Japanese NC clusters revisited: is postnasal voicing redundant?*

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Recent work in phonology has challenged the long-held assumption that redundant features do not play a role in phonology. In this paper I examine two cases in which it has been argued that redundant features must be phonologically active, Rendaku in Japanese and Labial Attraction in Turkish. In both cases, the generalization in question is based on evidence from only a certain part of the lexicon and numerous surface counterexamples to the generalization exist. I raise the issue of whether this type of stratification is reasonable or if the features under consideration must be discounted as redundant because of the existence of surface exceptions.

While phonologists have claimed that redundant features do not play a role in the phonology (e.g. Kiparsky 1985, Steriade 1987; see Steriade 1995 for a review), this assumption has been challenged in recent work by Archangeli and Pulleyblank 1994, Itô, Mester, and Padgett 1995, Steriade 1995, and others. In this paper, I examine two cases that Itô, Mester, and Padgett address, Japanese and Turkish, suggesting that, at the least, the assumptions that underlie the claim that redundant features can be phonologically active must be reconsidered.

The major focus of this paper is on Japanese Rendaku and its interaction with postnasal obstruent voicing. Itô, Mester, and Padgett argue that post-nasal obstruent voicing in Japanese is redundant, but that the phonological process of Rendaku is sensitive to the voicing of postnasal obstruents. Thus, voicing, while redundant, functions in the phonology. Others have questioned the details of Itô, Mester, and Padgett’s analysis (e.g. Hayashi and Iverson 1996, Kawasaki 1996, Pater 1995). I would like to take a different tack in this paper, questioning instead a basic assumption of their claim. Underlying the claim that post-nasal obstruent voicing in Japanese is redundant is an important assumption: this redundancy is computed over only a portion of the lexicon, the native, or Yamato, vocabulary of the language. In fact, both voiced and voiceless obstruents appear in the postnasal environment in Japanese when the Sino-Japanese and other loan vocabulary is also taken into consideration. In this paper I raise the issue of whether this type of stratification is reasonable or if postnasal voicing in Japanese must be discounted as redundant because voicing is in fact not redundant in this position. The second case, labial attraction in Turkish, is directly parallel. A process called Labial Attraction has been identified in Turkish by which, in some vocabulary, an unexpected vowel [u] is found following a labial consonant. Itô, Mester, and Padgett attribute the rounding of the vowel to redundant rounding being present on the labial consonant; however again the vocabulary is stratified, and surface exceptions to the generalization exist.

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1. Japanese Rendaku and redundant voicing

1.1 The phenomenon

In order to understand the problem, it is necessary to review briefly the well-known facts of Rendaku. Rendaku voices an initial stop of the second member of a compound, as illustrated in (1).

(1) ori + kami --> ori-gami  'paper folding'
oo + sumoo --> oo-zumoo  'grand sumo tournament'
mizu + teppoo --> mizu-deppoo  'water pistol'
yu + toofu --> yu-doofu  'boiled tofu' (IM 1995:819)
de + kuči --> de-guči  'exit ('leave' + 'mouth')' (IM 1995:819)

Rendaku is blocked under certain conditions, namely if the second member of the compound contains a voiced obstruent. This is the well-known Lyman's Law, which disallows more than one voiced obstruent per morpheme.

(2) ore + kugi *ore-gugi  'broken nail'
širo + tabi  *širo-dabi  'white tabi'
onna + kotoba  *onna-gotoba  'feminine speech'

Voiceless obstruents and sonorants, on the other hand, do not block voicing, as can be seen in the examples in (1).

The following generalization can be drawn. Voicing is contrastive for obstruents in all positions, including non-word initial position, in Japanese, and voiced obstruents block Rendaku. Voicing is non-contrastive for sonorants, and sonorants do not block Rendaku. It thus appears that only contrastive features play a role in the phonology of voicing in Japanese.

Considering Rendaku alone, there is no apparent need to weaken the claim that only contrastive features can be involved in the phonology. However, Itō, Mester, and Padgett 1995 note the presence of a morpheme structure constraint which interacts with Rendaku.

In the native vocabulary of Japanese, post-nasal obstruent voicing functions as a morpheme structure constraint: all post-nasal obstruents must be voiced.

(3) tombo  'dragonfly'  cf. *tompo
šindoí  'tired'  cf. *šintoi
unzari  'disgruntled'  cf. *unsari
šombori  'lonely'  cf. *šompori (IM 1995:819)

This constraint, called *NT, is stated in (4).

