Japanese Pitch Accent in a Typological Perspective

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Abstract

Standard Tokyo Japanese has a rich pitch-accent system where multiple pitch patterns are differentiated from each other in terms of the presence/absence of an abrupt pitch fall as well as its position. However, this is only one type of system among the variety of pitch-accent systems found in the language. This paper looks at these pitch-accent systems from typological viewpoints, through a comparison of the standard variety with some regional dialects that show radically different features.

Index Terms: pitch accent, Japanese dialects, distinctive feature, mora, question prosody

1. Introduction

Standard Tokyo Japanese has a rich pitch-accent system and has been studied and reported in depth in the literature. However, this is only one type of system among the variety of pitch-accent systems found in the language. The following shows the diversity of the language.

(1) a. Distinctive feature

Unlike Tokyo Japanese, some dialects use pitch rise rather than pitch fall to show lexical contrasts. This includes the Narada Dialect, a highly endangered dialect spoken near Tokyo, where the presence/absence of an abrupt pitch rise as well as the position of the rise is distinctive.

b. Number of distinctive patterns

Tokyo Japanese permits multiple pitch patterns, e.g., three patterns for trimoraic words, four patterns for trimoraic words, whereas many dialects, especially those spoken in the south, have only two patterns irrespective of the length of the word.

c. Domain of accent/tone assignment

Word accent patterns are defined in the domain of the word (content word) in Tokyo, whereas the domain expands to the prosodic word (content word plus one or more grammatical particles) in many other dialects.

d. Mora-counting vs. syllable-counting

The prosodic system of Tokyo Japanese relies heavily on the mora (and the bimoraic foot) in computing accent patterns, whereas Kagoshima Japanese uses the syllable to measure phonological distances.

e. Culminativity

Word accent of Tokyo Japanese has a culminative function by which only one lexical pitch accent is permitted per word, whereas quite a few dialects can have more than one accent (or distinctive High tone) in the same domain.

f. Right vs. left dominance

Tokyo Japanese has a right-dominant compound accent rule whereby the final member determines the basic prosodic pattern of the compound. This contrasts very sharply with a left-dominant compound accent rule found in Kagoshima Japanese and many other dialects, where the pitch pattern of the initial member spreads over to the entire compound.

g. Question prosody

Tokyo Japanese raises pitch at the end of interrogative sentences, whereas many dialects including Kagoshima Japanese lower pitch in the same position.

Due to the limitation of space, we will restrict ourselves to (1a) and (1g) in this paper.

2. Distinctive Feature

The pitch-accent system of Tokyo Japanese is a ‘multi-pattern accent’ system where the number of distinctive pitch patterns increases as the word becomes longer ([1]). Trimoraic nouns, for example, exhibit four patterns illustrated in (2), where high-pitched portions are indicated by capital letters for the sake of description.

(2) a. KA.bu.to-ga ‘helmet-NOM’
   b. ko.KO_ro-ga ‘heart-NOM’
   c. o.TO.KO-ga ‘man-NOM’
   d. sa.KA.NA-GA ‘fish-NOM’

The pitch patterns as in (2) have been analyzed in a theoretical framework employing the notion of ‘word accent’ ([2], [3]; see [4] for a compact summary of various studies on Japanese pitch accent). This ‘accentual’ analysis assumes that a certain position of the word is phonologically prominent and marked by a lexical pitch accent. In the case of Tokyo Japanese, the mora immediately before a sudden pitch fall is assumed to be phonologically ‘accented’, whereas words involving no such pitch fall are labeled as ‘unaccented’. Thus, the three-mora nouns in (2) can be analyzed as in (3), where apostrophes denote pitch accent, or the position of an abrupt pitch fall.

(3) a. ka’bu.to
   b. ko.ko’.ro
   c. o.to.ko’
   d. saكا.nا

Obviously, this ‘accentual’ analysis is abstract and underspecified in that what is only marked is the position of pitch fall. In finally-accented words such as (2/3c), this phonetic feature is manifested between the word-final mora and the following particle. If the word is not accompanied by any particle, the finally-accented pattern becomes phonetically very similar to and perceptually indistinguishable from the unaccented pattern in (2/3d) ([5]). While the position of pitch
fall is marked in (3), the position of pitch rise is not specified at all since it can be fully predicted: pitch rises between the first two moras, e.g. (2/3b-d), unless the word is accented on its initial mora: e.g. (2/3a).

What the accentual representations mean is that pitch fall plays a distinctive role in the pitch-accent system of Tokyo Japanese. In other words, every word must be specified in the lexicon with respect to whether it has a pitch fall and, if it does, where the fall occurs ([2]; [3], [6]; see [7] for a more underspecified analysis).

