

PITCH ACCENT AND VOWEL DEVOICING IN JAPANESE

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ABSTRACT

Japanese is widely recognized as a prototypical pitch-accent language, based on the fact that, given the “accent” location or the lack thereof, the tonal pattern of the entire word is totally predictable. Therefore, unlike tone languages, specification of the tone of each syllable is unnecessary. Consequently, it has been argued that, although Japanese may superficially resemble tone languages, it is essentially more like such stress-accent languages as English. However, unlike stress-accent languages, Tokyo Japanese exhibits no evidence of need to consider the so-called accented syllable more prominent than others. In fact, the very notion of accent may lead to an incorrect prediction that the vowel of an “accented” syllable is less likely deleted than other vowels. By examining the vowel devoicing (deletion) phenomenon in Japanese, the present paper reconsiders the notion of pitch accent as applied to Tokyo Japanese.

1. INTRODUCTION

Accent is a prominence given to a certain syllable in a word or phrase over the adjacent syllables, independently of the mode in which this prominence is produced. It serves to differentiate lexical and/or communicative meanings.

Languages are often characterized as *tonal* or *non-tonal*. Tonal languages utilize pitch to distinguish lexical items, whereas non-tonal languages do not use pitch distinctively. Tonal languages are further divided into *tone languages* and *pitch-accent languages*. In tone languages, the tone of each syllable is unpredictable and, therefore, must be specified in the lexicon. No syllable in tone languages is considered more prominent (i.e. accented) than any other(s). In pitch-accent languages, by contrast, the specification of some accent location(s) is sufficient to predict the tonal configuration, or melody, of the entire word. Therefore, the syllable on which such an accent falls is considered more prominent than other syllables. It can also be said that moving from one tone to the next in tone languages is a syllable-level phenomenon, whereas such a movement in pitch-accent languages is a word-level phenomenon.

The Tokyo dialect of Japanese has traditionally been described in terms of the way each tone-bearing unit carries either a high (H) tone or low (L) tone. (Whether the tone-bearing unit is a syllable or a mora remains controversial.) For example, the 5-syllable word /yamazakura/ ‘wild cherry’ is traditionally associated in the lexicon with the LHHLL pattern. Note that no syllable carries special prominence, and thus the notion of accent is foreign to this type of description.

In linguistics literature, however, Tokyo Japanese has been characterized as an archetypal pitch-accent language. At most one syllable is marked as accented, because such a description is sufficient to identify the melody of the entire word. (Not all Japanese words have accent. Those that contain no accented

syllable are referred to as *accentless* words.) In the case of /yamazákura/, marking the third syllable as accented can correctly derive the LHHLL pattern by application of the following rules: (i) assign H to all syllables up to the accented syllable, if any, or to the final syllable if no syllable is marked accented; (ii) assign L to all syllables following the accented syllable; (iii) reassign L to the initial syllable unless it is accented. Because the initial L is considered as default, only the location where pitch drops from H to L is significant in Japanese tonal phenomena [1]. In this analysis, accent manifests as the H tone that is immediately followed by a L tone.

This tonal characteristic of Tokyo Japanese is represented in standard autosegmental description in such a way that one syllable in accented words is marked with a star, and the tonal pattern of the words containing a starred syllable is derived by use of the following rules: (i) associate the vowel of the starred syllable with H (a language-specific tone association rule); (ii) spread the H tone leftward to the initial syllable, and the L tone rightward to the final syllable (a universal tone association rule); (iii) insert the initial L where appropriate [2].

In these pitch-accent descriptions, although only one syllable is marked in the lexicon, every syllable is associated with either a H or L tone at the surface level. However, acoustical analyses of Japanese utterances provide little evidence of such a claim. That is, tones appear to be more sparsely distributed at the surface level [3]. So in recent years it has been argued that Tokyo Japanese is similar to *stress-accent* languages, e.g. English, even at the surface level [3]. In this new pitch-accent analysis, the notion of accent plays an even more significant role than had previously been supposed.

