

Word-Internal Phrase Boundary in Japanese

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1. Introduction

In the diversity of views of how phrasal phonological rules refer to morphosyntactic information, one of the few ideas that is common to virtually all is that the domains of phrasal rules are necessarily no smaller than the word. I present here what appears to be a solid counterexample to this belief, namely a set of prefixes that are followed by a minor phrase boundary, together with a brief discussion of the implications of this fact.

2. Properties of Japanese Minor Phrases

In order to appreciate the evidence of the following section, it is necessary to have some understanding of the tonal system of Standard Japanese. The smallest unit in Japanese to have a tonal pattern is the *minor phrase*. Each minor phrase has a basic tonal pattern which we may schematize as $LH(L)$; that is to say, it begins Low, rises to High, and continues there, until at some point it may fall again to a Low pitch.

The only lexically distinctive property is the location of the fall from High to Low. This fall may occur on any syllable, or it may never occur at all. The syllable after whose first mora the fall occurs is said to be *accented*. If there is no fall, the word is said to be unaccented. A minor phrase has at most one accent; if it is composed of more than one word, as is often the case, then the leftmost lexical accent is realized, a process which I will refer to as Accent Resolution.

The non-distinctive initial rise is in principle always present but its phonetic realization is variable. If the accent falls on the first syllable, there is no Low plateau but only a short rise at the beginning of the minor phrase, unless the minor phrase is preceded by another minor phrase, in which case the initial Low may be realized as a Low plateau at the end of the preceding minor phrase.¹

¹ Most of this description of Japanese pitch accent is commonly known, though it is common to see the word rather than the minor phrase described as the unit possessed of a tone pattern.

3. Aoyagi Prefixes

The prefixes that are of interest to us and their peculiar phonological properties were first described by Aoyagi (1969), whence I will refer to them as Aoyagi prefixes. Representative examples of words formed with these prefixes are given in (1).² The pitch contour of the examples is shown schematically by the under- and over-lines.³

(1) Words Formed with Aoyagi Prefixes

Prefix	Gloss	Example	Gloss
móto	former	$\overline{m\acute{o}t\acute{o}d\acute{a}i\acute{z}iN}$	former minister
zéN	former	$\overline{z\acute{e}N\overline{s}y\overline{u}s\overline{y}oo}$	former Prime Minister
hí	un-	$\overline{h\acute{i}g\overline{o}r\overline{i}t\overline{e}k\overline{i}}$	illogical
kí	your (honorific/formal)	$\overline{k\acute{i}s\overline{y}o\overline{k}aN}$	your letter
hóN	this, the present	$\overline{h\acute{o}N\overline{k}\overline{a}\overline{i}g\overline{i}}$	this conference here

The peculiarity of these words lies in the fact that they exhibit HLH or HLHL tone patterns, which are not possible for single minor phrases. In the first example, the fall from *mo* to *to* indicates the presence of an accent on the first syllable. Consequently, if we had to do with a single minor phrase, we would expect everything thereafter to be Low. But in fact the pitch rises again and then falls, indicating the presence of a second accent on *dai*, as if Accent Resolution had failed to apply. The remaining examples are similar, only there is no second accent. The pitch falls on the accented syllables, e.g. *zeN* in the second example, but rather than staying Low as expected, it rises again and remains High. Moreover, the fact that the pitch does not rise again on these examples until the second mora of the stem indicates the presence of the initial Low.

The prefixes illustrated by no means exhaust the list of Aoyagi Prefixes. A more extensive list is given in (2).

(2) A Partial List of Aoyagi Prefixes

boo	a certain
doo	above-mentioned

Most accounts claim that there is no initial Low tone if the accent falls on the first syllable or if the first syllable contains more than one sonorant mora. However, I have given evidence in Poser(1984) that in principle the initial Low is always present. See Pierrehumbert & Beckman (1986) for additional discussion of the status of the initial Low and its variable realization.

² The representation is approximately phonemic. An acute accent indicates the location of the underlying pitch accent.

³ The rise that may occur at the beginning of an initial-accented word is not shown.

gen	original
han	anti-
han	pan-
hi	un-
hon	the present
ki	your (formal)
ko	deceased
moto	former
tai	anti-
tyoo	ultra-
zen	former
zen	all

The peculiar tone patterns of these prefixes are best explained on the assumption that they are followed by a minor phrase boundary. This immediately explains the possibility of there being two accents — the Accent Resolution rule is minor phrase-level and so will not apply. It also explains the presence of the Low region between the Highs in all of the examples — this is the minor phrase-initial Low.⁴

An alternative would be to attribute the peculiar tone patterns directly to the tonal properties of these prefixes, assuming that they are unusual in contributing a final Low tone which is realized at the boundary. But this would require lexical assignment of Low tone, which is otherwise unnecessary in Standard Japanese, and in any case would not explain the failure of Accent Reduction, an otherwise exceptionless rule, to apply.