According to Uwano ([8]), pitch fall plays a distinctive role not only in Tokyo Japanese but also in a majority of Japanese pitch-accent systems. On the other hand, there are a few systems where pitch features other than pitch fall play a more pivotal role. Uwano describes some interesting systems where pitch rise functions distinctively. One such case is the system of the Narada dialect, which is a highly endangered dialect spoken in a remote mountainous village in Yamanashi Prefecture (about 180 km to the west of Tokyo). Like Tokyo Japanese, this dialect permits n+1 patterns for n-mora nouns, but its surface patterns are strikingly different from those of the standard dialect. This is illustrated with trisyllabic nouns below, which should be compared with those of Tokyo Japanese given in (2) above.

\[(4)\]
\[
\begin{align*}
\text{a. ka.BU.to} & \quad \text{‘helmet’} \\
\text{b. KO.ko.RO} & \quad \text{‘heart’} \\
\text{c. O.to.ko} & \quad \text{‘man’} \\
\text{d. SA.ka.ma} & \quad \text{‘fish’} \\
\end{align*}
\]

Uwano ([8], [9]) attempted to provide a principled account of these patterns with the same notion of ‘word accent’ as used in the description of Tokyo Japanese. He successfully did so by assuming that pitch rise rather than pitch fall is distinctive in this system. Using /\text{?}/ as an accent marker for pitch rise, or ‘raising kernel’ in Uwano’s terminology, the words in (4) can be represented as follows.

\[(5)\]
\[
\begin{align*}
\text{a. ka.BU.to} & \quad \text{‘helmet’} \\
\text{b. ko.ko.ro} & \quad \text{‘heart’} \\
\text{c. o.to.ko} & \quad \text{‘man’} \\
\text{d. sa.ka.ma} & \quad \text{‘fish’} \\
\end{align*}
\]

In this analysis, /\text{?}/ marks the position of pitch rise and is attached to the preceding mora: /\text{?}/ serves to raise pitch immediately after the accented mora, just as /\text{?}/ serves to lower pitch immediately after the accented mora in Tokyo Japanese. Thus, /ka.BU.to/ in (5a) is accented on its initial mora, /ko.ko.ro/ in (5b) is accented on the medial mora, and /o.to.ko/ in (5c) is accented on the final mora. Just like the low pitch on the initial moras in Tokyo Japanese, e.g. (2b-d), the high pitch on the initial moras in (4b-d) can be assigned by a redundancy rule since it is not distinctive and can be predicted from the phonological structure. Seen in this way, /sa.ka.ma/ in (4d) can be analyzed as ‘unaccented’, just like /sa.ka.ma/ (2d) in Tokyo Japanese.

A truly insightful aspect of this analysis is that the accent patterns of Narada Japanese can be analyzed in exactly the same way as those in Tokyo Japanese: words are ‘accented’ in the same position in the two dialects. The two systems display different surface pitch patterns because the accent is realized in different ways. The word accent in Tokyo involves a ‘lowering kernel’ and lowers pitch immediately after it, whereas the word accent in Narada involves a ‘raising kernel’ which raises pitch immediately after it.

In sum, the pitch-accent systems of Tokyo and Narada Japanese can be analyzed in exactly the same way if it is assumed that pitch fall is distinctive in the former system while pitch rise is distinctive in the latter. Stated conversely, two pitch-accent systems of Japanese can differ in the phonetic nature of word accent although they would otherwise look very similar. This means that the parameter pertaining to the phonetic nature of pitch accent is quite independent of other parameters including those that determine the number of distinctive pitch patterns, the domain of pitch accent assignment, and culminativity.

3. Question Intonation

3.1. Tokyo type

Different pitch-accent systems of Japanese use pitch rises and falls in different ways in sentence-level processes, too. Question intonation is one such case. Japanese pitch-accent systems fall into two groups, those in which pitch rise is used as a phonetic cue to questions (Tokyo type) and those in which pitch fall signals interrogative intonation (Kagoshima type).

Our preliminary analysis shows that the latter type is found in two major areas in the Japanese Archipelago: northern Tohoku area in the north and Kyushu area in the south (Map 1).

MAP 1 Areas where pitch falls at the end of interrogative sentences

In the central part of Japan, pitch rise is the predominant phonetic cue to questions. In Tokyo Japanese, for example, pitch is raised at the end of interrogative sentences. Figure 1 compares the typical F0 patterns of one-word sentences /a.ME/ ‘(It’s) rain’ and /a.ME/ ‘(It’s) candy’ with those of their interrogative forms, /A.me/ ‘(Is it) rain?’ and /A.me/ ‘(Is it) candy?’

\[(a)\]

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In this analysis, /\text{?}/ marks the position of pitch rise and is attached to the preceding mora: /\text{?}/ serves to raise pitch immediately after the accented mora, just as /\text{?}/ serves to lower pitch immediately after the accented mora in Tokyo Japanese. Thus, /ka.BU.to/ in (5a) is accented on its initial mora, /ko.ko.ro/ in (5b) is accented on the medial mora, and /o.to.ko/ in (5c) is accented on the final mora. Just like the low pitch on the initial moras in Tokyo Japanese, e.g. (2b-d), the high pitch on the initial moras in (4b-d) can be assigned by a redundancy rule since it is not distinctive and can be predicted from the phonological structure. Seen in this way, /sa.ka.ma/ in (4d) can be analyzed as ‘unaccented’, just like /sa.ka.ma/ (2d) in Tokyo Japanese.

