid} \end{array} \right)$

However Ladefoged (1971) maintains that "there are two features which nearly

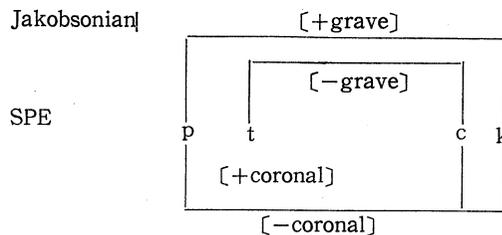
all languages use in a nonbinary way.”³⁾

Hyman says; “Why binary features? Why not simply view the four vowels i-e-ε-æ as what Trubetzkoy called a gradual opposition?”⁴⁾

SPE’s adherence to binarism is derived from their belief in feature counting in the simplicity metric. However, Ladefoged further states:

.....there are clear grounds for claiming that this is a scalar feature, in which even at the systematic phonemic level some items (mid vowels) are regarded as being potentially between others (high & low vowels).⁵⁾

The second problem is the characterization of the place of articulation feature. In the characterization of the palatal consonants, there is a difference between the Jakobsonian & SPE feature systems. In the former system, palatals are [-grave], forming a natural class together with dentals & alveolars. On the other hand, in the SPE system, palatals are [-coronal], forming a natural class together with velars & labials. For the illustration, see below:



Smith (1973) gives empirical evidence to support the Jakobsonian analysis quoting his data of the acquisition of phonology.

He maintains:

It would seem then that the definition of coronal given in Chomsky & Halle, 1968, should be interpreted to include /j/, an interpretation which is already possible given the vagueness of Chomsky & Halle’s definition, and which would also be consistent with their statement (p. 317) that laterals are ‘restricted to coronal sounds’; as the point of articulation of a palatal lateral [ʎ] is far closer to that of [j] than, say, that of [l]⁶⁾

Yet even this attribution of palatals to the category [coronal] is ture, the application of binary opposition to the place of articulation is arbitrary and highly suspect. Ladefoged maintains as follows:

With the exception of labials & velars, which are linked by the auditory feature [gravity], there seems to be little motivation for combining places of

articulation in any particular way.⁷⁾

Ladefoged rightly claims that:

We should regard the possible places of articulation as a linearly ordered set operating in a scalar feature, or an unordered set within a multivalued independent feature.⁸⁾

A possible compromise within the SPE framework is to regard Ladefoged's "place of articulation feature" as a separate binary feature, as he himself pointed out; but I suppose there is no point in clinging to binarism any longer because the SPE framework itself allows for a third value by leaving blanks in the feature specifications.

Here in this paper I will describe the sound systems of Japanese and English, and compare them in terms of the SPE feature system tentatively, but minor revisions will be made if necessary.

3. First let us analyze the vowel structures of English and Japanese using distinctive features.

	i	e	a	o	u
high	+	-	-	-	+
low	-	-	+	-	-
back	-	-	+(1)	+	+
round	-	-	-	+	-

(1) phonologically I interpret the Japanese /a/ as [+back]; however phonetically the point of articulation varies from back to front, and it is in most cases a central open vowel.

	i	e	æ	ʌ	ə	ɒ	o	u
high	+	-	-	-	-	-	-	+
mid	-	+	-	-	+	-	+	-
low	-	-	+	+	-	+	-	-
back	-	-	-	-	-	+	+	+
front	+	+	+	-	-	-	-	-
round	-	-	-	-	-	+	+	+

All vowels are $\left(\begin{array}{l} +\text{syllabic} \\ -\text{consonantal} \\ +\text{sonorant} \end{array} \right)$

(2) English diphthongs and long vowels are here interpreted after Trager & Smith as simple vowel + off-glide (w, j, h).

A comparison of the above two tables clearly shows the distinctive differences between the two languages and what points need the greatest attention when Japanese learn English. That is: first, the contrast in the lip position of the Japanese [ʌ] ((-round)) and that of the English [u] (i. e. [+round]), and second-

ly the Japanese /a/ corresponds to four sounds in English, namely [æ], [ʌ], [ə], and [ɒ]. This is due to the variable degree of backness in the Japanese [a] as well as in the English Schwa [ə].

Therefore in teaching English as a foreign language to Japanese, it becomes clear that you have to concentrate on these two distinctive points.

4. Next, then, let us turn to the comparison of semi-vowels.

All glides are $\left(\begin{array}{l} - \text{ syll} \\ - \text{ cons} \\ + \text{ sono} \end{array} \right)$

Japanese

	ɰ	j
back	+	-
round	-	-

English

	w	j
back	+	-
round	+	-

The significant difference which distinguishes the Japanese [ɰ] from the English [w] is the presence or absence (opposite feature value) of lip-rounding.

