Emergence of Unaccented Words in Japanese

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Abstract

Japanese is crucially different from other 'accent languages' in having a number of 'unaccented words', or words that are pronounced with a rather flat F0 contour. This paper illuminates some phonological factors responsible for the emergence of this peculiar type of word accent in Tokyo Japanese. It demonstrates, specifically, that unaccentedness emerges in words of some specific syllable structures—in four-mora loanwords that consist of four light (monomoraic) syllables as well as in three-mora words consisting of a light syllable followed by a heavy (bimoraic) syllable.

1. Introduction

It is well known that Japanese has two types of lexical words, i.e. accented and unaccented words. Unlike the first type of words, the second type of words involves no abrupt pitch fall at the phonetic output. Statistically, unaccented words account for about a half of Japanese vocabulary [4]. To take placenames, for example, /tookyoo/ 'Tokyo', /oosaka/ 'Osaka' and /hirosima/ 'Hiroshima' are unaccented words, while /kyóoto/ 'Kyoto', /kóobe/ 'Kobe' and /nagásaki/ 'Nagasaki' are accented. In Tokyo Japanese, unaccented words are pronounced in a basically flat pitch, with a certain degree of pitch rise in word/phrase-initial position.

It has been generally assumed in the literature that the distinction between the two classes of words is largely lexical, so that speakers 'learn' the distinction word by word. The goal of this paper is to argue against this traditional view and point out several phonological factors that are responsible for the emergence of unaccentedness. A particularly important factor is the syllable structure of words based on the distinction between heavy (bimoraic) and light (monomoraic) syllables. We will argue in this paper that words of an identical mora length exhibit different accent patterns depending on their syllabic composition.

2. Previous studies

While the accented-unaccented distinction is believed to be largely lexical and unpredictable, there are two linguistic factors that have been claimed in the literature to be responsible for the emergence of unaccented words. One of them concerns the phonological length of the word. It is believed that, other things being equal, unaccentedness tends to emerge in four-mora words and not in words of other phonological lengths.

The other linguistic factor that is claimed to yield unaccented words is the familiarity of individual words. Namely, it is believed that words tend to become unaccented as they become more familiar to the speaker. This view seems plausible to a certain extent. For example, many foreign words that have been in use in Japanese for a long time are pronounced with an unaccented pattern: e.g. /tabako/ 'tabacco', /karuta/ 'Japanese cards', /orugan/ 'choir organ' and /piano/ 'piano'. However, it is not very difficult to find loanwords that are unfamiliar to the speaker/society but are nevertheless pronounced as unaccented words. An extreme case of this is that of unaccented nonsense words. Take nonsense words like /batabina/ and /berugiwa/ written in *katakana* letters, for example. They are pronounced as unaccented words by most native speakers of Japanese although they are entirely new words to them. On the basis of this fact, Kubozono (1996) proposed that foreign words —words written in *katakana* letters— are pronounced with different accent patterns as they involve different phonological structures. Specifically, four-mora words exhibit a high degree of accentual variability depending on their syllable structure. This is shown in Table 1, where the accentuation of foreign place names is analyzed as a function of syllable structure: 'H' and 'L' stand for heavy and light syllables, respectively.

Table 1: *Syllable structure and accent in four-mora loanwords (foreign placenames).*

Syllable structure / Accent pattern	LLLL	HLL	LHL	LLH	HH	Total
Accented	26 (33%)	20 (61%)	38 (95%)	30 (88%)	21 (100%)	135 (64%)
Unaccented	52 (67%)	13 (39%)	2 (5%)	4 (12%)	0 (0%)	71 (34%)

Table 1 reveals two striking facts about the emergence of unaccented words. First, the unaccented pattern is most popularly shown by four-mora words that end in a sequence of two light syllables (i.e. #LLLL# and #HLL#). All other syllable structures tend not to yield this particular accent pattern. Second, the unaccented pattern is particularly popular in words beginning with a sequence of two light syllables. Thus, #LLLL# exhibits a more noticeable tendency towards unaccentedness than #HLL#. This type of correlation between

syllable structure and word accent cannot be revealed by only looking at native Japanese words, which consist predominantly of light syllables for historical reasons.

