

Alternations and Distributional Patterns in Japanese Phonology

Junko ITO*, Armin MESTER*, and Jaye PADGETT*

日本語の音韻交替と音韻分布

伊藤 順子* · A. メスター* · J. パジエット*

要旨: Ito, Mester, and Padgett (1995) は、日本語の複合語における連濁と鼻音に後続する阻害音の有声化との相互作用関係に基づいて、有声素性 [voice] が特定の鼻音環境においては余分 (redundant) であるにも関わらず能動的 (active) な役割を果たしているという議論を進めている。この議論で前提とされているのは日本語の語彙層が、和語、漢語、擬声擬態語、及び外来語などの語彙クラスに分かれていることである。これに対し Rice (1997) は、前提となっている語彙層の証拠付けに問題があり、有声素性についての Ito, Mester, Padgett (1995) の議論は成り立たないとしている。本稿では Rice (1997) の反論の問題点を指摘すると同時に、日本語の語彙クラスの動機付けを再考する。

Keywords: alternations, distribution, redundant features, lexical strata, postnasal voicing,
Japanese Phonology

Focusing on the interaction of compound voicing and postnasal voicing in Japanese, Ito, Mester, and Padgett (1995) develop an argument against traditional underspecification theory by showing that the [voice] specification of certain nasal-obstruent clusters in the native stratum of Japanese, though redundant, is phonologically active.¹⁾ Rice (1997) has attempted to cast doubt on this argument, which presupposes a division of the Japanese lexicon into a core native stratum and other more peripheral strata. Rice's central point rests on the claim that the motivation for this division is almost entirely distributional and not supported by alternations, thus indirectly weakening the argument for active redundant

[voice]. The goal of this short article is to clarify the factual situation by showing that, far from being purely distributional, the central generalizations necessitating a native stratum of Japanese in Ito, Mester, and Padgett (1995) are without exception all manifested in alternations.

1. Background

Compound voicing (*Rendaku*) involves the voicing of initial obstruents in second compound members meeting the right structural conditions, as shown in (1) (see Ito, Mester, and Padgett 1995, Rice 1997, and works cited there for further examples).

(1) ori + kami → origami (折紙) 'paper folding'

Rendaku is blocked when the targeted word already contains a voiced obstruent, as shown in (2).

(2) firo + tabi → firotabi (白たび) 'white socks' *firodabi

* Professor, Department of Linguistics, University of California, Santa Cruz, USA. (カリフォルニア大学言語学科教授)

This blocking, known as Lyman's Law, is a reflex of a more general prohibition on roots containing two voiced obstruents, such as **dabi*, **bagā*, etc. Both the constraint on roots and Lyman's Law are attributed to an Obligatory

Contour Effect involving [voice] by Ito and Mester (1986). The argument for active redundant [voice] is based on the fact that postnasal obstruents also block Rendaku, as shown in (3).

(3) take + **tombo** → **taketombo** (竹とんぼ) 'bamboo dragonfly' (a toy) ***takedombo**

This fact is significant, because voicing in postnasal obstruents is predictable (in YAMATO words — see below). There are no words such as **tompo* or **unsari* next to actual *tombo* 'dragonfly' and *unsari* 'disgusted', etc. Within traditional generative theories of underspecification (see Steriade 1995 for references and an overview), this implies that postnasal voicing is underlyingly absent and therefore phonologically inactive. In fact, the assumption of underspecification has been viewed as crucial to understanding Lyman's Law, since sonorants do not generally block Rendaku, as can be seen in (1) above. Voicing in sonorants is predictable, hence unspecified, according to this reasoning; voicing is therefore not present to block Rendaku in such words. In this context forms like those in (3) present a paradox: postnasal voicing is predictable, and derives from nasal voicing (itself also predictable), so it is unexpected that these forms would block Rendaku. The account presented by Ito, Mester, and Padgett (1995), though diverging a great deal from earlier underspecificationist assumptions, maintains the basic idea of underspecification for sonorants generally. Voicing in nasal-obstruent clusters is phonologically present and active, however, due to the interplay of the constraints posited within that account. In this way the facts of (1)–(3) are reconciled.