In English declarative intonation, the most significant cue of accent is pitch, followed by length, and then loudness [4]; accented syllables are pronounced more clearly than others, resisting a high level of vowel centralization [5]. Furthermore, those speakers who tend to delete vowels do not delete accented ones; e.g., the accented vowel [ɛ] is maintained in ‘president’ /pɹɛzɪdənt/ pronounced as [pɹɛzdⁿ]. It is, therefore, reasonable to conclude that the accented/stressed syllable in English is more prominent than other syllables. In Japanese, on the other hand, accent is manifested solely by pitch modulation; the accented syllable is neither longer nor louder than any others [6]. We will examine in the following whether the alleged accented syllable in Japanese is likely maintained.

It is important to note here that the term *accent* is used in two different senses: one is for prominence of a certain syllable over others, and the other is for predictability of the word tonal configuration. These two concepts are independent of each other. Recognizing a certain syllable as more prominent than others does not necessarily predict the melody of the word. Conversely, the fact that marking one syllable is sufficient to predict the word

melody does not entail the marked syllable's being more prominent than other syllables. Or does it? Is /za/ in /yama-zakura/, for example, more prominent than the other syllables?

In its discussion of vowel devoicing — a phenomenon in which high vowels drop in certain phonological environments — the present paper raises the question of whether it is appropriate to consider Tokyo Japanese as a prototypical accent language.

2. VOWEL DEVOICING

In Japanese, especially in the Tokyo dialect, high vowels normally drop when they occur between voiceless obstruents or in word-final position. (Non-high vowels may also drop, but less frequently and only in fast utterances [7, 8].) This phenomenon of vowel deletion is customarily referred to as *vowel devoicing*. Although the term “devoiced vowel” sounds oxymoron, most analysts are reluctant to consider it a vowel deletion phenomenon because the deleted vowels are nonetheless psychologically present in the native speakers' perception, and because the recognition of vowel deletion results in consonant clusters that would make Japanese phonotactics highly complex (cf. [8]). Table 1 provides some example of vowel devoicing.

/kiken/	‘danger’	[k'ken] or [kiken]
/kusuri/	‘medicine’	[kɕtɕuri] or [kɕɕtɕuri]
/aki/	‘autumn’	[ak ^h] or [akɕ]
/aku/	‘evil’	[ak ^h] or [akɕ]

Table 1: Examples of vowel devoicing

These devoiced high vowels *can* be fully voiced without changing the word meanings, and when native speakers are asked to pronounce each word very carefully, they do not devoice vowels. (This is certainly due in part to the Japanese syllabic orthography.) In normal conversation, however, lack of devoicing makes the utterance sound like a non-Tokyo dialect. The degree of vowel devoicing varies from individual to individual, and, to date, its exact conditions have not been thoroughly understood.

3. ACCENT AND VOWEL DEVOICING

In order to examine whether the “accented” syllable is more prominent than other syllables, let us consider how “accent” interacts with vowel devoicing. (To avoid awkwardness, hereafter the words *accent*, *accented*, and *unaccented* will not appear within quotation marks. Keep in mind that they are used as conventional labels, not in their substantial senses. Accent markings appearing in pronunciation dictionaries are also maintained for the sake of simplicity in argumentation.)

3.1. Devoicing of Accented Vowels

Shibatani claims that accented vowels are not devoiced [9, p.161]. However, accented vowels do undergo devoicing, as shown in Table 2. Devoicing in these examples is obligatory in natural Tokyo pronunciation.

/tika/	‘underground’	[tɕika]
/kikai/	‘machine’	[kɕikai]
/akikaze/	‘autumn wind’	[akɕikaze]
/aitiken/	‘Aichi prefecture’	[aitɕiken]

Table 2: Devoicing of accented vowels

3.2. Devoicing of Final High Vowels

Martin points out that the high vowel in word-final position is devoiced only if one of the preceding syllables is accented [10]. That is, according to Martin, (i) in accented words, the final high vowel must be devoiced if it is unaccented, but (ii) in accentless words, the final high vowel must not be devoiced. Martin's observation is valid to some extent. Regarding (i), devoicing of /u/ is obligatory in the verb-ending /másu/ and the copula /désu/ in Tokyo Japanese declarative intonation; regarding (ii), /i/ is normally devoiced in /áki/ ‘autumn’ (the first syllable accented), but it must not be devoiced in /aki/ ‘opening’ (accentless).

