SUBTLE DIFFERENCES BETWEEN THE SPEECH OF YOUNG SPEAKERS OF 'ACCENTLESS' AND STANDARD JAPANESE DIALECTS: AN ANALYSIS OF PITCH PEAK ALIGNMENT

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ABSTRACT

Japanese dialects are largely classified into two types in terms of prosodic systems, one having a lexical pitch contrast and the other having no such contrast. Dialects of the latter type are called 'accentless' dialects. Many previous studies reported that, in areas where an accentless dialect had been originally spoken, younger speakers acquired Standard Japanese lexical pitch accent and are thus no longer accentless. We replicated this finding when we followed the traditional approach of categorically labeling recorded tokens. However, an acoustic analysis revealed that there was a phonetic difference between the speakers from the accentless region (Accentless Group) and those from the Standard Japanese region (Standard Group); the alignment of the F0 peak in accented words tended to be delayed more in the Accentless Group than the Standard Group. This difference is probably due to the substratum interference of the original accentless dialect.

Keywords: accentless dialect, lexical pitch accent, peak alignment, delayed peak, standardization

1. INTRODUCTION

One of the features that have attracted theoretical phonologists as well as Japanese dialectologists is the variety of tonal systems in Japanese dialects. Well-studied tonal systems include lexical pitch accent in Tokyo (Standard) Japanese, word melody in Kagoshima dialect, and the combination of lexical pitch accent and word melody in Osaka dialect [4, 5, 19]. However, it is also true that many regional varieties are facing a drastic change in their tonal systems, particularly due to the influence of Standard Japanese.

This study deals with so-called 'accentless' dialects. 'Accentless' dialects are defined by the lack of pitch specification at the word level in Japanese dialectology [19]. In such dialects, lexical pitch contrasts found in Standard Japanese, such as *ame* (HL) 'rain' vs. *ame* (LH) 'candy', are non-existent; those words are distinguished only by context.

Previous studies have reported that younger speakers in areas known as accentless dialects had acquired the Standard Japanese tonal system and are thus no longer 'accentless' [11, 14, 16]. For example, Onishi reported that "speakers of the Sendai dialect, which was originally 'accentless', have acquired lexical pitch accent. This process has completed in younger generation" [14].

However, the subtle differences between the standard and accentless dialects may not be detectable by descriptive classification of their utterances. For example, Utsugi, et al. [18] conducted a speech perception experiment to compare speakers from two areas: Southern Tohoku including Sendai (originally accentless) and Southern Kanto including Tokyo (Standard Japanese) and found that the two groups were similar in their performance in simple discrimination or identification of pitch accent. But they found a reliable difference between the groups when the task was made difficult. The results were comparable to the difference previously reported between Spanish and French speakers using the same task [3]. This suggests that young Southern Tohoku speakers have a different prosodic system from Standard Japanese. If true, the production of pitch by young speakers of accentless dialects may also show subtle differences from that of standard dialects.

The main aim of the present study is to clarify whether young Southern Tohoku speakers produce pitch identically to Standard Japanese speakers. We speculate that there are some differences in young Southern Tohoku speakers' speech. Such differences would not be successfully detected through the traditional dialectological approach of impressionistic description that worked for old speakers who were mono-dialectal speakers and had strong characteristics of a regional dialect. The

differences could have been detected if the proper tasks and analysis techniques were used.

For this purpose, investigation into phonetic details is required. We specifically focus on peak alignment of pitch. Languages/dialects can differ in the peak alignment of pitch accent even though phonologically they have the same accent (e.g., [9, 10]). However, no studies have been conducted on peak alignment in the speech of Southern Tohoku speakers in the original 'accentless' variation and in young speakers' Standard-Japanese-like speech style, or that of surrounding pitch-accent dialects. We speculate that young Southern Tohoku speakers have almost acquired Standard Japanese pitch accent, but the acquisition is not perfect in terms of peak alignment.

We made recordings and conducted three analyses for recorded tokens: (i) categorical labeling of words in citation form (Analysis 1), (ii) acoustic analysis of words in citation form (Analysis 2), and (iii) acoustic analysis of words followed by a postpositional particle. The first approach is the one used in the previous studies. To clarify the limitations of each approach is another aim of this paper.