2. Lexical strata: stative patterns and alternations

The Rendaku alternation is characteristic of the native, or YAMATO, vocabulary stratum in Japanese. Similarly, postnasal voicing is a property of YAMATO words.²⁾ Looking to other lexical strata, one can find nasals followed by voiceless obstruents, as in *sam-po* (散歩) 'walk',

han-tai (反対) 'opposite', and *kan-kei* (関係) 'relation'; these are all SINO-JAPANESE compounds, borrowings from Chinese with a very long history in Japanese. More recent borrowings such as *kompyuutaa* (コンピューター) 'computer', *santa* (サンタ) 'Santa (Claus)', and *yan-kiizu* (ヤンkees) 'Yankees (baseball team)' also provide many examples of voiceless obstruents following nasals. Given that the Japanese vocabulary as a whole includes both words like *kan-gae* (考え) 'thought' and words like *yan-kiizu* (ヤンkees) 'Yankees', Rice (1997) suggests that voicing in postnasal obstruents should actually be treated as contrastive everywhere in Japanese. Were this true, then Japanese would not provide a case of a feature that is at the same time active and redundant. Indeed, Rice's main concern is to preserve the strong underspecificationist stance that predictable features are never phonologically active.

Rice (1997: 541) correctly notes that postnasal voicing can be seen as redundant only if "redundancy is computed over only a portion of the lexicon, the native, or YAMATO, vocabulary of the language", and then argues that this computation might not be possible. That is, she suggests that faced with a choice of positing separate classes such as YAMATO and SINO-JAPANESE, versus positing a postnasal voicing contrast, learners might more plausibly do the latter. However, the arguments for this point of view do not hold up.

Stratal divisions have long played a role in linguistics, both in the phonology of Japanese (see Martin 1952, 1987, McCawley 1968, Ito and Mester 1986, 1995a,b, Vance 1987) and elsewhere (see Chomsky and Halle 1968 and Nessly 1971 on English, Postal 1968 on Mohawk, Lightner 1972 and Holden 1976 on Russian, and

Mohanan 1986 on Malayalam, to name just a few examples from an enormous literature; see also Kiparsky 1968 for general remarks and Saciuk 1969 for a comprehensive cross-linguistic

survey). The posited separation between YAMATO and SINO-JAPANESE, in particular, is based on at least the following phonological differences:³⁾

(4)	YAMATO	SINO-JAPANESE
a. roots are maximally one foot	—	yes
b. all vowels are high (first root vowels exempted)	—	yes
c. vowel syncope and fusion of obstruents	—	yes
d. [C ^o], [C ^u] sequences are excluded	yes	—
e. Rendaku voicing	yes	—
f. Lyman's Law	yes	—
g. postnasal voicing	yes	—

In addition, the two classes can be distinguished according to morpheme combinatorics. SINO-JAPANESE morphemes are bound roots that combine largely with each other, forming a large, learned and technical vocabulary analogous to the LATINATE vocabulary of English. In English, a distinction between GERMANIC and LATINATE classes of morphemes is, to our knowledge, not controversial, whether in traditional rule-based phonology and morphology or in Optimality Theory (see, for example, Prince & Smolensky (1993: 49) on *cit-ation* vs. **writ-ation*). It is such clustering of phonological and morphological properties, commonly seen in languages investigated in detail, that motivates the stratal divisions of Japanese or English.⁴⁾ As usual, the overall criterion is regularity and sys-

tematicity, not exceptionlessness (see Kiparsky's (1988: 363–373) illuminating discussion of the neogrammarians' "exceptionlessness" hypothesis). A general and well-established pattern is not disturbed by a handful of counterexamples. This is especially so when the pattern is embedded in a large network of interlocking generalizations, involving independently justified and universal constraints.

A good part of Rice's argument against this stratal division rests on the claim that the crucial generalizations are not only contradicted in parts of the lexicon (necessarily so — otherwise there would be no stratal division in the first place), but also purely distributional, i.e., not involved in any morpheme alternations:

- (5) "Much of the evidence for lexical stratification that Ito and Mester (1995: 818) cite comes not from phonological alternations but from distribution. For instance, Rendaku is the only alternation that they cite for Japanese. The other criteria are distributional [...]." Rice (1997: 546–7)

Yet there are a large number of alternations involving the relevant constraints other than Rendaku (see above), and the relevant facts are amply documented and analyzed in Western structuralist and generative literature since Martin (1952). We illustrate these now.

