LEXICAL PITCH ACCENT IN GOSHOGAWARA JAPANESE: RISING OR FALLING?

Yosuke Igarashi

Japan Society for the Promotion of Science, National Institute for Japanese Language
yosuke.igarashi@kokken,go.jp

ABSTRACT

This study analyzes Goshogawara Japanese (GJ) which has a *rising* lexical pitch accent. Accented words in this dialect are known to exhibit a pitch fall in the final syllable only when the word is at the final position of a prosodic phrase above the word. The results reveal that, contradictory to earlier reports, the fall is realized phrase-medially as well. The results suggest that the accented word in GJ contains a fall (HL) in its representation.

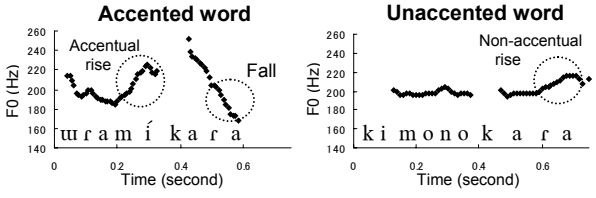
Keywords: Goshogawara Japanese, intonation, rising pitch accent, Japanese dialects.

1. INTRODUCTION

The present study examines the prosodic structure of Goshogawara Japanese (GJ) spoken in Aomori Pref. This dialect provides interesting issues concerning the relation between lexical pitch accent and intonation, since it has two unique characteristics. They are *rising pitch accent* and *pitch pattern alternation* which were first described for Hirosaki [7] and Shizukuishi Japanese [8].

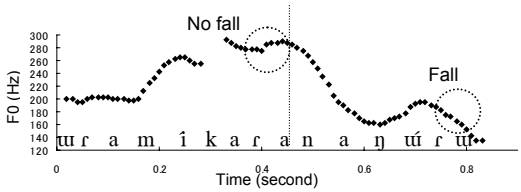
In GJ, the accented syllable exhibits a pitch rise, and hence GJ is known to have rising pitch accent. Just as Tokyo Japanese, GJ have both, words with pitch accent and words without it. (Accentedness is lexically determined). The unaccented words show a rise in the word-final syllable [3,6] (Fig. 1).

Figure 1: Fundamental frequency (F0) contours for accented and unaccented words in GJ, *ɯɾamî-kaɾa* 'due to grudge' and *kimono-kaɾa* 'from kimono'. Acute accents stand for accented syllables.



Pitch pattern alternation concerns the pitch movement in the final syllable of the accented word. The accented word in GJ can be realized in either of two different forms depending on the phrasing structure. One is the *non-connective form* which contains a fall in the word-final syllable (Fig. 1, left). This form occurs when the word is in phrase-final position. The other is the *connective form* where a flat high (or slightly rising) pitch prevails until the end of the prosodic word (Fig. 2). This form appears phrase-finally [7,8]. Note that unaccented words do not show the alternation [7]: they never exhibit the word-final fall even at phrase-final position (Fig 1, right).

Figure 2: F0 contours for a word *ɯɾamî-kaɾa* (in connective form) within an utterance *ɯɾamî-kaɾa nagŋúɾu* '(He) punched due to grudge'. Vertical line indicates a boundary of prosodic words.



The affiliation of the word-final fall found in the non-connective form has been a point of controversy. Uwano [7,8] explicitly claims that the final fall is a property of the *phrase* (prosodic constituent above the word), whereas Hattori [2] considers it as a property of the *accented word*.

This study investigates if the fall found in the non-connective form is a property of the prosodic phrase above the word or it is a property of the accented words *per se*.

2. METHODS

2.1. Hypotheses

We have two hypotheses. One is the *Phrasal Fall Hypothesis* (PFH), where the final fall is taken as a property of the prosodic phrase. The other is the *Accentual Fall Hypothesis* (AFH), where the fall is regarded as a property of the accented word *per se*.

Notice that the PFH requires the caveat that 'the falling property is realized only when the word is accented. In the same way, the AFH will work only on the proviso that 'the falling property is realized

only when the word is phrase-final'. However, if the present experiment reveals that the accented word at the *non-final* position of the phrase as well exhibits a certain falling property, then the AFH will require no caveat and will give the correct prediction that the PFH does not yield.

In fig 2, the accented word at non-final position of the phrase shows a sharp fall from the end of the word to the beginning of the second word. If this fall is absent when the first word is unaccented, then it should be regarded as the property of the accented word. In my view, the fall is not strictly restricted to the stretch of the accented word but can also be delayed on the following word.