2. DATA COLLECTION

2.1. Participants

Twenty-four participants, aged between 19 and 25, participated in the experiment. They were classified into two groups: 'accentless' and 'standard', the latter being included as a control group. The accentless group consisted of participants from a part of the area of the Southern Tohoku 'accentless' dialects: Southern Miyagi, Southern Yamagata, and a large part of Fukushima prefecture. The exact area was determined based on literature on Japanese dialectology [5]. The standard group consisted of participants from the area of Standard Japanese: Tokyo, Saitama, Kanagawa, and Chiba prefectures. Each group consisted of twelve subjects (6 females and 6 males).

2.2. Datasets

Among several datasets we recorded, three sets will be discussed in the present paper. One set was designed to investigate the overall characteristics of pitch accent, whereas the other two sets were designed to conduct an acoustic analysis.

Dataset 1 consisted of 30 bimoraic nouns (12 first-mora-accented, 12 final-mora-accented, and 6 unaccented words.)

Dataset 2 included 2 first-mora-accented bimoraic nouns × 3 repetitions. Words in this set contained only sonorants to minimize the effect of microprosody.

Dataset 3 included words that were the same as those in Dataset 2 and were followed by a postpositional particle *–ga*.

2.3. Recording procedure

In the recordings, participants read test words shown on a computer display. The words were shown in a randomized order.

The recordings for the accentless group were conducted in Sendai city, which is located in the area of the accentless dialects, and those for the standard group were conducted in a suburb of Tokyo, which is located in the area of Standard Japanese.

3. ANALYSIS 1

The first analysis used Dataset 1. This followed the approach used in previous studies.

3.1. Analysis procedure

Tokens were categorically labeled by a trained phonetician who is a native speaker of Standard Japanese. Two categories, 'HL' and 'LH', were used for Set A, and three, 'HLL', 'LHL', 'LHH' for Set B according to Standard Japanese phonology.

3.2. Results

Agreement rates were calculated between labels and canonical accent patterns in accent dictionaries [1, 13]. As a result, all speakers showed rates higher than 90%. The rate reached 100% for 8 among 12 speakers in the Accentless Group and 10 among 12 speakers in the Standard Group. The mean rates were 98.3% (SD = 2.7%) for the Accentless Group and 99.4% (SD = 1.3%) for the Standard Group.

4. ANALYSIS 2

The second analysis used Dataset 2, which was designed to conduct an acoustic analysis. It consisted of only first-mora-accented words.

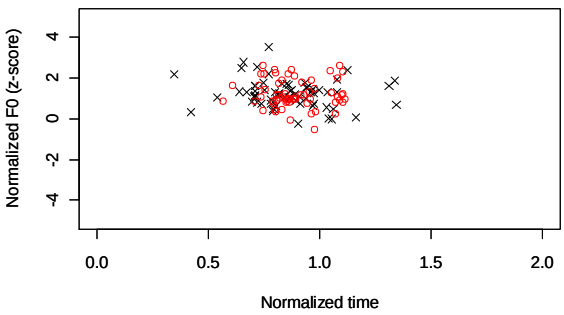
4.1. Analysis procedure

Tokens were first labeled categorically as we did for the Dataset 1. One token among 144 in total, which was labeled 'LH', was omitted from the analysis. The remaining tokens were submitted to an acoustic analysis. Segmentation of the recorded tokens was performed manually using Praat. Then F0 contours were extracted with the same software. Based on the extracted F0 contours, the alignment and height of F0 peaks were measured. If a token had an alignment beyond +/- 2 × SD within each group, that token was treated as an outlier. As a result, 129 tokens (64 in the Accentless Group and 65 in the Standard Group) were obtained.

4.2. Results

Figure 1 shows the alignment of F0 peaks. As can be seen, most of the tokens had a peak in the latter half of the first syllable. Some tokens had a peak in the second syllable although an accent was phonologically placed on the first syllable. This is a phenomenon known as "delayed peak" (or *ososagari*) [7, 12, 17].

Figure 1: Alignment and height of F0 peaks in Dataset 2. X-axis: normalized time (0.0, 1.0, and 2.0 correspond to the start of the first syllable, the syllable boundary, and the end of the second syllable, respectively). Y-axis: Normalized F0 in z-score. Red circle: Accentless group, black cross: standard group.



