PROSODIC PHRASING OF BIMORAIC ACCENTED PARTICLES IN SPONTANEOUS JAPANESE

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ABSTRACT

Lexical pitch accents in bimoraic particles of Tokyo Japanese are believed to be deleted when the particles are combined with accented words. Analysis of the Corpus of Spontaneous Japanese revealed, however, there are many cases where particles retain their accent, thereby forming an accentual phrase of their own. Factors that favor accent preservation include semantic properties of particles, inter-accent distance, boundary pitch movements, and, formality of speech. Particles having emphatic and/or limitative meanings, like /sa'e/, /ko'so/ and /no'mi/, are the most probable to retain their accents.

Keywords: accentual phrase, phrasing, lexical pitch accent, particle, boundary pitch movement.

1. INTRODUCTION

In Tokyo Japanese (TJ, hereafter), there are a series of accented 2 mora particles like /ma'de/, /na'do/, /sa'e/, /no'mi/ (where apostrophe stands for lexical accent) and so on. Standard description of TJ phonology (see [1,2] among many others) says that accents in these particles are deleted when they are coupled with accented nouns. For example, accented /ma'de/ ('*until*'), becomes unaccented /made/ when it follows accented /kyo'Hto/ ('*Kyoto*'), like /kyo'Hto+ma'de/ (where, '+' stands for morpheme boundary, and 'H' stands for a long vowel), while it retains the accent in /toHkyoH+ma'de/ when it follows the unaccented /toHkyoH/ ('*Tokyo*').

At the same time, however, it is known among Japanese linguists that there can be instances of TJ where the accented particles retain their accent even when they follow accented nouns as in /kyo'Hto+ma'de/.

This phenomenon is very interesting from a point of view of the accentual phrase (AP, hereafter) analysis of TJ prosody. According to the standard treatment of AP in TJ [4-6], syntactic phrase ('*bunsetsu*') like {kyoHto+made} forms a single AP, but the utterance /kyo'Hto+ ma'de/ can not constitute a single AP, because AP is the prosodic domain where at most only one lexical accent exists.

The aim of the current paper consists in the survey of the actual status (in terms of their accentedness) of the accented 2 mora particles when they follow accented content words. For this purpose we will analyze a large-scale corpus of spontaneous speech know as the CSJ.

2. DATA

2.1. CSJ

CSJ, or *Corpus of Spontaneous Japanese*, is a large-scale (662 hours, 7.5 million words) corpus of spontaneous monologue of the present-day Japanese (recorded mostly in 1999-2002) [7]. It is famous for its richness of linguistic annotations including the prosodic labeling using the X-JToBI scheme [8]. In the current paper we did not use the prosodic label because the X-JToBI labeling is currently applied to a subset (44 hours) of CSJ. As will be shown below, we needed to analyze the whole CSJ because some of the particles have low occurrence frequency.

2.2. Selection of particles

In this paper, 10 particles shown in the first column of Table 1 will be analyzed. The last two particles, /de'mo/ and /de'wa/ are different from the rest in that they are the combination of two monomoraic particles, i.e., /de+wa/, and /de+mo/. These articles are analyzed for the sake of the comparison with the other eight particles that are inherently bimoraic.

The second column of Table 1 shows the number of particles in the whole CSJ. The third column is the number of particles as uttered by the speakers who are born in the wider Tokyo area: Tokyo, Chiba, Kanagawa, and Saitama prefectures. As can be seen in the third column, there are considerable differences in the number of samples

depending on particles. For frequently occurring articles (>400, i.e., /ma'de/, /yo'ri/, /si'ka/, /na'do/, /de'wa/, and /de'mo/), a maximum of 350 samples were randomly selected from the TJ samples as shown in the fourth column of Table 1. Less frequently occuring samples were chosen for analysis if they met all of the following 3 conditions were chosen for analysis:

- The particle is preceded by an accented word.
- The preceding word is not finally accented.
- The particle is not a part of disfluent speech like repair or word fragment.

The second condition is necessary because finally accented words in TJ tend to lose its accent and turn into unaccented word. The fifth column of the Table 1 shows the number of samples selected for analysis.

Table 1: Process of sample selection.

Particle	CSJ	TJ	Random sampling	N	Agreement [%]
su'ra	90	47	47	14	93
sa'e	284	118	118	43	82
no'mi	1,031	368	368	196	82
ma'de	10,599	4,979	350	124	77
yo'ri	4,175	1,898	350	175	89
ko'so	564	265	265	90	81
si'ka	2,188	1,021	350	191	86
na'do	5,164	2,496	350	172	62
de'wa	14,541	6,051	350	172	80
de'mo	11,233	6,069	350	142	80