2.1 Postnasal voicing alternations

First, a well-known alternation associated

with postnasal voicing is literally presented in Ito, Mester, and Padgett (1995: 575–576 (data); 601 (analysis)), the very article Rice is reacting to. The gerundive suffix *-te* and the past suffix *-ta* (6a) take on postnasal voicing after verbs ending in nasals (6b). Both verbal roots and their suffixes belong to the YAMATO stratum.

(6) a.	mi-	(見る) 'see'	mi-te	'seeing'	mi-ta	'saw'
	hafir-	(走る) 'run'	hafit-te	'running'	hafit-ta	'ran'
	kaw-	(買う) 'buy'	kat-te	'buying'	kat-ta	'bought'
	b. with postnasal voicing:					
	yom-	(読む) 'read'	yon-de	'reading'	yon-da	'read'
	fum-	(踏む) 'step on'	fun-de	'stepping on'	fun-da	'stepped on'
	kam-	(噛む) 'chew'	kan-de	'chewing'	kan-da	'chewed'
	hasam-	(挟む) 'insert'	hasan-de	'inserting'	hasan-da	'inserted'
	jin-	(死ぬ) 'die'	jin-de	'dying'	jin-da	'died'
	higam-	(僻む) 'be soured'	higan-de	'being soured'	higan-da	'was soured' ⁵⁾

Besides this fully regular and widespread alternation involving inflectional endings, compounding of verbal roots also provides a context where postnasal voicing is seen to emerge as an

alternation. The situation arises whenever the first of the two roots ends in a nasal and the second one begins with a voiceless obstruent, as illustrated in (7).

(7)		/fum+VERB/	(踏む)	'to step on'	
tsukeru	'attach'	fun-dzukeru	(踏ん付ける)	'trample on'	*fun-tsukeru
haru	'stretch'	fum-baru	(踏ん張る)	'resist'	*fum-paru
kiru	'cut'	fug-giru	(踏ん切る)	'decide'	*fug-kiru
fibaru	'tie'	fun-dzibaru	(踏ん縛る)	'immobilize'	*fun-fibaru ⁶⁾

2.2 Alternations associated with other constraints

Rice similarly suggests that the other 'non-surface-transparent' constraints involved in the stratification of the Japanese lexicon lack support from alternations. These include segmental conditions (traditionally considered allophonic, e.g., affricate [ts] only before [u]), a constraint against singleton [p], as well as the constraint against voiced obstruent geminates. We take up each of these in turn.

Consider first one of the segmental conditions mentioned by Rice⁷⁾, namely, the restric-

tion on alveolar affricate [ts], only occurring before the vowel [u]. It is quite surprising that Rice mentions this as a condition without alternations, since the [t]~[ts] alternation is well known as a textbook example of a segmental alternation found in Japanese (e.g., Halle & Clements 1983: 123, among others), and in fact, is also exemplified in Ito & Mester (1995b: 825), the same work Rice is referring to in her comments quoted in (5) and in note 4. The alveolar affricate [ts] occurs as an allophonic variant of /t/ before /u/, and this alternation is widely observed in conjugated forms of verbs:

(8) kat-anai	'win-NEGATIVE-PRESENT'
kat-e	'win-IMPERATIVE'
kats-u (勝つ)	'win-PLAIN PRESENT'

Other verbs, with the same set of alternations, include *tat-* (立つ) 'stand', *ut-* (打つ) 'strike', *mot-* (持つ) 'hold', *hanat-* (放つ) 'release', etc. Given what Rice claims about the redundancy/contrastiveness of postnasal voicing, parity of reasoning

demands that the existence of peripheral items where [ts] occurs before other vowels (e.g., *tsaa* 'czar', *tsepperin* 'Zeppelin airship', *kantsoone* 'canzone') and thus contrasts with [t], necessitates the underlying contrastive specification of

all occurrences of the alveolar affricate, including those participating in fully regular alternations.