However, contrary to Martin (i), final high vowels need not be devoiced in most accented words, or at least the utterances lacking the final devoicing do not necessarily sound unnatural in Tokyo Japanese. Table 3 below provides some examples of accented words with a voiced final high vowel that can be compared with the words with identical strings of phonemes, but lacking accent. It can be said that, with some exceptions (e.g. /másu/ and /désu/, as mentioned above), devoicing of high vowels in word-final position is optional.

/kási/	‘lyrics’	[kaɕi] or [kasi]
/kasi/ (accentless)	‘a loan’	[kasi] NOT [kaɕi]
/káti/	‘value’	[katɕi] or [kati]
/kati/ (accentless)	‘victory’	[kati] NOT [katɕi]
/kásu/	‘to tax’	[kastɕu] or [kastu]
/kasu/ (accentless)	‘to loan’	[kastu] NOT [kastɕu]
/káku/	‘write’	[kaktɕu] or [kaktu]
/kaku/ (accentless)	‘to loan’	[kaktu] NOT [kaktɕu]

Table 3: Devoicing of the final vowel in accented words

Regarding Martin's claim (ii), although devoicing of the final high vowel is prohibited in accentless disyllabic words, as shown in Table 3 above, there are abundant examples of final devoicing when accentless words are longer than two syllables.

/toiki/	‘sigh’	[toiki]
/mukasi/	‘old times’	[mutɕikaɕi]
/ukatu/	‘careless’	[utɕatɕu]
/keisatu/	‘police’	[ke:satɕu]
/kyookatu/	‘threat’	[kjo:katsɕu]
/henzimat/	‘waiting for reply’	[hendɕimatɕi]
/osyoogatu/	‘new year’	[oɕo:ɕatɕu]

Table 4: Devoicing of the final vowel in unaccented words

In these words, final-vowel devoicing is the norm but not obligatory. It appears, therefore, that the constraint on final-vowel devoicing, as claimed by Martin (ii), applies only to bisyllabic unaccented words.

3.3. Successive Vowel Devoicing

Han contends that devoicing of two consecutive syllables is rare, and that devoicing of three consecutive syllables does not occur [11]. However, devoicing of two consecutive vowels is commonplace, and even three devoiced vowels in a row can be

easily heard in natural Tokyo Japanese.

/titikata/	‘paternal side’	[tʃitʃikata]
/hutuka/	‘two days’	[ɸutʃuka]
/kifukin/	‘donation money’	[kʃifukin]
/tukikage/	‘moonlight’	[tʃukikage]
/sikituméru/	‘spread over’	[ʃikʃitʃumertʃu]

Table 5: Devoicing of successive vowels

Let us now consider the cases in which both accented and unaccented syllables satisfy devoicing condition to see whether accented vowels are less prone to devoicing than unaccented ones. The next table presents some disyllabic words with an accented initial syllable.

/títi/	‘father’	[tʃitʃi]
/tíku/	‘area’	[tʃikʃu]
/tútu/	‘cylinder’	[tʃutʃtu]
/húsi/	‘immortal’	[ɸutʃi]

Table 6: Devoicing of the initial accented vowel

Significantly, it is the accented vowel that undergoes devoicing, rather than the unaccented final vowel. Voicing the former and devoicing the latter is unacceptable. (Both vowels can be devoiced only if the word is embedded in a phrase, but not when the word is uttered in isolation.) This fact indicates that, as far as devoicing is concerned, the so-called accented syllable is not more prominent than the final syllable.

The next case to consider is when two candidates for devoicing are in non-final positions and the first syllable of the two carries accent. (The relevant part is marked in bold face. The accent location is determined by examining hyper careful pronunciation.)

/tosítuki/	‘years, time’	[toʃitʃuʃki]
/okíkusan/	‘Okiku’ (name)	[okʃikuʃan]
/ryakúsíte/	‘in abbreviation’	[rjakʃuʃite]
/sabisíkute/	‘feeling lonely’	[sabiʃikuʃte]
/utukúsíkusae/	‘even beautiful’	[utʃuʃkuʃikuʃsae]

Table 7: Devoicing of vowels in word-medial positions

Accented syllables undergo devoicing just as unaccented syllables do, and thus they do not exhibit any special status.