(4) *NT

N C
\ / voice

Consider the interaction of this constraint on post-nasal voicing with Rendaku. If only contrastive features function in the phonology, one would predict that the voicing on the post-nasal obstruent would not block Rendaku since it is predictable voicing. As Itō, Mester, and Padgett 1995 point out, however, this prediction is not borne out: Rendaku is blocked by a nasal-stop cluster even though the voicing is predictable on the stop. This is shown by the examples in (5).
Itô, Mester, and Padgett 1995 thus develop an analysis based on the following assumption: predictable voicing sometimes patterns as if it were redundant and other times as if it were contrastive. Thus, redundant features can function in the phonology. The details of their analysis are unimportant to the point being made in this paper, and I will not go into them here.

1.2 Lexical stratification, Rendaku, and post-nasal voicing

I now turn to a key assumption made by Itô, Mester, and Padgett, the assumption of lexical stratification. The Japanese lexicon is traditionally divided into four strata: native, or Yamato, vocabulary, Sino-Japanese vocabulary, mimetic, or onomatopoetic, vocabulary, and foreign (e.g. English, Portuguese) vocabulary. I will consider only the native and Sino-Japanese vocabulary, vocabulary that is of a great time-depth. Scholars note that this classification is loose - some historically Sino-Japanese and foreign vocabulary patterns, with respect to the phonology, as if it were native (see Itô and Mester 1995:836, McCawley 1968, Vance 1987).

Most linguists recognize two major ways in which the Yamato and Sino-Japanese vocabulary is differentiated. First, the Sino-Japanese vocabulary is written in kanji, or Chinese characters; the Yamato vocabulary may or may not be. And second, a constraint of root monosyllabism holds of the Sino-Japanese vocabulary; Yamato roots may or may not be monosyllabic.

Itô and Mester 1995:819 suggest a number of phonological criteria for distinguishing the strata; those that are used to distinguish the Yamato from the Sino-Japanese vocabulary are given in (6). Notice that in addition to the constraint on root monosyllabism in the Sino-Japanese vocabulary, Itô and Mester restrict Rendaku and Lyman’s Law to the Yamato vocabulary and introduce a constraint that nasal-voiceless stop clusters are restricted to the non-Yamato vocabulary; they must be voiced in the Yamato (and mimetic) vocabulary.

(6) Yamato vocabulary     Sino-Japanese vocabulary
   Rendaku, Lyman’s Law    root monosyllabism
   *NT

Other constraints, not of relevance here, hold of both sets of vocabulary.

The primary phonological differences between the Yamato and Sino-Japanese vocabulary come then in the restriction of Rendaku and Lyman’s Law to the Yamato vocabulary, the absence of *NT clusters (i.e. nasal-voiceless obstruent) in the Yamato vocabulary, and the requirement over the Sino-Japanese vocabulary that stems must be underlyingly monosyllabic.

Consider first the statement that Rendaku and Lyman’s Law hold just of the Yamato vocabulary. IMP note that ‘the alternation is confined to the Yamato (native) stratum of the lexicon and, though productive, has lexical exceptions’ (1995:574). They follow Martin 1952:48 in this; he states that sequential voicing (Rendaku) is frequent only in native Japanese morphemes. Note, however, Martin’s use of the word ‘frequent.’ In fact, according to Vance 1987, while Rendaku is frequent in the Yamato vocabulary, it is by no
means restricted to this vocabulary. Vance 1987 notes a number of Sino-Japanese morphemes which are affected by Rendaku.¹

(7) ura ‘back’ + hyooši ‘cover [exterior + paper]’ → ura-byooši ‘back cover’ (Vance 1987:138)
    uNdoo ‘exercise’ + fusoko ‘unsufficiency’ → uNdoo-busoku ‘lack of exercise’
    (Vance 1987:140)
    ko ‘child (Yamato) + kaiša → ko-gaiša ‘subsidiary company’ (Vance 1987:140)

In addition, Vance notes that some native Japanese morphemes consistently resist Rendaku.

(8) soko ‘bottom’ + cuči ‘soil’ → soko-cuči ‘subsoil’ (Vance 1987:147)
    kucu ‘string’ + himo ‘lace’ → kucu-himo ‘shoelace’

Still other native Japanese morphemes are inconsistent in terms of whether they are affected by Rendaku.