In sum, the tone patterns induced by Aoyagi prefixes suggest that they belong to a different minor phrase from the stem to which they attach.

4. Aoyagi Prefixes are Prefixes

Although I have referred to these morphemes as prefixes, as do those who have previously discussed them (Aoyagi 1969, Kageyama 1982) and Japanese dictionaries, we must entertain the possibility that this characterization is incorrect and that they are really independent words, in which case the fact that they are followed by a minor phrase boundary will hardly be surprising. Although to my knowledge no evidence that these actually are prefixes has ever been given, there is good reason to believe that this characterization is correct.

Much of the time when we try to argue that something is part of a word we appeal to phonological criteria — does it trigger or undergo a word-level rule? I know of no double-edged tests for lexical status in Japanese, but there are a number of single-edged tests, such as induction of accent on a following morpheme, triggering of voicing assimilation, or triggering of *rendaku*, the voicing of the initial obstruent

⁴ Kageyama (1982) contains a brief discussion of these prefixes in which he independently suggests that these prefixes are followed by a minor phrase boundary. Thanks to Yo Matsumoto for drawing my attention to Kageyama's discussion.

of the second member of a compound. The Aoyagi prefixes pass none of these tests, but since they are single-edged this does not constitute evidence against their being prefixes.

Indeed, failure to undergo word-level phonological rules is exactly what we should expect given the presence of a minor phrase boundary. If it is correct that minor phrases are composed of phonological words, then processes that are restricted to phonological words should not apply across a minor phrase boundary.⁵

However, there are a variety of other grounds for believing that Aoyagi prefixes are indeed lexically attached. The first is that they are inseparable from the following stem, unlike other pre-nominal modifiers.

Consider, for example, the words *kidaigaku* “your university” and *motodaiziN* “former minister”, each of which contains an Aoyagi prefix. As example (3) shows, the adjective *yuumei* “famous” cannot intervene between the prefix *ki* and *daigaku*. Similarly, as examples (4) and (5) show, neither *yuumei* nor the adjective *erai* “distinguished” can intervene between the prefix *moto* and the *daiziN*.

(3) **ki* *yuumei* *na* *daigaku*
 your famous copula university
 your famous university

(4) **moto* *yuumei* *na* *daizin*
 former famous copula minister
 a formerly famous minister

(5) **moto* *erai* *daizin*
 former distinguished minister
 a formerly distinguished minister

These examples illustrate the larger generalization that no independent word can intervene between an Aoyagi prefix and the stem to which it attaches. In this the Aoyagi prefixes contrast with other nominal modifiers. For example, we can insert the adjective *yuumei* between the determiner *sono* “that” and the following noun in the noun phrase *sono daigaku* “that university”, yielding (6).

(6) *sono* *yuumei* *na* *daigaku*
 that famous copula university
 that famous university

Similarly, consider the scope of the modifier over the following material Independent words can have either narrow scope, in which they modify only the immediately following word, or wide scope, in which they modify the whole following NP. In (7), for example, *sono* “that” can have scope either over the immediately following noun

⁵ Of course, phonological rules that are lexical in the sense of Lexical Phonology may still apply to the extent that they are not restricted to phonological words.

uma “horse”, or over the whole NP of which *uma* is a modifier. But in the structurally similar (8) the Aoyagi prefix *moto* can have only narrow scope — it cannot modify the entire following NP.

- (7) *sono uma no kubiwa*
 that horse GEN collar
 the collar of that horse (narrow scope)
 that horse collar (wide scope)
- (8) *moto daiziN no komoN*
 former minister GEN adviser
 adviser to the former minister (narrow scope)
 *former adviser to the minister (wide scope)

The same is true when the following NP is a conjunction. In (9) the relative clause *tosi-o totta* “aged” (literally, “has passed years”) may be construed either with the immediately following noun or with the whole conjunct. But in (10), which is identical but for the substitution of the Aoyagi prefix *moto* for *tosi-o totta*, only the narrow scope reading is possible.

- (9) *tosi-o-totta syuusyo to daitooryoo*
 aged Prime-Minister and President
 the aged Prime Minister and the President (narrow scope)
 the aged Prime Minister and President (wide scope)
- (10) *moto syuusyo to daitooryoo*
 former Prime-Minister and President
 the former Prime Minister and the President (narrow scope)
 *the former Prime Minister and President (wide scope)

Thus, Aoyagi prefixes do not behave like independent words with respect either to separability or semantic scope.