The third case for examination consists of two syllables in non-final positions, with the second syllable carrying accent.

/sikísya/	‘conductor’	[ʃikʃiʃa] or [ʃikiʃa]
/syukúsya/	‘lodging’	[ʃuʃkuʃa] or [ʃuʃkuʃa]
/ikitúkeba/	‘if arrive’	[ikʃitʃukeba]
/arukítútu/	‘while walking’	[arukʃitʃutʃtu]
/nootikíkaku/	‘agrarian plan’	[no:tʃikʃikakʃu]
/utukúsíkatta/	‘was beautiful’	[utʃuʃkuʃikʃatta]

Table 8: Devoicing of accented vowels word-medial positions

Here we see some variations. While the accented vowels are devoiced in the words with four or more syllables, they can be

voiced in trisyllabic words. Some might take this as evidence for an accent effect on vowel devoicing. However, such an irregularity is more likely a property of trisyllabic words in general than of the accented syllable. If the same strings of sounds are embedded, as shown in Table 9, the accented vowels become devoiced. Therefore, as in the two previous cases, we do not find evidence for accent effects here either.

/yuusikísya/	‘intellectuals’	[ju:ʃikʃiʃa]
/karisyukúsya/	‘temporary lodging’	[kariʃuʃkuʃa]
/soosikíkan/	‘chief commander’	[so:ʃikʃikan]

Table 9: Devoicing of accented vowels in longer words

To sum up, the so-called accented syllables do not evidence any more significance than adjacent unaccented syllables in the vowel devoicing phenomenon; the vowels of accented syllables drop as freely as those of unaccented syllables.

4. DISCUSSION

Analyses of Tokyo Japanese as a pitch-accent language encounter tremendous difficulty when they attempt to describe vowel devoicing. Because the accentual H tone cannot be associated with a voiceless segment, the pitch-accent analyses are forced to shift the accent to some adjacent syllable (or delete the accent).

Determining the accent location is difficult when vowels are devoiced, and, not surprisingly, there are considerable variations among native speakers when they are asked to voice all syllables. Furthermore, in recent years tonal patterns of words have been rapidly changing. Kindaichi reports that less than 50 years ago, when he served as a pronunciation advisor at Japan Broadcasting Corporation (NHK), such words as /tosiyori/ ‘elderly people’ and /hirusugi/ ‘early afternoon’ had accent on either the final or the penultimate syllable, and he selected final accent as the norm [12]. Today these words are uttered exclusively with penultimate accent, /tosiyóri/ and /hirusúgi/.

Kindaichi also points out that most unaccented adjectives have recently acquired accent on the final syllable of the stem. For example, /tumeta-i/ ‘cold’, /akaru-i/ ‘bright’, /kanasi-i/ ‘sad’ used to be pronounced without accent, but now, they are normally pronounced with penultimate accent.

Because of these rapid changes, many descriptions in accent dictionaries have become obsolete and unreliable. Understandably, inaccurate descriptions are sometimes observed in linguistic literature as well. McCawley, for example, transcribes the verbs /húku/ [ɸutʃku] ‘blow’, /túku/ [tʃutʃku] ‘adhere’, and /kakúsu/ [kaktʃtu] ‘conceal’ with final accent due to the penultimate vowel devoicing [13, p.266]. He contends that when an accented syllable is devoiced, accent generally shifts one syllable to the right. However, native speakers do not utter these words with the LH or LHH pattern when all syllables are fully voiced, and they do not perceive any accent shift between the voiced and devoiced versions of pronunciation.

McCawley also argues that the adverbial forms of the adjectives have underlying antepenultimate accent, e.g. /tíkaku/ [tʃikakʃu] ‘near’ and /húkaku/ [ɸuʃkakʃu] ‘deep’, but because these antepenultimate syllables are devoiced, accent manifests itself on the penultimate syllables, i.e. it is shifted to the right and

realized as /tikáku/ and /hukáku/. However, both HLL and LHL melodies for these words are normal in Tokyo Japanese. McCawley's data provide no evidence for considering that vowel devoicing shifts accent synchronically.