Kubozono's finding regarding the correlation between syllable structure and word accent has been corroborated by other independent statistical studies. Tanaka (1996), for example, examined the accentuation of all four-mora loanwords listed in the NHK Accent Dictionary (1985) and obtained the results which crucially resemble those in Table 1.

In this paper, we will present two more lines of evidence which reinforce Kubozono's view that lexical accent patterns are closely related with and actually predictable from the syllable structure of the word. The first line of evidence comes from an analysis of so-called alphabetic acronyms (section 3), while the other line concerns three-mora non-native words—SJ compounds and loanwords (section 4).

3. Alphabetic acronyms

Alphabetic acronyms refer to abbreviated words used in Japanese that consist of two or more English alphabet letters: e.g. *JR* 'Japan Railways', *NHK* 'Nihon Hoso Kyokai (Japanese Broadcasting Corporation)'. In order to investigate the accent structure of this type of word, we made a list of 80 alphabetic acronyms that are popularly used in contemporary Japanese and examined how they are pronounced by twelve native (five male and five female) speakers of Tokyo Japanese.

The 80 test words used in this experiment fall into two major classes, two-letter and three-letter words, with the former being further classified into three groups according to the phonological structure of their second letter (or N2). Thus, the 80 test words fall into four groups in (1) according to their morphological and phonological structure. The number of words in each group and tokens obtained for each word group are given in brackets. Since each alphabetic letter is pronounced with at least a bimoraic length, three-letter acronyms including those in (1d) are six moras long or longer.

(1) a. two-letter acronyms whose second letter consists of one heavy syllable (22 words, 264 tokens)
ET, IQ, EU, FA, PC, DJ, SP, NG, PK, etc.
b. two-letter acronyms whose second letter consists of two light syllables (17 words, 204 tokens)
CM, FM, LL, SL, SM, SF, OS, CM, BS
c. two-letter acronyms whose second letter is three or more moras long (3 words, 36 tokens)
DH, JR, PR
d. three-letter acronyms (38 words, 456 tokens)
BGM, NHK, SOS, IRA, VHS, OHP, IBM, etc.

Analysis of these acronyms has yielded the results in Table 2 with respect to their accent structure. As is clear from this table, the unaccented pattern emerges in a highly restricted and predictable context: it is only observed in acronyms of (1b)-type, which consist of four moras and end in a sequence of two light syllables. Stated conversely, the accent pattern in question is never observed in words longer than four moras as in (1c) and (1d) or in four-mora words that end in a heavy syllable as in (1a). The absolute lack of the unaccented pattern in these word types suggests that presence of an accent represents a default pattern in alphabetic acronyms on the whole. The same fact also suggests that the accented-unaccented distinction has no direct bearing on the familiarity of a word.

Table 2: *Acronym type and accent pattern.*

Acronym type / Accent pattern	(1a)	(1b)	(1c)	(1d)
Accented	264 (100%)	41 (20%)	36 (100%)	456 (100%)
Unaccented	0 (0%)	163 (80%)	0 (0%)	0 (0%)
Total	264 (100%)	204 (100%)	36 (100%)	456 (100%)

Note that the correlation between word accent and phonological structure as revealed in Table 2 crucially resembles the situation that we saw in the preceding section. Namely, in both ordinary loanwords and alphabetic acronyms, the unaccented pattern characteristically appears in four-mora words that end in a sequence of light syllables; all other mora/syllable structures give rise to accented words.

This said, it is necessary to add that ordinary loanwords and alphabetic acronyms exhibit different patterns when they are accented. As is well known, accented loanwords are generally accented on the antepenultimate mora, or the third mora from the end of the word: e.g. /ku.ri.sú.ma.su/ 'Christmas'. In contrast, alphabetic acronyms usually attract an accent on the initial mora of their final member. Thus, they are accented on the penultimate mora (or the second mora from the end) if their final member is bimoraic as in (2a), on the antepenultimate mora if their final member is three moras long as in (2b), or on the fourth mora from the end of the word if their final member is four moras long as in (2c).