If Aoyagi prefixes are not prefixes, what are they? They must be nominal modifiers of some sort, but as we have seen, they do not behave like other nominal modifiers with respect to such properties as separability and semantic scope. Moreover, they are morphologically peculiar in that they lack the inflection that nearly all other nominal modifiers have. The verbs of relative clauses are inflected for tense, as in (11). The same is true of conjugated adjectives, as in (12). Nominal adjectives must be followed by the copula, which itself is inflected for tense, as in (13). True nouns must be followed by the genitive marker *no*, as in (14).

- (11) *mi-ta daizin*
 see-past cabinet-minister
 The cabinet minister (I) saw.

- (12) erai daizin
distinguished cabinet-minister
A distinguished cabinet-minister
- (13) hen na daizin
strange copula cabinet-minister
A strange cabinet-minister
- (14) nagoya no daizin
Nagoya GEN cabinet-minister
The cabinet-minister from Nagoya

The only Japanese nominal modifiers that are invariant are those that we may refer to as determiners, listed in (15).

- (15) Japanese Determiners
- | | |
|-------|----------------------------------|
| kono | this |
| sono | that (near you) |
| ano | that (away from us both) |
| dono | what |
| | |
| konna | this sort of |
| sonna | that (near you) sort of |
| anna | that (away from us both) sort of |
| donna | what sort of |
| | |
| aru | certain |

But this seems an unlikely category for morphemes with the semantics of the Aoyagi prefixes, and in any case we have seen that they behave differently from the determiners with respect to separability and semantic scope. In sum, if the Aoyagi prefixes are not prefixes they must be independent words, but they do not fit neatly into any morphological or syntactic category.

In addition to these syntactic properties, Aoyagi prefixes exhibit one other typically lexical property. The Japanese lexicon contains two major strata, native morphemes, known as *yamato-kotoba* and morphemes borrowed from Chinese, known as *kango*.⁶ To a large extent Sino-Japanese morphemes combine only with other Sino-Japanese morphemes and native morphemes combine only with native morphemes. As we might expect, since lexical stratum is a lexical property, such combinatorial restrictions hold only inside of words; there are no such constraints on syntactic combinations of words.

⁶ In addition, there are now many loans from languages other than Chinese, and so-called mimetic words, which though of native origin exhibit certain phonological peculiarities.

Almost all Aoyagi prefixes belong to the Sino-Japanese stratum (*moto* is the only exception known to me) and to a very large extent they attach only to other Sino-Japanese morphemes. There are some exceptions to this, e.g. the prefix *haN* “anti-”, which can be attached to names of any origin, as in *haN-tyomusuki* “anti-Chomsky”, but most of them obey these restrictions. Since such combinatorial restrictions apply only within lexical words and involve lexical information, the fact that Aoyagi prefixes are subject to them argues that they are lexically attached.

It is difficult to find conclusive evidence of lexicality, but the Aoyagi prefixes behave like prefixes with respect to separability and semantic scope, fit into no syntactic category, and exhibit lexical combinatorial restrictions. This, combined with the fact that except for their phonology there is not a shred of evidence against treating them as prefixes, suggests that the traditional characterization as prefixes is correct, and that we are faced with a legitimate example of a word-internal phrase boundary.

5. Implications

The existence of the Aoyagi prefixes is surprising because we generally assume that the domains of phrasal rules are necessarily larger than words, because phrases are made up of words. But this is true only in a theory in which there is a single hierarchy of constituents.

One of the innovations of the metrical theory is the notion that there is a phonological constituent structure parallel to and distinct from the morphosyntactic constituent structure. Most of the work on the prosodic hierarchy has dealt with supra-word-level constituency, but there has been some work extending phonological constituency down inside words. Booij & Rubach (1984,1987) have appealed to phonological words that may be morphosyntactic word-internal, and Inkelas (1988) has recently proposed a further extension, in which there are two completely parallel hierarchies. Viewed from this perspective we should not be surprised at the existence of word-internal phrase boundaries, for the words in question are morpho-syntactic, whereas the phrases are prosodic, and there is no good reason to assume that the two hierarchies should be aligned. The properties of the Aoyagi prefixes may be readily described in terms of Inkelas’ notion of dual prosodic and morpho-syntactic subcategorization. Like other affixes, Aoyagi prefixes morphologically subcategorize a stem. Unlike other affixes, they prosodically subcategorize a minor phrase.