Thus present experiment explores the 'carried-over' falling effects that the accented word in connective form is supposed to have. We expect, first, that the effects will result in *initial lowering* (low pitch at the initial syllable) of the following word. In other words, the sharp fall, starting from the offset of the accented word, will create a low target at the initial syllable of the next word.

Downstep (pitch range compression of the following words) can be regarded as one of the putative falling effects [2]. The contour in Fig. 2 clearly shows a pitch range compression of the second word. If the compression is not caused by a preceding unaccented word, then it should be a consequence of the fall of the accented word. The view that the fall (HL) belonging to the word acts as a downstep trigger is consistent with other Japanese dialects such as Tokyo and Osaka [5].

2.2. Speech materials and measurements

Nine sets of test sentences were designed. They were originally written in standard Japanese, and then translated into GJ by the two participants.

Datasets I-VII examine downstep. First, the two words with different combinations of accentedness (AA, UA, AU and UU, where A and U stand for accented and unaccented, respectively) were designed and then inserted into test sentences. The examples of the sentences are shown in Table 1.

The 2NDPEAK defined as the highest F0 value (Hz) in the second word was measured to see if downstep occurs. The value in the transition from the peak of the preceding word was avoided. The points measured are indicated by an arrow in Fig. 3.

Datasets VIII-IX were designed to investigate initial lowering. Again, four sets of words with four combinations of accentedness were designed. To avoid tonal crowding, the second words had four syllables before the syllable showing an accentual or non-accentual rise. The accented words had three pre-accented syllables.

In the AFH, the initial syllable of the following word should be lower when the preceding word is accented than unaccented. However, the stronger lowering can also be interpreted as the result of downstep. Thus, in order to control downstep, the location of focus was manipulated, because focus blocks downstep in GJ [3]. The words were inserted into sentences with the context that induced focus on either the first (Dataset VIII) or second word (Dataset IX). Dataset VIII is shown in Table 1. Dataset IX had the same sentences as VIII, except that the particle of the first word was *-wa*.

The measure used to examine degree of initial lowering was INITLOW, which was defined as the minimum F0 value (Hz) in the first two syllables of the second word. The points measured are demonstrated by an arrow in Fig. 4-5.

Table 1: Examples of test sentences. The boldface indicates the test words.

Dataset I:	
(a) AA	**ɯmé: mamé** tábe-ta. 'I ate good-tasting beans.'
(b) UA	**amɛ: mamé** tábe-ta. 'I ate sweet beans.'
(c) AU	**ɯmé: ame** tábe-ta. 'I ate good-tasting candies.'
(d) UU	**amɛ: ame** tábe-ta. 'I ate sweet candies.'
Dataset IX.	
(a) AA	**inámori-ŋa omijaŋeɯ́riba-no** ɯɾá-ni iɾɯ́-n-da-jo. 'Inamori is behind the souvenir shop.'
(b) UA	**janaŋida-ŋa omijaŋeɯ́riba-no** ɯɾá-ni iɾɯ́-n-da-jo. 'Yanagida is behind the souvenir shop.'
(c) AU	**inámori-ŋa ɯnaŋija-no** ɯɾá-ni iɾɯ́-n-da-jo. 'Inamori is behind the eel shop.'
(d) UU	**janaŋida-ŋa ɯnaŋija-no** ɯɾá-ni iɾɯ́-n-da-jo. 'Yanagida is behind the eel shop.'

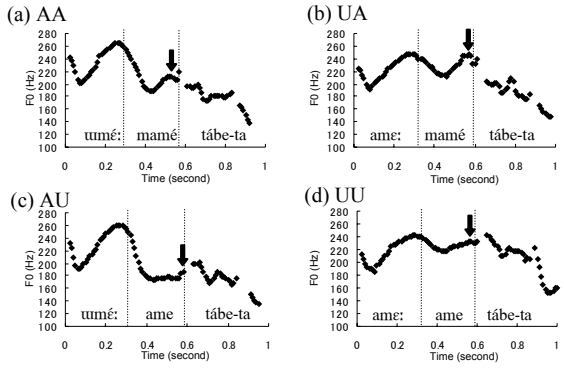
2.3. Subjects and analysis procedure

Two 21-year-old female native speakers of GJ (M and K) participated in the experiment. The subjects read the entire set of the sentences five times. The recordings were made using Marantz PMD 660 at a 44.1 kHz sampling rate. Recorded materials were analyzed by Praat [1].