(2) a. ii-tíi (ET), ai-kyúu (IQ), ehu-ée (FA), pii-kée (PK), sii-pii-úu (CPU), enu-tii-tíi (NTT), ee-tii-ému (ATM)
b. dii-éiti (DH), zyee-áaru (JR), pii-áaru (PR), bui-tii-áaru (VTR)
c. bii-emu-dáburyuu (BMW)

The accent patterns in (2) can be accounted for in two different ways. First, they may arise from the stress pattern of English whereby acronyms are accented on their final member. For example, *BC* 'before Christ' and *PTA* 'parent-teacher association' are accented on *C* and *A*, respectively. It is quite possible that this English stress pattern was borrowed into Japanese together with the morphological rule of abbreviation. Alternatively, the accent patterns in (2) can be attributed to the compound accent rule of Japanese whose primary feature is to preserve the accent of the final member in resultant compound expressions. This accent rule is responsible for the accentuation of compound expressions such as /mikkusu-píza/ 'mixed pizza' and /koosoo-bíru/ 'tall buildings'. The same rule, if applied to alphabetic acronyms, will yield the accent patterns in (2).

Returning to the discussion of unaccented alphabetic acronyms, the following question naturally arises from the generalization proposed above: what is responsible for the accented vs. unaccented distinction within the category of (1b) in Table 2? Namely, what is the crucial factor that yields the unaccented pattern in 80% of the words while assigning an accent to the rest of the words in (1b)-type acronyms? A closer look at the data reveals that the syllable structure of the first member of the two-letter acronyms plays an important role here. This can be seen from Table 3, where the accentuation of (1b)-type acronyms is reanalyzed in terms of the syllable structure of their first member (or N2).

Table 3: *Syllable Structure and Accent Pattern of (1b)-type Acronyms.*

N2 syllable structure / Accent pattern	Bisyllabic	Monosyllabic
Accented	2 (3%)	39 (30%)
Unaccented	70 (97%)	93 (70%)
Total	72 (100%)	132 (100%)

The data in Table 3 as combined with the results in Table 2 reveal the following three phonological conditions on the emergence of the unaccented pattern. Of the two factors related to syllable structure, (3b) is obviously much more important than (3c) since none of the four-mora acronyms satisfying (3c) but not (3b) is unaccented.

(3) a. four moras long
b. a sequence of two light syllables word-finally
c. a sequence of two light syllables word-initially

Again, these are exactly the same conditions that are responsible for an unaccented pattern in loanwords which we saw above. In other words, ordinary loanwords and alphabetic acronyms are subject to one and the same set of phonological constraints with respect to the emergence of the unaccented pattern. Given this generalization, one question worth asking is why unaccentedness characteristically occurs in words consisting of four moras and four syllables. This is a highly interesting and challenging question that remains largely unanswered, but it can probably be related to the fact that native Japanese words, which usually consist of light syllables, generally take the unaccented pattern if they are four moras long. Details of this analysis need to be explored in the future.

Finally, it is worth adding that the correlation between word accent and syllable structure in alphabetic acronyms is also observed in Osaka Japanese. According to an ongoing study by Tomoaki Inoue, alphabetic acronyms are pronounced in basically the same way in Osaka as in Tokyo. Specifically, the unaccented pattern is observed in and only in those acronyms that fulfill the first two phonological conditions in (3). Stated conversely, acronyms are invariably accented as opposed to unaccented if they fail to satisfy the two conditions in (3a,b). It is very interesting that different dialects are subject to one and the same set of phonological constraints on the emergence of unaccented acronyms.

4. Trimoraic non-native words

Let us now consider the accented vs. unaccented distinction in three-mora words. While three-mora words do not display as strong a tendency towards unaccentedness as four-mora words, a statistical analysis shows that about a half of three-mora words are still unaccented [4]. Since native Japanese words do not basically contain a heavy syllable, Sino-Japanese (SJ) compounds and loanwords serve as a good source of data for a potential relationship between word accent and syllable structure.

