

Some phonological rules that Decide Phonetic Forms of Japanese Numerals

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INTRODUCTION

This paper has two purposes. One: to explain the phonological changes in Japanese numerals. Two: to show that one particular type of Romanized transcription system of the Japanese language, namely the "Japanese system", among many others, is the most appropriate for representing the phonological system of the Japanese language, and hence, for representing the "Japanese syllabary table" in roman letters.

The basic position of the presenter is not that of a generative phonologist, but that of a descriptive linguist who is interested in every complex aspect of languages, including phonetic, phonological, syntactic, semantic and pragmatic aspects, that is worth discussing. The presenter sometimes resorts to the techniques developed by generative grammarians but he is interested in the techniques, not in revising and developing the theory of generative grammar.

The presenter has long tried to explain why one pencil is counted as *ippon*, two pencils as *nihon*, and three pencils as *sanbon*. Phoneticians may insist that these phenomena be accepted as they are, and that there is no need to explain them, but when you teach Japanese, students may well be interested in the phonetic changes of this type and may ask you to explain why. In order to explain why, you have to start with finding the optimal Romanized transcription system of Japanese, and the present discussion will start with this.

Three types of transction will be used in this paper. One is the Romanized transcription called "Japanese system" in italics, basically IPA phonetic representation by [], and phonemic representation by / /.

1 Some Basic Assumptions

It must be in order to clarify some basic assumptions this paper is based on before we go into the main discussion.

1.1 The Japanese phonological system and the optimal Romanized transcription

I propose that the phonological system of Japanese consonants is as follows. (Japanese has five vowels *a, i, u, e, o*, which is commonly accepted by Japanese phonologists and phoneticians. The vowel *u* is unrounded / u /, but this fact is not a crucial matter to our discussion.)

		bilabial	alveolar	palato- alveolar	velar	glottal
stop	voiceless	p	t		k	
	voiced	b	d		g	
fricative	voiceless		s			h
	voiced		z			
affricate	voiceless					
	voiced					
nasal	voiceless					
	voiced	m	n, N			
flapped	voiceless					
	voiced		r			
semi-vowel	voiceless					
	voiced	w		j		

This phonological system, which does not list [ɸ, ɕ, ts, dz, t, d, t͡ɕ, ɲ] and lists / N /, is based on the following assumptions:

- (1) The bilabial fricative that appears as the first consonant of a word like *huro* [ɸuro] surfaces as the result of the phonological rule that assimilates / h / in front of the vowel / u / into [ɸ].
- (2) The velar fricative that appears as the first consonant of a word like *hito* [ɕito] surfaces as the result of the phonological rule that assimilates / h / in front of the vowel / i / into / ɕ /.
- (3) The voiceless and voiced alveolar affricate consonants [ts, dz] surfaces as the result of the phonological rule that assimilates / t / in front of the vowel / u / into [ts, dz].
- (4) The voiceless and voiced palato-alveolar consonants [t͡ɕ, d͡ʒ] surfaces as the result of the phonological rule that assimilates / t / in front the vowel / i / into [t͡ɕ, d͡ʒ].
- (5) The palatal nasal [ɲ] surfaces as the result of the phonological rule that assimilates the alveolar nasal / n / in front of the vowel / i / into [ɲ].
- (6) The consonants [ɸ, n, m, ɲ] that appear in the following words are realizations of a consonant phoneme / N / (this phoneme is placed as an alveolar nasal on the chart for convenience sake) assimilated by the following sounds: *kanko*(sightseeing) [ɸ], *kanto* (a district in Japan) [n], *kanpo* (Chinese medicine) [m], *kannin* (forbearance) [ɲ]. This phoneme is what is called *hatu-on* to be discussed below.

These assumptions, especially assumptions (1)(3)(4)(6), are not necessarily universally accepted by Japanese phonologists and phoneticians (see, for example, *Nihon Onsei-Gakkai* (ed., 1976, s.v. HATSUON), but for the description and explanation of the

interesting phonetic change of Japanese numerals, the phonological system described above is optimal, I believe.

The consonants of the Japanese language do not appear in isolation, the only exception being /N/ and *soku-on* to be discussed below: /N/ appearing before a consonant with an intervening vowel and appearing at the end of a word; *soku-on* being a succession of two identical consonants. Therefore, it is very convenient and has been a long practice to combine each consonant and each vowel together and make a table by arranging those combinations. The above assumptions lead us to the following "Japanese syllabary table" (this is not a complete table, unnecessary combinations of consonants and vowels for the present discussion being omitted).