The existence of word-internal minor phrase boundary also bears on the controversial question of whether phonological rules refer directly to syntactic structure, as proposed by Kaisse (1985) among others, or whether post-lexical rules refer only to a hierarchy of phonological phrases, as advocated by Selkirk (1978) and Nespor & Vogel (1986), among others, with reference to syntax possible only indirectly as a result of the influence of syntax on phonological phrasing.

It is difficult to find real differences between these two general approaches, though there are of course many differences between particular instantiations of them. There seems to be no difference in principle between the direct and indirect theories as far as how individual rules may parse the utterance. Any constraint that

we might impose on direct reference to syntactic structure could equally well be formulated as a constraint on the mapping between syntactic structure and prosodic structure, and conversely.

A clearer difference is that under the indirect reference hypothesis the various phrasal rules must all parse the utterance in the same way,⁷ whereas the direct reference hypothesis imposes no such constraint. Consider, for example, a direct reference theory in which there are no constraints on the parse and the corresponding indirect reference theory in which there are no constraints on the phrasing algorithm. Now add the constraint to the indirect reference theory that there be only one level of phrasing. This does not constrain the class of phrasal rules at all — any single rule could be formulated just as it might be without this constraint. But it requires that all phrasal rules use the same parse. We could, for example, parse an SOV sentence [SO][V] or [S][OV], but we could not have a language in which one rule used the former parse and another rule the latter parse. In this way the indirect reference hypothesis constrains the class of languages even though it does not constrain the class of rules.

The skeptic may reply that we are not playing fair — we have imposed a constraint on the indirect reference theory that we have not imposed on the direct reference theory. This is true, but the crucial point is that the direct reference theory provides no straightforward way of imposing a comparable constraint.⁸ In our simple example it is not too difficult to find an equivalent constraint: we need only require that all phrasal rules parse the syntactic structure in the same way. But once we permit a richer phonological phrasing the problem becomes harder — we must not only limit the number of distinct parses to some fixed number, but they must also be hierarchically related. In sum, the indirect reference hypothesis imposes what appears to be the right constraint in an extremely straightforward way, whereas it is more difficult to state this constraint under the direct reference hypothesis.

There is, however, a second way in which the two approaches differ. Even if we can constrain how individual rules parse the utterance equally well under either hypothesis, the indirect reference hypothesis allows us to impose tighter constraints on how information is used, since information to which the phrasing rules are permitted access need not be available directly to the phrasal phonological rules, and if it is not made available directly will be propagated to the phrasal rules only in a limited way.

The existence of the Aoyagi prefixes consequently provides an argument in favor of the indirect approach. Suppose that the application of post-lexical rules is governed directly by syntactic structure and that, therefore, there is no such entity as a minor phrase. Instead, post-lexical rules that in the indirect reference theory would be formulated as referring to minor phrases will refer directly to whatever information would be used in the indirect theory to parse the utterance into minor

⁷ More formally put, the constituents required by the phrasal rules must unify into a hierarchical structure.

⁸ The same constraint, of course, cannot be imposed on the direct reference theory since *ex hypothesi* it has no notion of phonological phrase.

phrases. But since Aoyagi prefixes induce minor phrase boundaries word-internally, it would be necessary for post-lexical phonological rules to have access to the internal structure of words, including the identity of particular morphemes, since they must be able to distinguish the Aoyagi prefixes from other prefixes. This is of course a blatant violation of the generally sound hypothesis of Lexical Phonology (Kiparsky 1982, Mohanan 1982, 1986) that post-lexical rules do not have access to the internal structure of words.

If the structure that governs the application of post-lexical rules is a phonological structure, distinct from syntactic structure, the behaviour of the Aoyagi prefixes is not so problematic. That is, given a mechanism for constructing phonological phrases within the lexicon, post-lexical rules can refer to this information without being given unconstrained access to word-internal information.

6. Conclusion

Certain Japanese prefixes typically belong to a separate minor phrase from the stem to which they attach. Minor phrases typically contain more than one word and are domains of application of post-lexical rules, yet the evidence favors the traditional claim that these prefixes really are prefixes. It therefore appears to be possible for a prosodic phrase boundary to appear inside a lexical word. This fact provides an argument in favor of the indirect reference hypothesis, under which phrasal phonological rules refer to morpho-syntactic structure only indirectly, via the prosodic structure. It also provides additional support for Inkelas' proposal that prosodic constituency exists in the lexicon and that morphemes can subcategorize for prosodic constituents as well as morpho-syntactic constituents.

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