4.1. Sino-Japanese compounds

Let us first consider SJ compounds and examine their accent and syllable structures. SJ morphemes consist of one or two moras, the latter being either syllabic or bisyllabic. In other words, they fall into the three types in (4) when both syllable and mora structures are taken into consideration. Statistically, the type in (4b) accounts for about sixty percent of all SJ morphemes, whereas the types in (4a) and (4c) account for only 25% and 16%, respectively.

(4) a. Monosyllabic and monomoraic
e.g. /é/ ‘picture’, /gó/ ‘word’, /tó/ ‘capital’
b. Monosyllabic and bimoraic
e.g. /dái/ ‘big’, /kyóo/ ‘capital’, /sán/ ‘three’
c. Bisyllabic and bimoraic
e.g. /ya.kú/ ‘role’, /gá.ku/ ‘learning’, /te.tu/ ‘iron’

With an exception of some nativized morphemes such as /ya.kú/ ‘role’ and /te.tu/ ‘iron’, SJ morphemes are generally initially-accented. In contrast, SJ compounds consisting of two morphemes —or, equivalently, two Chinese characters— exhibit a full variety of accent patterns. We will restrict ourselves to three-mora compounds, which take one of the three syllable structures in (5).

(5) a. Heavy+Light
e.g. /kyoo.to/ ‘Kyoto’, /kuu.ki/ ‘air’, /ee.go/ ‘English’
b. Light+Heavy
e.g. /zi.dai/ ‘period, era’, /zi.bun/ ‘(my)self’, /ti.hoo/ ‘provincial area’, /e.hon/ ‘picture book’
c. Light+Light+Light
e.g /ya.ku.syo/ ‘public office ’, /ga.ku.sya/ ‘scholar’, /i.ga.ku/ ‘medicine’

These three-mora SJ compounds fall into three groups according to the accent pattern they take: (a) initial accent (i.e. accent on the initial syllable), (b) final accent (i.e. accent on the final syllable, either heavy or light), and (c) unaccented. They are described in (6) with the examples in (5).

(6) a. Initial-accent
/kyóo.to/, /kúu.ki/, /í.ga.ku/
b. Final-accent
/ti.hóo/, /e.hón/
c. Unaccented
/ee.go/, /zi.dai/, /zi.bun/, /ya.ku.syo/, /ga.ku.sya/

In order to see the distribution and frequencies of these three accent patterns, we looked at all SJ compounds consisting of two SJ morphemes listed in Sugito’s (1996) CD-ROM and examined their accent patterns in relation to syllable structure. The results of this analysis are summarized in Table 4: #LLL# is tentatively excluded from analysis.

Table 4: *Syllable structure and accent in SJ compounds.*

	Initial accent	Final accent	No accent	Total
#HL#	1750 (78%)	13 (1%)	494 (22%)	2257 (100%)
#LH#	230 (15%)	44 (3%)	1298 (83%)	1572 (100%)
Total	1907 (52%)	56 (2%)	1697 (46%)	3660 (100%)

As shown in this table, different syllable structures favor different accent patterns. Specifically, HL bisyllables exhibit a striking tendency towards initial accent, whereas their symmetrical syllable structure, i.e. LH, prefers the unaccented pattern. In fact, more than 80% of LH bisyllables take the unaccented pattern, while only about 20% of HL bisyllables show the same accent pattern. Moreover, the two syllable structures also differ in the extent to which the final accent is tolerated: #HL# disfavors this accent pattern much more than #LH#.

Given the data in Table 4, one may naturally wonder why #HL# prefers an initial accent, whereas #LH# favors the absence of accent as well as a final accent. This correlation

between syllable structure and word accent can be attributed to the interaction of two general constraints or principles assumed in general phonological theory. For one thing, like many languages including English and Latin, Japanese exhibits a very strong tendency to avoid placing an accent on the final syllable of a word (Kubozono 1997). This tendency is attributable to a universal constraint called 'Nonfinality' in a recent phonological theory. In addition to this, Japanese is subject to another general principle called 'Weight-to-Stress Principle (WSP)' by which an accent tends to be attracted onto a heavy syllable rather than a light syllable. These two constraints combined will predict an initial accent for #HL# bisyllables. In contrast, #LH# bisyllables will produce a contradictory result: Initial accent will violate the WPS, whereas final accent will violate Nonfinality. Assigning no accent will result in a better output form than either of these accent patterns.