The alignment of peaks was subjected to an ANOVA with one between-subject factor, Group (accentless vs. standard.) The effect of Group was not significant ($F(1,22) = 0.5436$, $p = 0.4687$). This suggests that there is no between-group phonetic difference in terms of the alignment of F0 peak.

5. ANALYSIS 3

Dataset 3 consisted of first-mora-accented words, each followed by a particle.

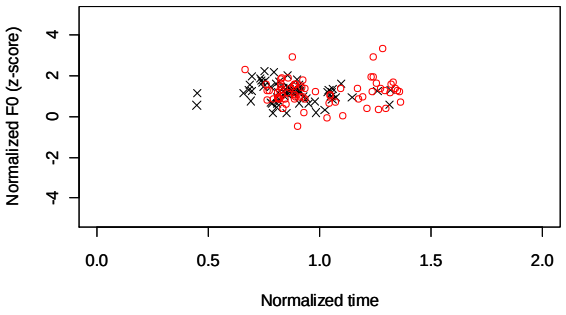
5.1. Analysis procedure

The analysis procedure for Dataset 3 was the same as that for Dataset 2. All of the tokens were categorically labeled as 'HLL' and were thus submitted into an acoustic analysis without omissions. Through the process of outlier omission as was done for Dataset 2, 135 tokens (69 in the Accentless Group and 66 in the Standard Group) were obtained.

5.2. Results

Figure 2 shows the alignment of F0 peaks.

Figure 2: Alignment and height of F0 peaks in Dataset 2. X-axis: normalized time (0.0, 1.0, and 2.0 correspond to the start of the first syllable, the syllable boundary, and the end of the second syllable, respectively). Y-axis: Normalized F0 in z-score. Red circle: Accentless group, black cross: standard group.



The alignment of peaks was subjected to an ANOVA with one between-subject factor, Group (accentless vs. standard.) We found a significant effect of Group ($F(1,22) = 5.7483$, $p = 0.02543$). Tokens in the Accentless Group tended to have later peaks than those in the Standard Group. That is to say, the Accentless Group had a greater tendency towards the 'delayed peak' phenomenon.

6. GENERAL DISCUSSION

Previous dialectological studies reported that younger speakers in accentless-dialect regions had acquired the standard Japanese lexical pitch accent. However, the present study revealed that a characteristic of the regional dialect is existent even in younger speakers from the accentless region. The speech of young Southern Tohoku

speakers is characterized by a greater delay in accentual peaks, as found in analysis 3.

In addition to this finding, the present study emphasizes the importance of an acoustic phonetic approach to prosody of regional dialects. The results of analysis 1, in which no difference was found, suggest the limitation of categorical labeling. This approach is unable to detect within-category differences. This explains why previous studies did not find peculiar features in the speech of young speakers from the accentless region.

Interestingly, no between-dialect difference was found in analysis 2. This suggests an interaction between peak alignment and 'tonal crowding' [2]. That is to say, the alignment of a tonal element is affected by the crowdedness of surrounding tones. In the present case, since the utterance-final L% is associated with the second syllable of the token in Dataset 2, the high peak is likely to be pushed forward. This effect does not occur in Dataset 3 since the second syllable is not utterance-final.

One might wonder why peak alignments were delayed more in the Southern Tohoku speakers than Standard Japanese speakers. It is probably due to between-dialect differences in laryngeal control. According to Kiritani, et al. [8], differences are found in laryngeal muscle activities between accentless and Tokyo speakers; suppression of the crycothyroid (CT) muscle was found after an initial pitch rise in Tokyo speakers, whereas CT activity was maintained throughout the utterance in accentless speakers. It is probable that such a fundamental difference in laryngeal control underlies the difference of peak alignment.

Our next research task will be to investigate between-style differences in the speech of young Southern Tohoku speakers. It is possible that they have several speech styles, which are extremely different from one another; one closer to Standard Japanese and the other closer to the original regional dialect found in older speakers. Another possibility is that they have a single 'new dialect' which is close to neither Standard Japanese nor the original regional dialect [6].

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