

Accentual Phrasing in Japanese: The Significance of Underlying Accents

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Abstract

The parsing of an intermediate phrase into its component accentual phrases in Japanese has had many proposed mechanisms. The most common theories have involved syntactic configurations, and, recently, optimality theory has been gaining in popularity. This study examined the speech of five female speakers of Standard Tokyo dialect of Japanese. These speakers demonstrated that accentual phrase construction depended not on syntax, but on the underlying accentuation of words.

1. Introduction

It is commonly recognized that Japanese contains different types of prosodic units above the level of the word: the utterance (sentence), the intermediate (major) phrase, and the accentual (minor) phrase [1] - [4]. It is accentual phrasing that is of interest to the current study. Our contention is that the accentual phrase formation is sensitive to the underlying accentual configuration of the component words.

Acoustically, the utterance is characterized as the domain of declination at about 10 Hz per second [2]. The intermediate phrase is the domain of catathesis, or iterative application of pitch compression caused by accents [3]. The accentual phrase is, then, the domain of a delimitative rise in pitch and a maximum of one pitch accent [5].

McCawley [1], Poser [2], Beckman and Venditti [6] typify the early considerations of accentual phrase constituency based on syntactic structures. McCawley originally supposed that a noun followed by postpositions is subject to the rules that demarcate the accentual phrase. Poser proposed a minor phrase that includes a noun and its postpositions. Similarly, a content word and a function word are noted as the typical components of the accentual phrase according to Beckman and Venditti. There is general agreement that an accentual phrase may contain at most one accent [2], [3], [7], [8].

Phonological rules have historically been the device favored to account for the surface structure of the accentual phrase. McCawley [1] first proposed a system of generative rules such that accented nouns cause accent deletion in following postpositions. Tsujimura and Davis [9] attempted to account for the accentuation of noun-noun compounds with a system in which the accent of the second noun shifts to the first mora if the accent is initially located on the penultimate or ultimate mora. Poser [10] also discusses the accentuation of noun-noun compounds; many are assumed to use the same

process as for minor phrase formation in which all but the leftmost accent is deleted. For compounds not using the "left accent wins" system, he claims that the accent is on the first syllable if the second noun is unaccented, penultimately accented, or finally accented. Otherwise, the accent of the second noun becomes the accent of the whole compound. Selkirk and Tateishi [7] suggest the use of a prosodic word in place of a minor phrase. Within the construction of a prosodic word, accent is initially ignored and then a rule deletes all but the leftmost accent.

Another account for accentuation has been manifested in Optimality Theory (OT). Kubozono [8] views the ranking of five rules as key in determining the accent structure of an accentual phrase and discounts the influence of morpheme types. His ranking places priority on the disallowance of an accent on the final mora or syllable. The next highest constraint is the parsability of the accent, and then the disallowance of a final foot accent. Lastly, there follows the constraint requiring a peak of prominence at the right edge of a word. Tanaka [11] expands on Kubozono's ideas to include an account for unaccented compounds. He does this through a highest ranking for the disallowance of an accent on the final foot, syllable, or mora. This is followed by the requirement for the head word accent to have a corresponding accent in the compound. Next, he adds the constraint that a final prosodic word cannot be accented. This is followed by a requirement for agreement between the inner edge of a root and the edge of an accented syllable. Finally, he includes the constraint requiring a right edge prominent peak. Both OT theories note that historical changes in accent placement are likely due to a reranking of the constraints.

This pilot study looks at conditioning factors for accentual phrasing, observing how the accents of component words are realized to form accentual phrases. The conditioning factor for accentual phrasing is found to be the underlying accentual configuration of the phrase rather than the syntactic or surface accentual structure.

2. Accentual Behaviour of Japanese Postpositions

Before reporting on the accentual phrasing experiment, the accentual behaviour of Japanese postpositions will be discussed as they play a significant role in accentual phrasing. In combinations of postpositions and their host nouns, many of the postpositions exhibit peculiarities in accentual behaviour. This accentual behaviour of postpositions is well documented [1], [2], [12], [13], [14], [15].

Postpositions may be categorised into four major types: (1) [+Left-winning] postpositions; (2) [+Anonymity] postpositions; (3) [+De-accenting] postpositions; and (4) [+Pre-accenting] postpositions. The first type, the [+Left-winning] postposition, is an unmarked case. Some of the non-monomoraic postpositions such as *ma'de* 'to', *de'su* 'copula', or *ba'kari* 'only' are classified in this type. If a [+Left-winning] postposition has any accent conflict, i.e., when both the host and the postposition are accented, it is the accent of the host which is realised, and the accented postposition loses its accent, as in *i'noti + ma'de = i'noti-made* 'to life'. If there is no accent conflict, an available accent is realised as the accent of the unit (noun + postposition), as in *miyako + ma'de = miyako-ma'de* 'to the capital'.