(9) niwa ‘garden’ + ki ‘tree’ → niwa-ki ‘garden tree’ (Vance 1987:147)
    yama ‘mountain’ + ki ‘tree’ → yama-gi ‘mountain tree’

Yet other compounds have more than one possible realization, either with or without Rendaku.

(10) haya ‘fast’ + kuči ‘mouth’ → haya-kuči / haya-guči ‘fast talking’ (Vance 1987:148)
     yoko ‘side’ + cura ‘face’ → yoko-cura / yoko-zura ‘side of the face’ (148)²

Vance concludes that there are plausible historical explanations for many of the exceptions, but nevertheless ‘the fundamental irregularity of sequential voicing remains a fact of modern standard Japanese’ (1987:148). Given that both Yamato and Sino-Japanese vocabulary can be affected by Rendaku, it is unclear that this is a reasonable diagnostic for lexical strata.

Now consider the constraint *NT. As IMP 1995 and IM 1995 note, the *NT constraint is restricted to the Yamato vocabulary. A consequence of this is that nasal-voiceless obstruents sequences, while not present in the Yamato vocabulary, do exist in the Sino-Japanese vocabulary.

(11) sampo hantai kei santakuroozu hontoo aikogka ‘walk’ (IM 1995:819)
     ‘opposite’ (IM 1995:819)
     ‘relation’ (IM 1985:819)
     ‘Santa Claus’ (IM 1995:819)
     ‘true’ (Poser, p.c.)
     ‘iconification’ (Poser, p.c.)

The property that nasal-voiceless stop clusters are absent from the Yamato vocabulary is not noted by other researchers working on Japanese. For instance, Vance 1987:134 remarks, without reference to the issue of lexical strata, that there is a voiced/voiceless contrast both word-initially and in the environments V(y)V and N(y)V.

¹ Rendaku also affects ‘some old and well-assimilated loans from languages other than Chinese’ (Vance 1987:140). Vance lists words borrowed from Portuguese, Cambodian, and English that are affected by Rendaku.
² Vance lists a third form, involving the so-called moraic obstruent.
Given what we have seen about the distribution of Rendaku, one might expect to find cases of Sino-Japanese compounds with NT clusters where Rendaku could apply. I do not know if such compounds exist, and two problems exist in identifying them. First, the Chinese writing system, which is used for the Sino-Japanese vocabulary, does not indicate voicing: Vance 1987:168 says 'Ordinary kanji dictionaries like Suzuki et al. (1975) do not list allomorphs due to Japanese alternations as alternative Sino-Japanese pronunciations. For instance, we have seen that sequential voicing applies to many Sino-Japanese morphemes, but kanji dictionaries do not list the allomorphs with initial voiced obstruents.' A consequence of this is that it is not possible to determine from a standard dictionary whether a Sino-Japanese word is affected by Rendaku. Second, as Vance also discusses, many Sino-Japanese words come in doublets, with more than one pronunciation for each kanji. For instance, Vance says that a kanji meaning ‘below’ has the go-on (older wave of borrowing form) /ge/, as in /ge.sui/ ‘sewer,’ and the kan-on (later loan words) /ka/, as in /ka.haN/ ‘lower half.’ A consequence of this is that a Sino-Japanese word might look as if it enters into alternations, but it is necessary to sort out whether this is productive or if the word is part of a doublet. I thus must leave open the question of what happens when a Sino-Japanese word with a nasal-voiceless obstruent clusters enters into Rendaku; this would clearly be interesting data.

What I hope to have shown so far is that the assumption of lexical stratification is of extreme importance to Itô, Mester, and Padgett’s claim that redundant features can be phonologically active as in fact both NT and ND clusters are found on the surface in Japanese. Yet the actual grounds for the stratification are themselves uncertain. In arguing for lexical stratification, Itô and Mester 1995 follow in a long tradition. As Itô and Mester 1995:818 point out, in the classical linguistic literature on morpheme classification (e.g. Chomsky and Halle 1968:174, 373; McCawley 1968:62-75, Postal 1968:120-139, Saejuik 1969:505-512) it is argued that morpheme classifications are more than a record of etymological history, but continue to play a role in the grammar. They cite English, where the lexicon is stratified between English and Latinate vocabulary, with Velar Softening being restricted to the juncture between Latinate stems and Latinate suffixes. In Chamorro, the native stratum has no underlying mid vowels, but the Spanish loan words do have such vowels. Itô and Mester 1995:818 provide several more similar examples from the literature where it is argued that the lexicon can be stratified based on inventories or processes.