<i>a</i> ,	<i>i</i> ,	<i>u</i> ,	<i>e</i> ,	<i>o</i>
<i>ka</i> ,	<i>ki</i> ,	<i>ku</i> ,	<i>ke</i> ,	<i>ko</i>
<i>sa</i> ,	<i>si</i> ,	<i>su</i> ,	<i>se</i> ,	<i>so</i>
<i>ta</i> ,	<i>ti</i> ,	<i>tu</i> ,	<i>te</i> ,	<i>to</i>
<i>na</i> ,	<i>ni</i> ,	<i>nu</i> ,	<i>ne</i>	<i>no</i>
<i>ha</i> ,	<i>hi</i> ,	<i>hu</i> ,	<i>he</i> ,	<i>ho</i>
<i>ma</i> ,	<i>mi</i> ,	<i>mu</i> ,	<i>me</i> ,	<i>mo</i>
<i>ya</i> ,	<i>yi</i> ,	<i>yu</i> ,	<i>ye</i> ,	<i>yo</i>
<i>ra</i> ,	<i>ri</i> ,	<i>ru</i> ,	<i>re</i> ,	<i>ro</i>
<i>wa</i> ,	<i>i</i> ,	<i>u</i> ,	<i>e</i> ,	<i>wo</i>

N

Other Romanized transcription systems based on different phonological interpretations writes *shi* instead of *si*, *chi* instead of *ti*, *tsu* instead of *tu*, *fu* instead of *hu*. Some questions arise, e.g., why those systems do not write *ci* instead of *hi*, *ni* instead of *ni*, *u* instead of *fu* (the consonant of *hu* is a bilabial fricative, not labio-dental fricative, as we suggested in assumption (1)).

Further evidences to show that above Romanized transcription system is optimal will become apparent by the discussion to follow.

2 The phonological changes of numerals and how to explain them

2.1 Facts about phonological changes of the numerals

The Japanese language has a complex numerical system where different numerals to count books, chairs, rooms, cars, etc. are employed. It is an interesting object of research identifying which numerals are used with which objects, but in this paper I will be concentrating on the phonetic variants that occur in combination with numbers, one, two, three, etc. Pencils are counted as follows (as least in my dialect):

ippon no enpitu (one pencil)

nihon no enpitu (two pencils)

sanbon no enpitu (three pencils)

Enpitu is “pencil” and *no* is “of” but for the convenience of the present discussion, I will not refer to these words. Counting more than four pencils, either *pon*, *bon* or *hon* are used, which shows that we do not need to consider other number + numeral combinations. Now, most adult native speakers of Japanese are perhaps unaware that these three phonetically distinct forms are used to count pencils, which fact shows how natural this phonetic variation is, but it is not easy to explain why the combination *iti* (one) and *hon* (the presumable basic form of other phonetically different variants *pon*, *hon*, and *bon*. This *hon* originally came from the word *hon* meaning “a basis, a basic structure”.)

2.2 Explanations of those phonological changes

In order to explain these apparently easy and straightforward (a least for native speakers of Japanese) phenomena, we will have to resort to some techniques developed by generative phonologists. The only way, I believe, to explain this fact is to assume that the phonological form of the numeral *hon* changes into its three peculiar phonetic forms [pon], [hon] and [bon] when they are with *iti* (one), *ni* (two), and *san* (three).

Some aspects of phonetic changes commonly found in the Japanese language, two of which are *hatu-on* and *soku-on*. *Hatu-on* is an abstract nasal phonological unit (let's give it the phonological status represented by / N / as we already did above) which surfaces as phonetic forms [m], [n], [ŋ], [ɲ] assimilated by the features of the next phonological unit. At the end of a word, it is either pronounced as a back nasal [N] or works as a nasalizer of the vowel before it and it loses its phonetic value itself:

kanko (sightseeing) [kaŋkoo]

kanpo (Chinese medicine) [kampoo]

kanto (a district in Japan) [kantoo]

kannin (forbearance) [kaŋɲin]

kan (can, [noun]) [kaN] or [kã]

Soku-on refers to such phenomena as follows:

ikkai (the first floor)

sappari (not at all)

ittyo (one piece [of tofu])

issun (a measurement of length)

Soku-on is, together with *hatu-on*, an exceptional consonant and consonant combination, in which *k*, *p*, *t*, and *s* are followed by the same sounds. My interpretation of *soku-on* is as

follows: it is a combination of a vowel deletion process and an assimilation process of the consonant triggered by the phonological unit that comes next: i.e.

basic form→	vowel deletion→	phonological rule→	assimilation by
		that changes <i>h</i> into <i>p</i>	the next sound
<i>iti + kai</i>	<i>it + kai</i>		[ikkai]
<i>satu + hari</i>	<i>sat+hari</i>	<i>sat+pari</i>	[sappari]
<i>iti + tyo</i>	<i>it + tyo</i>		[ittyo]
<i>iti + sun</i>	<i>it + sun</i>		[issun]

Those discussions lead us to an easy explanation of the phonetic changes of *hon* into *pon*, *hon* and *bon*:

basic form	soku-onization	hatu-onization
<i>iti + hon</i>	[ippon]	
<i>ni + hon</i>	[nihon]	
<i>san + hon</i>		[sambon]

3. Concluding remarks

People are grouped into units of *han* (incidentally, the English word "honcho" came from this Japanese word *han*), whose phonetic forms are realized as [pan], [han], [pan] when they are combined with *iti* (one), *ni* (two), and *san* (three) respectively.

<i>iti + han</i>	→ [ippan]
<i>ni + han</i>	→ [nihon]
<i>san + han</i>	→ [sampan]

In order to explain why *han* is changed into *pan* after *san*, instead of being changed into *ban* like *hon* combined with *san*, we will have to find explanations in the etymology, but this matter is not in the scope of the discussion today.

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