The second type of postposition, which is marked by [+Anonymity], is the unaccented counterpart of the [+Left-winning] postpositions, and, being a part of a host noun, they are never independent in accentuation and never cause any accent conflicts. All the monomoraic postpositions, such as *o* 'accusative', *ni* 'dative', or *wa* 'topic marker' are included in this type.

The third type of postposition is marked by the feature [+De-accenting]; postpositions such as *gu'rai* 'as much as', *dake* 'only', or *jyuu* 'throughout' are classified in this type. In the case of a [+De-accenting] postposition, the accent of the host will not be realised because of the predominant power associated with the [+De-accenting] postposition which de-accent the accent on its left, as in *i'noti + gu'rai = inoti-gu'rai* 'as much as life'. The unaccented [+De-accenting] postpositions, *jyuu* and *dake*, create an unaccented accentual phrase regardless of the accentuation of the host, as in *i'noti + jyuu = inoti-jyuu* 'throughout life'; *miyako + jyuu = miyako-jyuu* 'throughout the capital'.

The fourth type of postposition is marked by the feature [+Pre-accenting] because postpositions of this type place an accent on the last syllable of the preceding host if the host does not have an accent as in *miyako + 'sika = miyako'-sika* 'only the capital'. If the host is accented, however, *'sika* obeys the left-win rule as in *i'noti+'sika = i'noti-sika* 'only life'.

3. Accentual Phrasing Experiment

3.1 Aim of Experiment

The main aim in conducting the acoustic experiment is to obtain generalisations about accentual phrasing. More precisely, we would like to know whether it is a syntactic configuration or an accentual configuration, which determines how an intermediate phrase is parsed into accentual phrases. While there is likely to be variations in phrasing, there should also be a general trend in accentual phrasing, which should be determined either by a phonological or syntactic condition. It is these trends, along with the conditions of accentual phrasing, which we hope to elicit from the experiment.

3.2 Procedure

The list of possible combinations of the lexical items used as stimuli in the experiments is summarised in Table 1. The phrases made of the possible combinations were set in a carrier sentence: '... *te-ga todokima'su* 'I can reach out my hand for ...' except for the possible combinations with *gu'rai*. The

Table 1: List of stimuli used in the experiment

Modifier	Noun	Postposition
<i>ao'i</i> 'blue'		<i>ma'de</i> 'to'
<i>omoi</i> 'heavy'	<i>oma'me</i> 'beans'	<i>gu'rai</i> 'as much as'
<i>a'ni-no</i> 'brother's'	<i>nimame</i> 'cooked beans'	<i>jyuu</i> 'all over'
<i>ane-no</i> 'sister's'		<i>ni</i> 'to'

phrases with *gu'rai* were placed in the carrier sentence, ... Adj - N *wa arima'sen* as in *ao'i omame-gu'rai ao'i oma'me-wa arima'sen* 'there are no beans which are as blue as the blue beans'. It was the meaning of *gu'rai* which demanded the different carrier sentence.

The stimuli were organised as follows. In the modifier slot, there were two pairs of modifiers, having similar phonemic configurations, each of which contrasted an accented modifier with an unaccented modifier. The same was true of the noun slot; the accented noun, *oma'me*, was contrasted with the unaccented noun, *nimame*, in that both had the same number of morae as well as similar phonemic configurations. In the postposition slot, *ma'de* represented [+Left-winning] postpositions; *gu'rai* represented accented [+De-accenting] postpositions; and *jyuu* represented unaccented [+De-accenting] postpositions. The [+Pre-accenting] postposition, *'sika*, was not included in the list because its segments, /s/, devoiced /i/, and /k/, are all invisible in F₀ analysis. Lastly, *ni* represented monomoraic [+Anonymity] postpositions.

These stimuli, embedded in the carrier sentences and randomly ordered, were written in Japanese on sheets of paper. Each sentence was paired with its echo question. The data for analyses were taken only from the answers because, being old information, none of the items in the phrases in the answers should have received any narrow focus. The total of 160 utterances were recorded by five female subjects who were speakers of Standard Tokyo Japanese. The subjects were requested to utter the stimuli in a well-articulated, but natural, manner.

Measurements were taken using Micro Speech Lab (MSL) and MSLPITCH which are IBM PC compatible speech analysis programs developed at the Centre for Speech Technology Research in Victoria, Canada. The recorded items were analysed with a 10 bit, 10k / second sampling rate.