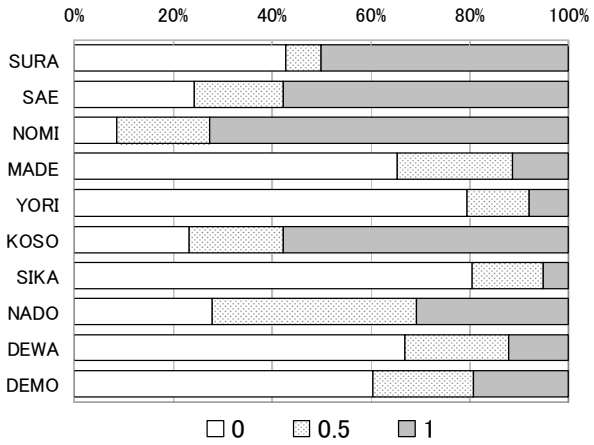
2.3. Classification of the accentedness

Two authors of the current paper listened to these samples and judged the accentedness of the particles as either unaccented or accented. The presence and type, if any, of the accent phrase final boundary pitch movement (BPM hereafter) on the particle were also described. The last column of Table 1 shows the agreement ratio of the accentedness between the two judges. The ratio is higher than 80% with the exception of /na'do/ and /ma'de/. There was a general tendency for the second author to be more sensitive to the presence of accent, and the tendency was especially clear in these particles for unknown reasons.

3. ANALYSIS

In the rest of this paper, the mean perception of 2 judges will be used as the accentedness data. The data consists of 0 (unaccented), 0.5 (where 2 judges disagreed), and 1 (accented), accordingly. Figure 1 shows the mean perceived accentedness of 10 particles. The particle accent is consistently reserved (i.e. mean 1 judgment) more than 50% of cases in particles /su'ra/, /sa'e/, /no'mi/, and, /ko'so/. On the other hand particles that showed the highest rate of consistent unaccented perception (i.e., mean 0 judgment) include /ma'de/, /yo'ri/, and /si'ka/, but these particle were perceived consistently as accented at least 5% of cases.

Figure 1: The mean perceived accentedness of particles.



3.1. Semantic property of particles

Semantic property of particles played an important role in Figure 1. Simple case particles (/ma'de/ and /yo'ri/) and sequence of case and topic particles (/de'wa/ and /de'mo/) are generally low in consistent 1 perception, while particles that have either 'emphatic' or 'limitative' meanings (i.e. '*toritate*' particles in Japanese) showed high rate of consistent 1 perception. The latter category includes /su'ra/ '*even*', /sa'e/ '*even*', /no'mi/ '*only*', and, /ko'so/ '*indeed*'.

There seems to be an apparent exception to this tendency; limitative particle /si'ka/ ('*only*') did not show high rate of consistent 1 perception. This is not an exception, however. Phonetic realization of accent is difficult in this particle because the first vowel of the particle is in an optimal environment for vowel devoicing (i.e., a closed vowel preceded and followed both by voiceless consonants), which is the only instance in the 10 particles analyzed here. In CSJ, more than 95 % of /i/ vowels are devoiced in this segmental context [9].

3.2. Distance between accents

Uwano wrote, with respect to /ma'de/, that particle accent is more liable to be realized as the location of accent in the preceding word moves closer to

the word initial position [3]. Figure 2 shows the relationship between the accent distance and accentedness. The abscissa represents the distance between the accents in the particle and the preceding word in terms of the number of morae. Number of samples involved in each distance is shown in each bar.

Figure 2: Influence of accent distance between the particles and preceding words.

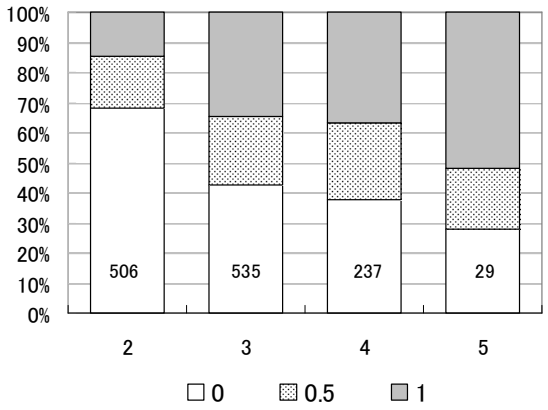


Table 2: Influence of accent distance on each particle. The rate [%] of consistent 1 judgment.

Particle	Accent distance		
	2	3	4
su'ra	25.0	40.0	66.7
sa'e	75.0	39.1	70.0
no'mi	17.0	78.0	43.0
ma'de	8.3	6.8	26.3
yo'ri	4.4	20.9	0.0
ko'so	38.5	58.5	87.5
si'ka	2.6	6.3	3.6
na'do	26.0	29.3	40.0
de'wa	14.5	19.0	17.1
de'mo	12.9	13.8	5.6

When all particles are pooled as in Figure 2, clear positive correlation can be seen between the accent distance and the rate of consistent 1 judgment. However, this tendency is not so clear when we breakdown the analysis and examine each particle individually. In Table 2, the linear relationship between distance and consistent 1 rating can be observed only for /su'ra/, /ko'so/ and /na'do/. The high percentage of consistent 1 rating for these particles with four morae distance seems to favorably bias the pooled results as seen in Fig 2.