5. Let's turn to the comparison of liquids next. Liquids are characterized as

$\left(\begin{array}{l} - \text{ syll} \\ - \text{ cons} \\ - \text{ sono} \end{array} \right)$ in the SPE feature system. In English there are two types of

liquids, namely lateral and non-lateral liquids; on the other hand, Japanese has only one liquid as is often the case in Far-eastern languages.

English

	r	l
ant	-	+
coro	+	+
cont	+	+
lateral	-	+

Japanese

	ɽ
ant	+
coro	+
cont	+
lateral	-

As is shown above, the Japanese [ɽ] has two feature specifications different from both English [r] and [l]. Therefore you can conclude that the Japanese [ɽ] is somewhat between the two. When you try to produce English [r], you must curl back the tip of your tongue and try not to touch palate. In producing English [l], you are required to touch alveolar ridge while producing the sound.

6. There is quite a tough problem in [h]. For the detailed discussion and phonological characterization, see Roger Lass (1975). Here I will interpret [h] as a voiceless vowel which cannot have syllabic status (on-glide to vowels) and follow-

ing Pike (1945), I will share the view that [h] is a cavity friction and its point of articulation is decided by the sound segments which follow it. [h] is characterized

in SPE as $\begin{pmatrix} - \text{cons} \\ - \text{syll} \\ - \text{sono} \end{pmatrix}$.

There is no particular difference in the characterization of [h] in English & Japanese, except for the fact that on account of the differences in allophonic realization rules there are some differences at the phonetic level. But these differences are to be discussed later in the section which deals with the true fricatives because the allophones of the Japanese [h] localize its friction to palatal before [i] and to labial before [u].

7. Now we go on to discuss the differences between Japanese and English in true consonants. True consonants are characterized as $\begin{pmatrix} - \text{syll} \\ + \text{cons} \end{pmatrix}$.

7-1 First let us compare the stop system. Here by "stop" I mean [-cont] segments.

English

	p	b	m	t	d	n	k	g	ŋ
ant	+	+	+	+	+	+	-	-	-
coro	-	-	-	+	+	+	-	-	-
voi	-	+	+	-	+	+	-	+	+
nas	-	-	+	-	-	+	-	-	+

Japanese

	p	b	m	t	d	n	k	g	N
ant	+	+	+	+	+	+	-	-	-
coro	-	-	-	+	+	+	-	-	-
voi	-	+	+	-	+	+	-	+	+
nas	-	-	+	-	-	+	-	(-)	+

So far there are no distinctions in the above two tables, though they contain enough feature specifications to describe each language. To make a comparison between the two languages, however, we have to add another feature, namely [\pm high]. The addition of the feature [\pm high] makes the following clear distinction between the English [ŋ] and Japanese [N].

	E	J
	ɒ	N
ant	—	—
coro	—	—
voi	+	+
nas	+	+
high	(+) ←	→ (-)

Besides the above correspondence between the English [ɒ] and Japanese [N], phonetically Japanese has a velar nasal [ŋ] as an allophone of the voiced velar stop [g]. Standard Japanese has the following allophonic rule:

$$/g/ \longrightarrow \text{ɒ} / V \text{ ___ } V$$

Thus in Japanese the nasality of the voiced velar stop is not distinctive. On the other hand, in English nasality acts as a distinctive feature. Therefore the point is to teach where to use the voiced velar stop [g] instead of the velar nasal [ŋ] and vice versa in order to prevent the Japanese learners of English, from mixing up [g] and [ŋ].

à suivre

Notes

- 1) Chomsky & Halle, *The Sound Pattern of English*, (New York: Harper and Row, 1968), p. 306.
- 2) William S. - Y. Wang, "Vowel features, paired variables, and English vowel shift," *Language*, 44, pp. 695-708, 1968.
- 3) Ladefoged, P., *Preliminaries to Linguistic Phonetics*, (Chicago: University of Chicago Press, 1971,) p. 91.
- 4) Hyman, L. M., *Phonology, theory and analysis*, (New York: Holt Rinehard and Winston, 1975,) p. 91.
- 5) Ladefoged, op. cit., p. 56.
- 6) Smith, N. V., *The Acquisition of Phonology*, (London: Cambridge University Press, 1973.) p. 196.
- 7) Ladefoged, op. cit., p. 91.
- 8) Ibid., p. 43.