3. RESULTS

As can be seen from Fig. 3 (for Dataset I), clear downstep was observed for Datasets I-VII: the peak of the second word was lower when preceded by an accented word than by unaccented word. We can also see that, regardless of the accentedness of the preceding word, accentual peaks are higher than non-accentual ones. This is consistent with the results for Tokyo Japanese [5].

Figure 3: F0 contours for Dataset I. (Specific tokens produced by M.



Pooling the data of Datasets I-VII, a two-way analysis of variance (ANOVA) was conducted, for each speaker separately, with 2NDPEAK as the dependent variable and with the First word accent (A or U) and the Second word accent (A or U) as the independent variables. The results showed that for both speakers, there was a significant main effect of First word accent, with the A yielding lower 2NDPEAK than U [for M, $F_{(1,116)} = 90.81$, $p < 0.001$; for M, $F_{(1,116)} = 507.30$, $p < 0.001$]. This confirmed the existence of downstep. Also, there was a significant main effect of Second word accent, with A having higher 2NDPEAK than U [for M, $F_{(1,116)} = 71.38$, $p < 0.001$; for M, $F_{(1,116)} = 48.89$, $p < 0.001$]. This confirmed the higher scaling of accentual peaks than non-accentual ones.

In summary, one of the predictions of AFH was bourn out. The accented words caused downstep, which can be seen as the falling effect of the accented words at non-final potion of the phrase.

Fig. 4 shows F0 contours for Dataset VIII (focus on the first word). There was a sharp fall between first and second words resulting in clear initial lowering when an accented word precedes (a, c), whereas it is hardly detected when an unaccented word precedes (b, d). In the latter case, the F0 appeared to be interpolated linearly from the peak of the first word to the dip before the rise of the second. Besides, K yielded tokens with no dip (hence no rise), merging the first two words.

The clear lowering due to the preceding accented word can not be explained solely by the results of downstep. From Fig. 5 (Dataset IX: focus on the second word) we see that, even if downstep is blocked, the initial lowering is clearly seen when an accented word precedes (a, c).

Pooling the data of Datasets VIII-IX, a three-way ANOVA was conducted, for each speaker separately, with INITLOW as the dependent variable and with the First word accent (A or U), the Second word accent (A or U), and Focus (1st or 2nd word) as the independent variables.

Figure 4: F0 contours for the test words of Dataset VIII (focus on the first word). Specific tokens by M.

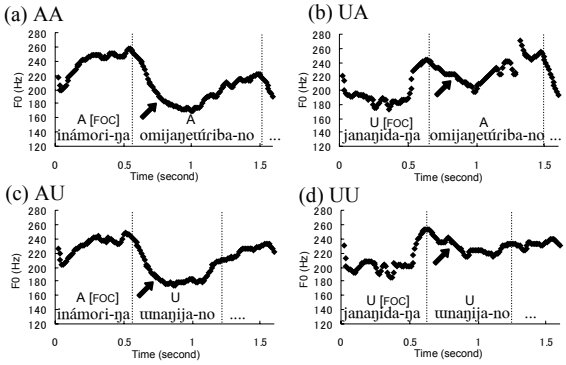
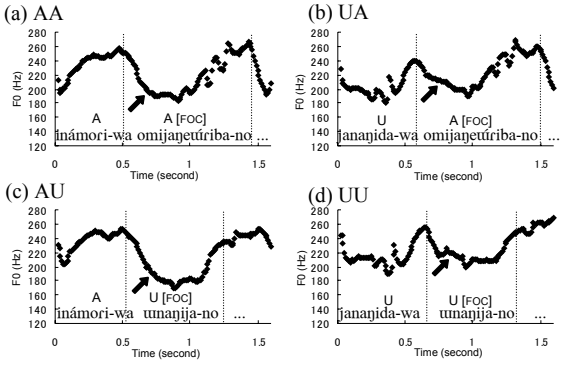


Figure 5: F0 contours for the text words of Dataset IX (focus on the second word). Specific tokens by M.



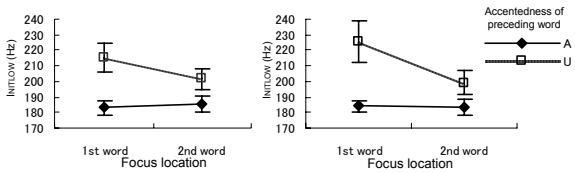
As expected, there was a significant main effect of First word accent [For M, $F_{(1,32)} = 44.23$, $p < 0.001$; For K, $F_{(1,32)} = 6.37$, $p < 0.05$], with A yielding lower INITLOW than U, but no significant effect of Second word accent [For M, $F_{(1,32)} = 3.27$, $p = 0.08$; For K, $F_{(1,32)} = 0.91$, $p = 0.34$].