3.3. BPM

Sometimes the particle in question is accompanied by a BPM. The influence of BPM is evaluated in Table 3. The X-JToBI notations L%H% and L%HL% stand respectively for rising and rising-falling renditions. L% stands for cases where no BPM occurred. PNLP is a special variant of the L%HL%. In PNLP version, the peak of the rising contour locates in the penult mora of an AP, while in ordinary L%HL%, it locates on the last mora [8].

It can be seen from Table 3 that presence of any BPM has the effect of deleting, or reducing, the accent of the particle. This effect is stronger in L%HL% than in L%H%, and the strongest in PNLP.

Table 3: Influence of BPM on accentedness. Numbers in parenthesis show the occurrence rate [%].

BPM	Accentedness		
	0	0.5	1
L%H%	121 (83)	18 (12)	7 (5)
L%HL%	25 (92)	1 (4)	1 (4)
PNLP	17(100)	0 (0)	0 (0)
L%	518 (46)	248 (22)	362 (23)

3.4. POS of adjacent words

Influence of the POS (part of speech) of the preceding and following words are examined. POS of the following words had no influence. As for the preceding words, the rate of consistent 1 judgment arose when preceding words are particles, as shown in Table 4. However, we cannot conclude from this that preceding particle has special influence, because in Japanese there is a statistical tendency that particles of emphatic/limitative meaning tend to follow other particles.

Table 4: Influence of the POS of preceding words and frequency of consistent 1 judgment is shown. Occurrence rate [%] shown in parenthesis.

POS	Accentedness		
	0	0.5	1
Particle	100 (45)	38 (16)	91 (39)
Pronoun	40 (89)	4 (9)	1 (2)
Verb	29 (69)	6 (14)	7 (17)
Noun	495 (52)	212 (20)	262 (28)

Table 5 shows the mean accentedness judgment as a function of semantic property of the particles in question (see 3.1) and the POS of preceding words. It is to be noted that the cases of particle /si'ka/ were excluded from the analysis because this particle is strongly influenced by vowel devoicing (see 3.1). Table 5 clearly shows that preceding particle has no special effect on accentedness judgment. The seeming effect of preceding particle shown in Table 4 is the

reflection of the effect of emphatic/limitative particles.

Table 5: Relation between the semantic property of particles and the POS of preceding words. Mean accentedness is shown. Number of cases is shown in parenthesis.

POS	POS of preceding word		
	Particle	Others	Total
Emphatic/ limitative	0.73(120)	0.76(225)	0.75(345)
Others	0.28(43)	0.28(744)	0.28(787)
Total	0.61(163)	0.39(969)	0.43(1132)

3.5. Type of talks

It is probable that nonlinguistic, or social, factors have some influence on particle accentedness in addition to the linguistic factors examined so far. As social factors, we examined speaker gender, speaker age, and type of talks, and found that type of talk had certain influence.

As mentioned above, CSJ is basically a corpus of monologue, and its two main talk types are academic presentation speech (APS, live recording of presentations in academic meetings) and simulated public speaking (SPS, public speaking on everyday topics done by recruited subjects in front of small audience). In addition to these, read speech is also recorded for the sake of comparison with spontaneous speech. Preceding analyses revealed that these talk types differ in terms of the formality (or speaking style) [9-11], reading is the most formal, and SPS is the most casual.

Figure 3: Influence of type of talks and semantic property of particle on mean accentedness.

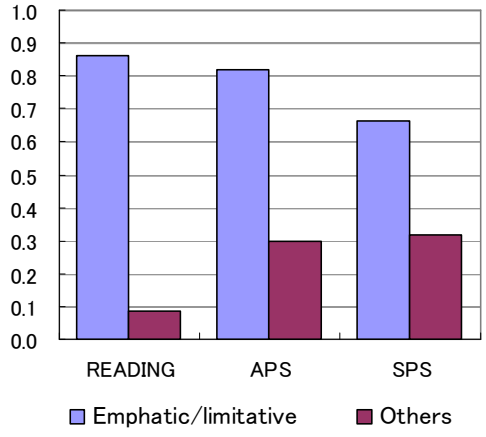


Figure 3 shows mean accentedness as a function of the type of talks (as shown by abscissa) and the semantic property of particles (excluding /si'ka/). Type of talks has clear influence on mean accentedness, but the nature of the influence differs considerably depending on the property of particle. The nature of this interaction is less well understood. It suggests, however, the possibility that the prosodic independence of bimoraic particle transmits quite different pragmatic and/or sociolinguistic meanings depending on the semantic property of particles.

4. CONCLUSION

We examined the prosodic phrasing of bimoraic accented particles in TJ using a large-scale spontaneous speech corpus, and found out three linguistic factors --semantic property of particles, inter-accent distance, and, accent phrase final pitch movement (BPM)-- that govern phrasing structure. All other factors turned out to be the indirect reflection of the semantic property of particles. Social factors like formality of speech also appeared to play some role, but its nature is not fully understood at the current stage of analysis.

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