4.2. Loanwords

Loanwords borrowed from English and other European languages are another type of word that is rich in syllable structure. Only 10% of loanwords are unaccented in Tokyo Japanese, presumably reflecting the fact that English words involve an abrupt pitch fall when pronounced in isolation. The tendency to avoid the absence of accent is strong in three-mora loanwords, whose unaccentedness ratio is only 7% on average.

As can be seen from Table 5, however, this ratio varies slightly depending on the syllable structure involved: #HL# is more likely to take an initial accent than #LH#, whereas #LH# is more likely than #HL# to be finally-accented or unaccented. This represents basically the same situation that we saw in Table 4. In fact, the only major difference between SJ compounds and loanwords is that the latter prefers the initial-accent pattern much more than the former in general.

Table 5: *Syllable structure and accent in three-mora loanwords.*

	Initial accent	Final accent	No accent	Total
#HL#	325 (93%)	0 (0%)	25 (7%)	350 (100%)
#LH#	109 (83%)	13 (10%)	10 (8%)	132 (100%)
Total	434 (90%)	13 (3%)	35 (7%)	482 (100%)

5. Conclusions

In this paper we have investigated phonological factors that are responsible for the emergence of unaccented words in (Tokyo) Japanese. This analysis has demonstrated that the occurrence of this peculiar word accent type is highly correlated with and predictable from the phonological structure of the word. Particularly important is the syllable structure as well as the mora length of the word.

Other things being equal, four-mora words are much more likely to become unaccented than words of other phonological lengths. However, four-mora words exhibit a high degree of accentual variation depending on their syllabic composition. In loanwords and alphabetic acronyms, for example, four-mora words ending in a sequence of two light syllables exhibit a much higher ratio of unaccentedness than those that take different syllable structures. The ratio of unaccentedness continues to rise higher if four-mora words begin with a sequence of light syllables. Consequently, four-mora, four-syllable loanwords and acronyms show the most noticeable tendency towards unaccentedness. By contrast, four-mora words involving a heavy syllable tend to avoid becoming unaccented.

A similar syllable structure effect on the accented/unaccented distinction was found in three-mora words, too. Although three-mora words are much less likely to be unaccented than four-mora words as a whole, they too exhibit a considerable degree of accentual variability depending on their syllable structure. In the case of SJ compounds consisting of three moras, those that end in a heavy syllable display a striking tendency to take the unaccented pattern, whereas those that begin with a heavy syllable are predominantly accented and not unaccented. This correlation between syllable structure and accent was found in three-mora loanwords too, although to a lesser degree.

It is not clear yet how the syllable structure effects on the choice between accented and unaccented patterns can be generalized across words of different mora lengths. For example, it seems difficult to see how the syllable structure conditions on four-mora words, i.e. those summarized in (3b,c), can be generalized with the syllable structure effect on three-mora words that is responsible for the predominance of the unaccented pattern in #LH# SJ compounds.

However, it is worth emphasizing here that the emergence of the unaccented pattern is highly correlated with the syllable structure of the word. Given the information on syllable structure, in fact, it may be possible to predict the emergence of unaccentedness in four-mora loanwords as well as in three-mora SJ compounds. In this sense, the distinction between accented and unaccented words is not lexical but is rule-governed.

This finding has significant implications for both phonological theory and speech technology. Note, first of all, that the syllable plays a pivotal role in accent assignment in Japanese. This does not contradict the general view that Japanese is a mora language as opposed to a syllable language. The evidence that we presented in this paper indicates that the syllable as well as the mora serves as an important linguistic unit in a largely mora-based prosodic system of Tokyo Japanese.

The same evidence also has implications for speech synthesis and other aspects of speech technology. It is not entirely necessary to assign an accent pattern to every word in the lexicon. The accentuation of low-frequency words and entirely new words can and should be derived by rule to minimize the size and contents of the lexicon.

6. References

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