Second, the ban against singleton [p], ruling out any voiceless labial plosive that is exclusively linked to onset position, is not purely distributional. Rather, it causes many morphemes to alternate between labial [p] (in geminates and assimilated nasal + plosive clusters, see Padgett 1995 on the typology and representation of such clusters) and debuccalized [h]. Examples of

[h]~[p] alternations are numerous in verb-root compounding (9a) (where the prefixal roots *hik-* 'pull' and *tsuk-* 'stab' induce gemination of the following consonant, see also (10)), intensifying *ma-* prefixation (9b), and in Sino-Japanese root compounding (9c). Compounds with Rendaku voicing illustrate the same point. Here it is the overlay of voicing that licenses the labial in the compound, resulting in an overall [h]~[b] alternation (9d).⁸⁾

(9) a.	haru	'stretch'	hip-paru	(引っ張る)	'pull strongly' (<i>hik-</i> 'pull')
	hataku	'slap'	hip-pataku	(引っぱたく)	'thrash'
	hafiru	'run'	tsup-pafiru	(突っ走る)	'dash, race' (<i>tsuk-</i> 'stab')
	hanasu	'let s.o. go'	tsup-panasu	(突っ放す)	'abruptly part from s.o.'
	haneru	'reject'	tsup-paneru	(突っ撥ねる)	'turn down, spurn'
b.	hiruma	'daytime'	map-piruma	(真っ昼間)	'broad daylight'
	hadaka	'naked'	map-padaka	(真っ裸)	'stark naked'
c.	hatsu-bai	(発売) 'sale'	jup-patsu	(出発)	'departure'
	hai-tatsu	(配達) 'distribution'	jim-pai	(心配)	'worry'
d.	hana	'flower'	ike+bana	(生け花)	'flower arrangement'
	hata	'side, bank'	kawa+bata	(川端)	'river bank'

Finally, the constraint against voiced obstruent geminates plays an active role whenever a geminating construction is involved. The geminating pattern is exemplified in (10a) for verb-root compounding and intensive *-ri* adverb for-

mation (*okkakeru, hissori*). In (10b), the otherwise expected voiced geminate constructions are avoided (**tsuddasu, *jobbori*) in favor of a homorganic nasal + voiced obstruent sequence (*tsundasu, fombori*).

(10) a.	kake-	'run'	okkake-ru	(追っ駆ける)	'run after'	(<i>ow-</i> 'chase')
	tat-	'stand'	tsuttats-u	(突っ立つ)	'stand straight'	(<i>tsuk-</i> 'stab')
	biku-	'frighten'	bikku(-ri)	(びっくり)	'surprising, frightening'	⁹⁾
	hiso-	'secret'	hisso(-ri)	(ひっそり)	'secretly'	
b.	de-	'go out'	onde-ru	(追ん出る)	*odde-ru	'leave quickly' (<i>ow-</i> 'chase')
	das-	'put out'	tsundas-u	(突ん出す)	*tsuddas-u	'thrust out' (<i>tsuk-</i> 'stab')
	jobo-	'lone'	fombo(-ri)	(しょんぼり)	*jobbo(-ri)	'lonely'
	koga-	'burn'	kogga(-ri)	(こんがり)	*kogga(-ri)	'toasted, roasted'

We emphasize that the forms cited here are neither novel nor exotic, and we find extensive discussion regarding these alternations in previous work (Martin 1952, Kuroda 1965, McCawley 1968, Poser 1984, Vance 1987, etc.). Thus, the criticism levied against the stratification of Japanese lexicon, namely, that it is only moti-

vated by purely static constraints and not by alternations, is invalid.

But once the alternations are taken into consideration, no serious account is possible that does not, in some way, refer to lexical strata. In current Optimality Theory, accounting for an alternation usually involves ranking some

markedness constraint above a relevant faithfulness constraint. Some alternations, even though central to the language (such as postnasal voicing for verbal endings in Japanese), are stratum-specific, necessitating some means of differentiating faithfulness in terms of lexical strata. Other theories employ different mechanisms, but the basic task to be accomplished remains the same. Given an analysis of the alternation, however, the stative-distributional side of the pattern is subsumed under the very same generalization — provided stratal distinctions within the lexicon are recognized.