4. Results

The results of the experiment are summarised in Table 2 (for the accented noun *oma'me*) and Table 3 (for the unaccented noun *nimame*). In both sets, all the cases are divided into two groups: unmarked phrasing and marked phrasing. The markedness and unmarkedness are determined by the frequency of occurrences. In each table, there are four rows of phrase groups, which differ in the modifier they take. In a group, each phrase is specified with its ending postposition. The (+) and (-) signs specify whether items in a phrase are accented (+) or unaccented (-). There are two series of + and - specifications in the unmarked case in the *oma'me* set; the left series specifies a surface accentuation of a phrase while the right series (in parentheses) specifies the underlying (original) accentuation of

Table 2: Results for phrases with an accented noun head
oma'me

		OMA'ME - Set		
		Unmarked Phrasing		Marked Phrasing
<i>ao'i</i>				
A11	+/-	(<i>ma'de</i>)	(+++)	[+ - -] h/s
A12	+/-	(<i>gu'rai</i>)	(+++)	[] h
A13	+/-	(<i>jyuu</i>)	(++)	∅
A14	+/-	(<i>ni</i>)	(+++)	[+ - -] s
<i>omoi</i>				
A21	-/+	(<i>ma'de</i>)	(++)	∅
A22	-/+	(<i>gu'rai</i>)	(++)	∅
A23	-/-	(<i>jyuu</i>)	(+-)	∅
A24	-/+	(<i>ni</i>)	(+-)	[] h/s
<i>a'ni - no</i>				
A31	+/-	(<i>ma'de</i>)	(+++)	[+ - -] h
A32	+/-	(<i>gu'rai</i>)	(+++)	[+ - -] h
A33	+/-	(<i>jyuu</i>)	(++)	∅
A34	+/-	(<i>ni</i>)	(+++)	[+ - -] h
<i>ane - no</i>				
A41	-/+	(<i>ma'de</i>)	(++)	[] h
A42	-/+	(<i>gu'rai</i>)	(++)	[] h/s
A43	-/-	(<i>jyuu</i>)	(+-)	[] s
A44	-/+	(<i>ni</i>)	(+-)	[] h/s

the phrase. The *nimame* does not have two series because the surface and underlying accentual specifications are the same. A slash between symbols indicates the presence of an accentual boundary. If a phrase is realised as a single phrase it is marked by []. If there are no symbols inside [], it shows that the phrase is realised without a boundary and with the same accentuation as its unmarked phrasing. The letters following the accents in the marked cases indicate which subject uttered

Table 3: Results for phrases with an unaccented noun head
nimame

		NIMAME - Set		
		Unmarked Phrasing		Marked Phrasing
<i>ao'i</i>				
B11	+/-	(<i>ma'de</i>)		[] h/s
B12	+/-	(<i>gu'rai</i>)		[] s/t
B13	+/-	(<i>jyuu</i>)		[] h; +/- k
B14	+/-	(<i>ni</i>)		[] s/h
<i>omoi</i>				
B21	[- - +]	(<i>ma'de</i>)		∅
B22	[- - +]	(<i>gu'rai</i>)		∅
B23	[- - -]	(<i>jyuu</i>)		-/- k
B24	[- - -]	(<i>ni</i>)		∅
<i>a'ni - no</i>				
B31	+/-	(<i>ma'de</i>)		∅
B32	+/-	(<i>gu'rai</i>)		[+ - -] h
B33	+/-	(<i>jyuu</i>)		∅
B34	+/-	(<i>ni</i>)		[] h
<i>ane - no</i>				
B41	[- - +]	(<i>ma'de</i>)		∅
B42	[- - +]	(<i>gu'rai</i>)		-/+ k
B43	[- - -]	(<i>jyuu</i>)		-/- k
B44	[- - -]	(<i>ni</i>)		∅

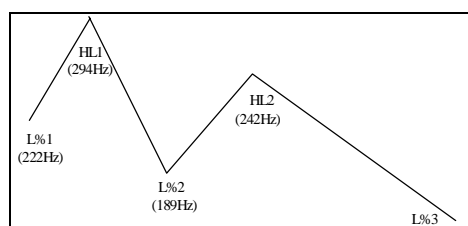


Figure 1: A schematic pitch contour of (+ / + -)

the instance. The ∅ symbol indicates the absence of an instance of the pattern.