Haraguchi's autosegmental account is also entrapped by the problem of devoiced accented syllables [2]. He argues that when devoicing occurs, accent shifts one segment to the left. For example, he transcribes the past-tense form of /kanási-i/ as /kanási-katta/ although the devoiced /si/ is associated underlyingly with accent. This description of accent shift is untenable; /kanási-katta/ is the norm, and /kanási-katta/ is an anomalous utterance.

As mentioned previously, native speakers categorize such words as /húku/ [ɸt̚t̚k̚t̚t̚] 'blow' and /túku/ [ts̚t̚t̚k̚t̚t̚] 'adhere' together with those words with the HL melody, rather than with single-syllable words, despite the fact that there is no H tone in the words. Han explains this phenomenon in such a way that the pitch fall or rise of the second syllable is the cue to accentual patterns. If the final vowel is pronounced with a pitch fall, the perceived accent is HL, whereas if the final vowel involves a pitch rise, the melody of the word is perceived as LH [11]. Sugito argues that the most significant acoustic correlate of the Japanese accent is a falling F0 contour on the post-accent syllable, rather than the F0-peak location itself, and that native speakers perceive an *illusory* H tone on a syllable when it is followed by a falling F0 contour [14]. Subsequent researches report the degree of the F0 fall necessary to induce such illusory perception [15, 16]. It has been reported that, unlike Han's claim, the post-accent syllable need not have a rising pitch for LH perception; if the F0 fall rate is less than a certain value, native speakers associate the word with the LH melody.

However, because all of the researchers mentioned herein have analyzed the Japanese tonal phenomena within the pitch-accent paradigm, the existence of an accentual H tone is presupposed. No experiment has been conducted to verify the claim that native speakers in fact hear an illusory H tone on a devoiced accented vowel in words like /húku/. The researchers typically synthesized bisyllabic words with a devoiced first vowel and varying F0 fall on the second vowel, and asked native speakers to identify the meanings of each stimulus, e.g. whether [ɸt̚t̚k̚t̚t̚] is 'blow' (HL) or 'cloth' (LH). If the native speakers identified the word as 'blow', then it was assumed that they heard an illusory H tone on the first syllable. However, it may be the case that native speakers simply hear the presence or absence of a pitch fall (a falling tone, F).

Although no one argues against the significance of such a pitch fall, representing it as bitonal HL or monotonal F is not a mere notational difference. The F tone can occur without a preceding H tone, but the bitonal HL requires the existence of a H. The issue here is whether the H is present in all accented syllables in Japanese. The answer appears to be negative because words like /kánari/ (conventionally known as HLL) are sometimes pronounced with a very low-pitch on the first syllable, /ka/ in this case, and a significant fall on /na/. The resultant utterance conveys a peculiar nuance, and yet it is perceived as normal as far as the tonal configuration of the word is concerned. By contrast, if the initial syllable exhibits a noticeable pitch fall, the utterance will be perceived as deviant.

Despite the fact that the word melody is predictable, there is no reasonable basis for the syllables conventionally known as accent carriers to be considered more prominent than others. In other words, those "accented" syllables do not bear *accent* as defined as a prominence. The distinctive factor in Tokyo Japanese is a pitch fall, which appears to be associated with a syllable boundary, rather than a particular syllable. Furthermore, if such an association is impossible, due to vowel devoicing, the syllable following the boundary is more significant than the preceding one.

5. CONCLUSION

The present paper has examined whether there is any basis to consider that the "accented" syllables in Tokyo Japanese are more prominent than the "unaccented" syllables. As far as vowel devoicing is concerned, one is unable to find any evidence for such a claim; the "accented" syllables are not more significant than the others. On the other hand, it is unarguable that the melody of words is predictable, and thus specification of the tone of each syllable is superfluous.

How then should Tokyo Japanese be characterized in typological terms? From the perspective taken in this paper, grouping it with tone languages is a more natural categorization than grouping it with such accent languages as English. Tokyo Japanese is a tone language, however impoverished it is.

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