3. Conclusion

Is the existence of alternations the ultimate litmus test for legitimate phonological generalizations? In other words, is purely distributional evidence really as worthless as Rice (1997) suggests? After all, there seem to be some strictly stative generalizations (see, for example, (4a,b,d) above, which do not involve alternations, different from the other cases in (4)) that are specific to certain lexical strata. For phonological analysis, alternations are of course highly valuable as heuristic tools. However, instead of subscribing to an inductivist methodology that would turn phonological theory into alternation analysis, we suggest that the more productive approach is a deductive one, namely, to explore how far the explanatory net of phonology can be cast (see Yip 1996). The challenge that distributional generalizations pose for the theory is best met not by denying the evidence, but by new and imaginative solutions that make use of general theoretical principles.

Notes

- 1) This is a revised version of a paper that appeared, in a preliminary form, in Ussishkin et al. 1999. We would like to thank the two reviewers whose insightful comments resulted in numerous improvements.
- 2) There are a very small number of exceptions to the postnasal voicing generalizations in Yamato words, and they mostly show the involvement of special factors. Thus colloquial *anta* 'you' is clearly a contraction of *anata* 'you', and the name of the special stew of sumo wrestlers known as *chanko-nabe* contains *chanko* (meaning *ossan* or *ojisan* 'Mr.'), which might involve the suffix *-ko* characteristic of Tohoku dialects.
- 3) For (4a-c), see Cho 1989, Ito 1986, Ito & Mester 1996, Kurisu 2000, Martin 1952, Padgett 1995, and Tateishi 1989; for (4d), see McCawley 1968:62B73. [C'] refers to palatalized (true) consonants.
- 4) It is important not to identify the synchronic classifications of an item as GERMANIC or YAMATO with its etymological history. Borrowed words, in particular ones of frequent use, are sometimes treated as native by speakers. This phenomenon is well-known for alternations that are wide-spread and productive (though not necessarily exceptionless) in their stratum, as is the case with Rendaku voicing (see Ito & Mester 1995b: 830 for examples and references, and Rice 1997: 544–545 for further examples).
- 5) As a reviewer reminds us, the last form, with its two voiced obstruents, shows that it is crucial to understand the scope of Lyman's Law in the correct way: It holds of exponents of morphemes such as [higan], but not of whole polymorphemic words such as [higan+da].
- 6) The last form, whose [dʒ] is derived by postnasal voicing and not by Rendaku, shows that postnasal voicing is in principle able to lead to the cooccurrence of voiced obstruents. This point is worthy of further study — note that this does not happen when the voicing feature is interpreted as due to Rendaku, even in postnasal position. Thus for *han* 'half' in first compound position, we find no voicing for *sode* 'sleeve': *hansode* (半袖), **hanzode*, but for *hakama* 'divided skirt for men's formal wear' and *korofi* 'killing' we find *hanbakama* (半袴) and *hangorofi* (半殺し), respectively. Other forms of interest in this context are *domburi* (丼) 'porcelain bowl' and *dango* (団子) 'dumpling', which can perhaps be viewed as polymorphemic. See Haraguchi 2001 for a collection of the miscellaneous factors interfering with compound voicing, including the one well-known exception to Lyman's Law, *nawa-bafigo* (縄梯子) 'rope ladder' (from *hafigo* 'ladder').
- 7) cf. Rice (1997: 547): "[...] bilabial fricatives and alveolar affricates are disallowed in the YAMATO and SINO-JAPANESE vocabulary except before certain vowels but are found in other strata; and so on. However, these "constraints" are all rendered opaque by the fact that there are surface counter-examples."
- 8) For intensifying *ma*-prefixation and root compounding (9ab), see Poser 1984 for further exemplification and discussion; for the [h]~[p] alternation in Sino-Japanese compounding (9c), see Ito and Mester 1996; for the [h]~[b] alternation in Rendaku (9d), see Ito and Mester 1986.
- 9) The base (ungeminated) forms appear as reduplicated adverbs (e.g., *biku-biku*), or as stems of other lexical formations (*hiso-ka* =adj, etc.).

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(Received 31 May, 2001;
Accepted after revision 2 July, 2001.)