I would like to raise a question that I believe raises a fundamental problem for the hypothesis of lexical stratification. Much of the evidence for lexical stratification that Itô and Mester 1995:818 cite comes not from phonological alternations but rather from distribution. For instance, in Japanese Rendaku is the only alternation that they cite. The other criteria are distributional: a root must be monosyllabic in the Sino-Japanese vocabulary; a non-geminate /p/ is not tolerated in Yamato and Sino-Japanese vocabulary; a nasal-voiceless obstruent cluster is not allowed in the Yamato vocabulary; a geminate obstruent must be voiceless in the Yamato and Sino-Japanese vocabulary; bilabial fricatives and alveolar affricates are disallowed in the Yamato and Sino-Japanese vocabulary except before certain vowels, etc. However, these constraints are all rendered opaque by the fact that there are surface counterexamples. In the case of root monosyllabism, this is a necessary characteristic of Sino-Japanese vocabulary; however, it is not a sufficient characteristic as non-Sino-Japanese roots can be monosyllabic as well. In all the other cases, surface violations of the constraints are found in the foreign, or peripheral, vocabulary of the language. Thus, these distributional constraints are not surface transparent.

Consider the existence of surface opaque constraints from the perspective of a language acquirer. The claim that would have to be made is that when the child hears a word like *tombo* ‘dragonfly,’ she or he treats the voicing as redundant. Now consider what happens on exposure to a word such as *sampo* ‘walk.’ The lexical stratification hypothesis demands that the child maintain the generalization that post-nasal voicing is redundant, and mark this word as belonging to a distinct lexical stratum. However, an
alternative hypothesis, a phonological one, is available. On exposure to an N-T cluster, the child abandons the notion that post-nasal voicing is redundant. The representational differences assumed by the two hypotheses are summarized in (12). I assume under both hypotheses that at an early stage only nasal-voiced obstruent clusters are available. I use the names ‘lexical stratification hypothesis’ and ‘representational hypothesis’ here. These titles are for convenience; clearly one can entertain a representational and a lexical stratification hypothesis simultaneously.

(12) stage 1 redundant post-nasal voicing (ND) stage 2 ND and NT

<table>
<thead>
<tr>
<th>lexical stratification hypothesis</th>
<th>representational hypothesis</th>
</tr>
</thead>
<tbody>
<tr>
<td>ND: redundant voicing on D</td>
<td>ND: distinctive voicing on D</td>
</tr>
<tr>
<td>NT: different lexical stratum</td>
<td>NT: distinctive voicelessness</td>
</tr>
</tbody>
</table>

(post-nasal voicing is a consequence of a rule) to learn: lexical classes, rule (constraint ranking) (post-nasal voicing is a consequence of a contrast) to learn: contrast

I cannot give decisive arguments for deciding between these hypotheses. More information would be needed; for instance, the numbers of words with ND and NT sequences and the frequency of those words in early language might be useful in sorting out whether a child creates lexical classes or changes phonological representations. However, the existence of surface violations of the *NT constraint must at least lead one to question whether the strong conclusion that Itô, Mester, and Padgett draw is a valid one - we are forced to reexamine the very foundations of their argument that redundant features can function actively in the phonology. The nasal-voiced obstruent sequence is a blocker for Rendaku not because a redundant feature is functioning in the phonology but rather because the feature of voicing is contrastive in the post-nasal position.

2. Turkish labial attraction

Itô, Mester, and Padgett 1993 discuss a second case where a redundant feature functions in the phonology, namely the case of Turkish labial attraction.

The problem in Turkish is the following. As is well known, Turkish vowels participate in a rounding harmony process such that non-initial non-low vowels are round if the first vowel is round; otherwise they are non-round. However, there are some unexpected round vowels found in Turkish, as in (13).