The results also revealed a significant main effect of Focus [For M, $F_{(1,32)} = 70.56$, $p < 0.001$; For K, $F_{(1,32)} = 27.65$, $p < 0.001$], with focus on the 1st word having higher INITLOW than focus on the 2nd word. Note that the effect was in the opposite direction that would be predicted by the downstep account for the lowering. Importantly, there was a significant interaction between Focus × First word accent [For M, $F_{(1,32)} = 6.36$, $p < 0.05$; For K, $F_{(1,32)} = 5.77$, $p < 0.05$]. As Fig. 6 demonstrates, focus had a larger effect when preceding word is unaccented. The lowering caused by the preceding accented word was largely intact despite of different focus locations.

There was a significant Focus × Second word accent interaction only for K [$F_{(1,32)} = 4.30$, $p < 0.05$], which is essentially uninterpretable.

Overall, the results favored the AFH. The accented words exhibited a sharp fall from its end to the next word, resulting in the initial lowering.

Figure 6: Means and SDs for INITLOW as functions of focus location and 1st word accent for Datasets VIII-IX.



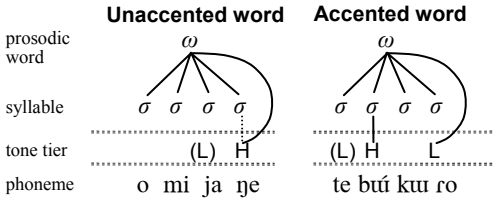
4. DISCUSSION AND CONCLUSION

The results supported the AFH: the falling property of accented words was revealed to be realized even at non-final position of the phrase. The PFH can not explain the fall that the accented words exhibit both in non-connective and connective forms.

Thus, the accented word of GJ can not be simply analyzed as possessing an accentual LH. Instead, it is proposed in this work that 1) the accented word has the L at its right edge, 2) this L, being preceded by accentual H, constitutes a HL sequence that functions as a downstep trigger, and 3) the L serves either as final fall (non-connective form) or as initial lowering of the following word (connective form), depending on the phrasing structure of the utterance.

It is premature to propose a complete prosodic structure of GJ. However, we can postulate a tree model similar to the one developed for Tokyo [5] to show how the main claim[1] (accented word of GJ having HL) can be formulated.

Below are the prosodic trees lower than the level of prosodic word (***ω***). Since it is well established that tone bearing unit in the dialects in Aomori Pref. is syllable (***σ***) [6], the lowest node of the tree is assumed to be ***σ***. The ***ω*** to the left is *omijaŋe* 'souvenir' (unaccented) and the one to the right is *tebúkuro* 'glove' (accented).



Notice that the tone linked to the right edge of ***ω*** is H for the unaccented ***ω***, while it is L for the accented ***ω***. The Ls in parentheses will be discussed below. The H of the unaccented ***ω*** is secondarily associated with the final syllable, as indicated by the dotted line. This H acts as the peak of non-accentual rise. On the other hand, the H of the accented ***ω*** is directly linked to the accented syllable, serving as the peak of an accentual rise.

The association of the L of the accented ***ω*** with ***σ*** is relevant to the pitch pattern alternation. Two tone-linking rules are proposed. One is the *secondary association rule*, whose application depends on the phrasing. If we refer to the domain for the alternation as the intonational phrase (***IP***), then the rule can be formulated as following: 'if the ***ω*** is rightmost in ***IP***, link the ***ω***-edge L to the ***ω***-final ***σ***, otherwise link the L to the first ***σ*** of the following ***ω***'. The other rule is the *tone spreading rule*, which is applied as 'spread the accentual H from left to right over the tonally unspecified ***σ***s'.

The Ls in the parentheses account for the dip before non-accentual or accentual rise. Which prosodic unit is the L affiliated to? One idea would be that the L is linked to the left edge of ***ω***. The alternative account would involve the introduction of *accentual phrase* (***α***) immediately above ***ω***. The ***α*** can contain at most one accent and has the L to the left. The results for speaker K showing the prosodic merging of ***ω***s, might support the model with ***α***, because it presupposes the phenomenon where two or more ***ω***s are merged into a single ***α***.

To conclude, the results of this study revealed that the accented word of Goshogawara Japanese (GJ) has a falling property regardless of its phrasal position. They suggest that the accented word of GJ contains a fall (HL) in its representation.

5. REFERENCES

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[1] Our two native speakers had a good intuition for judging which syllable was accented but were not able to judge what sort of pitch (such as rise and fall) marked the accented syllable.