A truly insightful aspect of this analysis is that the accent patterns of Narada Japanese can be analyzed in exactly the same way as those in Tokyo Japanese: words are ‘accented’ in the same position in the two dialects. The two systems display different surface pitch patterns because the accent is realized in different ways. The word accent in Tokyo involves a ‘lowering kernel’ and lowers pitch immediately after it,
The same pitch feature is used in Kyoto/Osaka Japanese. This dialect has different surface pitch patterns from Tokyo Japanese, but is not different from it in using pitch rise as a dominant phonetic cue to questions. Thus, /a.ME?/ ‘rain?’ and /A.ME?/ ‘candy?’ are clearly differentiated from their declarative forms /a.ME/ ‘rain’ and /A.ME/ ‘candy’ primarily by involving a final pitch rise.

3.2. Kagoshima type

While final pitch rise characterizes interrogative sentences in Tokyo and Kyoto Japanese, an opposite intonation pattern is observed in the northern and southern dialects. In Kagoshima Japanese spoken in the south, for example, pitch drops rather than rises at the end of interrogative sentences not only in words that originally have a pitch fall (Type A) but also in those that do not (Type B) ([10], [11]; cf. [12]). This can be seen from Figure 2, where the same one-word sentences in Figure 1 are used.
In this dialect, ‘rain’ and ‘candy’ have opposite lexical pitch patterns from the same words in Tokyo Japanese. At the sentence level, the prosodic differences between the two dialects become larger because of the different strategies used to signal questions: sentence-final pitch falls in Kagoshima versus pitch rises in the same position in Tokyo. In the former dialect, Type A words like /A.me/ ‘candy’ display a pitch fall between the two syllables in the declarative sentence as a manifestation of its lexical pitch accent (Figure 2b). This pitch fall is strengthened, i.e. gets longer and steeper, in the interrogative sentence (Figure 2d).

The presence of a pitch fall as a question marker is more evident in the case of Type B words like /a.ME/ ‘rain’, which is pronounced without a final pitch fall in the declarative form (Figure 2a), but with a sharp pitch fall in the interrogative form (Figure 2c). In fact, the interrogative form of /a.ME/ ‘rain’ (Figure 2c) has a pitch fall within the prolonged final syllable, a pitch pattern that is not generally observed in the syllable-based lexical prosody of Kagoshima Japanese.

The comparison between Figures 1 and 2 shows that there are two types of question prosody in Japanese: Tokyo type (pitch rise) and Kagoshima type (pitch fall). Needless to say, the difference between Tokyo and Kagoshima Japanese is observed not just in one-word sentences but in every type of interrogative sentence.

What is most interesting about the two types of question prosody is that these two types are observed in pitch-accent systems that would otherwise look very similar to each other. Iwate Japanese, for example, has a lexical pitch-accent system similar to that of Tokyo Japanese ([1]). However, it belongs to Kagoshima type as far as question prosody is concerned: it employs pitch fall as a phonetic cue to questions (Uwano, p.c.). This means that the parameter pertaining to the choice of question prosody is quite independent of other parameters related to pitch accent.

4. Conclusion
In this paper we have seen that different pitch-accent systems of Japanese employ pitch features in quite different ways. As for the distinctive feature of pitch accent, Tokyo Japanese employs the presence or absence of a pitch fall as well as its position as a distinctive feature. Narada Japanese, on the other hand, employs the presence or absence of a pitch rise as well as its position as a distinctive feature. Given that the two dialects otherwise have very similar pitch-accent systems, it is clear that the phonetic nature of lexical pitch accent is quite independent of other pitch features characterizing pitch accent of Japanese.

Similarly, question prosody exhibits contrastive pitch patterns in different pitch-accent systems of the language. Pitch-accent systems found in the central part of Japan, including Tokyo and Kyoto Japanese, use a sentence-final pitch rise as a phonetic correlate of question intonation (as opposed to declarative intonation). In the periphery of the country, in contrast, we find many pitch-accent systems where pitch fall is used to signal questions. Since some of these latter systems are very similar to the system of Tokyo Japanese in other respects, it follows that the binary choice of question prosody is an independent parameter among many parameters characterizing Japanese pitch accent.

Japanese dialects display variability in many other respects, too, including the number of contrastive pitch patterns, the domain of pitch accent assignment, the directionality of pitch accent assignment (left-to-right versus right-to-left), the counting unit (mora-counting versus syllable-counting), culminativity (versus non-culminativity), dominance in compounds (right dominance versus left dominance), and the phonetic nature of vocative intonation. All these factors seem more or less independent of each other, which suggests the complexity and diversity of pitch-accent systems of Japanese ([13], [14]).

5. Acknowledgements
The work reported in this paper was supported by the NINJAL collaborative research project ‘Phonological characteristics of the Japanese lexicon’ and the JSPS grants-in-Aid for Scientific Research (Grant no. 25580098 and 26244022).

6. References