(13) /a/ Labial u/ sequences

<table>
<thead>
<tr>
<th>Word</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>kabuk</td>
<td>‘rind’ (Itô, Mester, and Padgett 1993:23)</td>
</tr>
<tr>
<td>tabur</td>
<td>‘battalion’</td>
</tr>
<tr>
<td>armud</td>
<td>‘pear’</td>
</tr>
<tr>
<td>karpuz</td>
<td>‘watermelon’</td>
</tr>
<tr>
<td>maymun</td>
<td>‘monkey’</td>
</tr>
<tr>
<td>yavru</td>
<td>‘cub, chick’</td>
</tr>
<tr>
<td>samsun</td>
<td>‘mastiff’</td>
</tr>
<tr>
<td>avlu</td>
<td>‘courtyard’</td>
</tr>
</tbody>
</table>

Itô, Mester, and Padgett 1995:609, following Itô, Mester, and Padgett 1993:18-28 and Ni Chiossain and Padgett 1993, suggest that this pattern might be accounted for by allowing redundant labialization on the labial consonant to round the post-consonantal vowel. As they say, labial consonants must not generally be specified for redundant rounding because if they were, they would be expected to participate fully in the labial harmony system, which they do not, as the form in (14) illustrates.
(14) taviz; *tavüz 'concession' (page 24)

It is only when the first vowel is /a/ and the vowels themselves harmonize for place that the labial consonant can pass on its redundant voicing. The analysis proposed by Itô, Mester, and Padgett 1993 is very similar to that proposed for Japanese: a constraint that labial consonants must be round interacts with one that disallows labial consonants from being round; by allowing the redundant rounding to be present on labial consonants under certain circumstances, the correct results are achieved.

This Turkish case bears remarkable similarities to the Japanese case. There are numerous surface counterexamples to labial attraction. Clements and Sezer 1982 and van der Hulst and van de Weijer 1995 show that the generalization noted in (13) is incorrect: on the one hand, the pattern /a-C-u/ can occur in the absence of a labial consonant (15a); on the other hand the pattern /a-Labial-i/ is also possible (15b).

(15) a. marul ‘lettuce’ (data from van der Hulst and van de Weijer 1995:529)
   fatura ‘invoice’
   yakut ‘emerald’
   sabir ‘patience’
   kapi ‘door’
   kamis ‘reed’

b. marnl
   fatura
   yakut
   sabir
   kapi
   kamis

These facts lead van der Hulst and van de Weijer say ‘we conclude that ‘labial attraction’ does not form part of the synchronic phonology of Turkish’ (1995:529).

Interestingly, this case is another one where the exceptions are ‘largely due to borrowings made over a period of hundreds of years, from Persian, Arabic, and now certain European languages’ (IMP 1993:22). Itô, Meter, and Padgett 1993:22 go on to claim that in Turkish, as in Japanese, borrowings can ‘lead to ‘disjoint phonologies’ and they follow Lees 1961 and Lightner 1972:405 in assuming that labial attraction is valid over a subpart of the lexicon.

As in Japanese, Turkish labial attraction involves an opaque distributional pattern. Again, two hypotheses are available. The lexical stratification approach, as defined above, requires that a rule exist in a subpart of the grammar that does not hold of another part of the grammar; the representational approach requires that the words with a-Labial-u sequences have this representation underlyingly.

3. Conclusion

The conclusion that I draw is a simple one. While the theory that Itô, Mester, and Padgett develop is well-suited to handling cases where redundant features can function in the phonology, it is not yet clear that that redundant features actually do function in the phonology. In Japanese, the existence of nasal-voiceless obstruent clusters severely compromises the claim that obstruent voicing is redundant in nasal-obstruent clusters; the phonological evidence for stratification is not strong enough to allow for the strong conclusion that the language learner is aware of this stratification. In Turkish too, the surface counterexamples to the generalization that a labial consonant provides its redundant rounding to a following high vowel are numerous. The lexical stratification hypothesis allows one to treat distributional generalizations that exist over subparts of the lexicon as true generalizations, even when they are counterexemplified by distributional facts elsewhere in the grammar. I have questioned whether someone acquiring the language will adopt that lexical stratification hypothesis rather than a representational hypothesis. Such a position could easily lead to absurdity. For example, one could argue that in English postnasal voicing is redundant; thus words such as font and fond, where post-nasal voicing
appears to be distinctive, differ by belonging to different lexical strata; intervocalic voicing contrasts could likewise be made to follow from a theory of lexical stratification. I conclude that, in the absence of clearer facts, arguments such as those from Japanese and Turkish cannot be used as evidence against the position that only contrastive features are available in the phonology. In order to be truly convincing, we need cases where a feature that is redundant throughout the lexicon functions actively in the phonology; such cases have not, to my knowledge, been forthcoming.

References


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