For example, a part of the first *ao'i* group in the *oma'me* set can be read as follows:

	Unmarked Phrasing	Marked Phrasing
<i>ao'i</i>		
A11	+/- (<i>ma'de</i>) (+ + +)	[+ - -] h/s
A13	+/- (<i>jyuu</i>) (+ + -)	∅

The case, A11, *ao'i* + *oma'me* + *ma'de* (+ + +) was realised, in the unmarked case, as (+/+), i.e. *ao'i* L% *oma'me-made* with the insertion of an accentual boundary (L%). As an example, the schematic F₀ contour of the phrase is shown above in Figure 1. The subjects H and S, however, uttered the same phrase as [+ - -], i.e. *ao'i-omame-made* with no accentual boundary insertion and with just one culminative accent on the leftmost item, *ao'i*. The utterance from these subjects is regarded as marked phrasing. Another case, A13, *ao'i* + *oma'me* + *jyuu* whose underlying accentuation is (+ + -), was realised as (+/- -), i.e. *ao'i* L% *omame-jyuu*, an intermediate phrase consisting of two accentual phrases. All five subjects showed the same phrasing pattern (the marked case has the ∅ symbol). This pitch contour can be seen in Figure 2 below.

Let us examine the unmarked phrasing seen in the *oma'me* set. The phrases in this set have a consistent pattern of phrasing, i.e. the insertion of an interphrasal boundary between the modifier and the noun. The accentuation of the phrases seems to have no impact on the phrasing; all possible combinations of accentuation are present in the data.

The above facts seem to suggest that a syntactic configuration rather than an accentual configuration determines accentual phrasing. That is, in unmarked phrasing, a phrase of 'modifier + noun + postposition' is uttered as an intermediate phrase consisting of two accentual phrases with the boundary inserted after the modifier. To account for the accentual phrasing, we can posit a very simple working hypothesis of interphrasal accentual boundary insertion after a modifier in a 'modifier + noun + postposition' construction.

Next, let us look at unmarked phrasing in the *nimame* set and test the above hypothesis on this data. In the *nimame* set, the working hypothesis based on syntactic configuration is refuted; in the *omoi-* and *ane-no* groups, there is no instance with an interphrasal accentual boundary which discounts the syntax based hypothesis. The question, then, is how to account for the fact that it is only the phrases in the unaccented modifier groups that do not have an interphrasal L%. It appears as if the accentual configurations of the phrases fail to condition accentual phrasing because in the *oma'me* set, there are cases where L% is inserted between an unaccented modifier (-) and an unaccented (-) noun (i.e. A22, A23, A42, and A43). On the

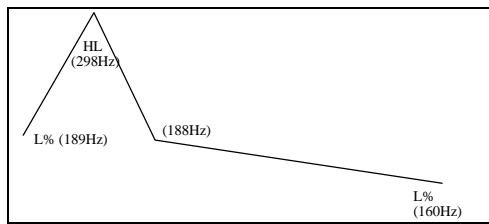


Figure 2: A schematic pitch contour of (+ / - -)

other hand, in the *nimame* set, there is no insertion of L% in the phrases, which have exactly the same accentual configuration (e.g. all the phrases in the *omoi-* and *ane-no* groups). So, contrary to the previous syntax-based working hypothesis, it seems that accentual phrasing is arbitrary; the insertion of the interphrasal accentual boundary cannot be predicted by a syntactic configuration or by an accentual configuration.

Importantly, however, it becomes possible to make generalisations on accentual phrasing once the underlying accentual configuration is taken into account. That is, in all of the underlying accentual forms (i.e. the accentuation of the phrases prior to the applications of the postpositional features) in the *oma'me* set, there is at least one + in either the modifier slot or in the noun slot. It is always the case that an interphrasal boundary is inserted after a noun in these cases. Additionally, in the *nimame* set, all the phrases in the *ao'i-* and *a'ni-no* groups have a + specification in the modifier slot, and they all have an interphrasal L%. However, all the phrases in the *omoi-* and *ane-no* groups which do not show any interphrasal L% do not have a + specification in either the modifier slot or in the noun slot. Thus, from these facts, we can deduce the following generalisation: in the case of unmarked phrasing, a phrase of 'modifier + noun + postposition' has an interphrasal accentual boundary after the modifier if either the modifier or the noun is underlyingly accented. This generalisation accounts for the unmarked phrasing exhibited in all of the data.

5. Conclusion

Based on the acoustic evidence, we have shown that (i) the conditioning factor for accentual phrasing is the underlying accentual configuration of a given intermediate phase; and that (ii) an accentual phrase boundary is inserted between two words if at least one of them is underlyingly accented. We believe that these claims hold for not only the cases where the intermediate phase consists of just three items, 'modifier + noun + postposition', but also in the case of intermediate phrases consisting of more than a few items. Currently, we are conducting another pilot study involving the introduction of new stimuli and new subjects. The results will be available early in 2002 and are expected to provide additional evidence to support our claims.

6. References

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