Alternations and Distributional Patterns in Japanese Phonology

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Abstract: Ito, Mester, and Padgett (1995) observed that the voicing alternation in Japanese is not always determined by the nasal obstructive, as is often assumed. In particular, they noted that in certain contexts, voiced obstruents follow nasal vowels, even though the nasal obstructive is voiceless. This raises the question of whether voicing is a property of the nasal obstructive itself or of the nasal vowel.

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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-obstructed clusters in the native stratum of Japanese, though redundant, is phonologically active. 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

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This blocking, known as Lyman's Law, is a reflex of a more general prohibition on roots containing two voiced obstructions, such as *dabi, *boga, etc. Both the constraint on roots and Lyman’s Law are attributed to an Obligatory Contour Effect involving [voice] by Ito and Mester (1985). The argument for active redundant [voice] is based on the fact that postnasal obstructions 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 obstructions is predictable (in YAMATO words — see below). There are no words such as *tompo or *unsari next to actual tombo ‘dragonfly’ and unzari ‘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 obstructions, as in sam-po (散歩) ‘walk’, han-tai (反対) ‘opposite’, and kag-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 kompyuta (コンピューター) ‘computer’, sanka (サンカ) ‘Santa (Claus)’, and yag-kizu (ヤギズ) ‘Yankees (baseball team)’ also provide many examples of voiceless obstructions following nasals. Given that the Japanese vocabulary as a whole includes both words like kagae (考へ) ‘thought’ and words like yagkizu (ヤギズ) ‘Yankees’, Rice (1997) suggests that voicing in postnasal obstructions 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 Saeiuk 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:

\begin{tabular}{ll}
YAMATO & SINO-JAPANESE \\
--- & yes \\
--- & yes \\
yes & --- \\
yes & --- \\
yes & --- \\
yes & --- \\
\end{tabular}

(4) 

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

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 *citation vs. *writiation). 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. As usual, the overall criterion is regularity and systematicity, 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'  hafite-te 'running'  hafite-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'
hasan- (挿す) 'insert'  hasan-de 'inserting'  hasan-da 'inserted'
fin- (死ぬ) 'die'  fin-de 'dying'  fin-da 'died'
higan- (雑む) 'be soured'  higan-de 'being soured'  higan-da 'was soured'

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 (踏んでける) 'trample on'
        haru 'stretch'  fun-baru (踏ん張る) 'resist'
        kiru 'cut'  fun-ɡiru (踏ん切る) 'decide'
        fiharu 'tie'  fun-ɡfibraru (踏ん繋ぐ) 'immobilize'

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 Rice, namely, the restriction 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 [l]-[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', tspeperiu '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

\[(9)\]

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\begin{align*}
\text{a. } & \text{ haru} \quad \text{‘stretch’} & \text{hip-paru} \quad \text{‘pull strongly’ (hik- ‘pull’)} \\
\text{b. } & \text{hata} \quad \text{‘slap’} & \text{hip-pataku} \quad \text{‘thrash’} \\
\text{c. } & \text{hachiru} \quad \text{‘run’} & \text{tsup-paijaru} \quad \text{‘dash, race’ (tsuk- ‘stab’)} \\
\text{d. } & \text{hanasu \quad ‘let s.o. go’} & \text{tsup-panasu} \quad \text{‘abruptly part from s.o’} \\
\text{e. } & \text{hanaru} \quad \text{‘reject’} & \text{tsup-paneru} \quad \text{‘turn down, spurn’} \\
\text{f. } & \text{hiruma} \quad \text{‘daytime’} & \text{map-piruma} \quad \text{‘broad daylight’} \\
\text{g. } & \text{hadaka} \quad \text{‘naked’} & \text{map-padaka} \quad \text{‘stark naked’} \\
\text{h. } & \text{hatsu-bai} \quad \text{‘sale’} & \text{fup-putsu} \quad \text{‘departure’} \\
\text{i. } & \text{hatsu-tsu} \quad \text{‘distribution’} & \text{fim-pai} \quad \text{‘worry’} \\
\text{j. } & \text{han} \quad \text{‘flower’} & \text{ike+bana} \quad \text{‘flower arrangement’} \\
\text{k. } & \text{hata} \quad \text{‘side, bank’} & \text{kawa+bata} \quad \text{‘river bank’}
\end{align*}
\]

Finally, the constraint against voiced obstructive 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 formation (okkakeru, hissori). In (10b), the otherwise expected voiced geminate constructions are avoided (*tsuddasu, *jorobori) in favor of a homorganic nasal + voiced obstructive sequence (tsundasu, jombori).

\[(10)\]

\[
\begin{align*}
\text{a. } & \text{kake-tsu} \quad \text{‘run’} & \text{okkake-ru} \quad \text{‘run after’ (ow- ‘chase’)} \\
\text{b. } & \text{bikyuu} \quad \text{‘frighten’} & \text{bikyu(-ri)} \quad \text{‘surprising, frightening’} \\
\text{c. } & \text{hisu-ru} \quad \text{‘secret’} & \text{hisu(-ri)} \quad \text{‘secretly’} \\
\text{d. } & \text{de-ru} \quad \text{‘go out’} & \text{onde-ru \quad ‘leave quickly’ (ow- ‘chase’)} \\
\text{e. } & \text{dasu-ru} \quad \text{‘put out’} & \text{tsundasu-ru \quad ‘thrust out’ (tsuk- ‘stab’)} \\
\text{f. } & \text{joba-ru} \quad \text{‘lone’} & \text{jomba(-ri)} \quad \text{‘lone’} \\
\text{g. } & \text{koga-ru} \quad \text{‘burn’} & \text{koga(-ri)} \quad \text{‘toasted, roasted’}
\end{align*}
\]

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 motivated 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 inductive 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 anata ‘you’ is clearly a contraction of anata ‘you’, and the name of the special stew of sumo wrestlers known as chaqkonabe contains chaqko (meaning osan or ojisan ‘Mr.’), which might involve the suffix -ko characteristic of Tohoku dialects.


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 polymorphic words such as [higan+da].

6) The last form, whose [d] 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 hav ‘half’ in first compound position, we find no voicing for sode ‘sleeve’: hasude (半袖), *hasude, but for hakama ‘divided skirt for men’s formal wear’ and koroi ‘killing’ we find havbakama (半殺) and hasgagori (半殺し), respectively. Other forms of interest in this context are domberri (柄 ‘porcelain bowl’ and dawgo (囲子) ‘dumpling’, which can perhaps be viewed as polymorphic. 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-bajigo (繰梯子) ‘rope ladder’ (from bajigo ‘ladder’).

7) cf. Rice 1997: 547: “[..] bilabial fricatives and alveolar affricates are disallowed in the YAMATO and SINO-JAPANESE vocabulary except for 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 counterexamples.”

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., bika-bika), or as stems of other lexical formations (hiso-ka =adj, etc.).
References


Usui, Shin, Adam, Dylan Herrick, Kazutaka Kurisu, and Nathan Sanders (eds.) (1999) PASC 6 [Phonology at Santa Cruz], Linguistics Research Center, UC Santa Cruz.


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