Vowel Devoicing and the Loss of Lexical Accent in Tokyo Japanese

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Abstract: Two experiments investigated how the conflict between vowel devoicing and pitch accent is resolved in Tokyo Japanese. Previous studies found that either the pitch after the devoiced accented mora is raised to compensate for the loss of the accent, or the accent location is shifted away from the devoiced mora. Experiment 1 found that pitch raising occurs only when the phrasal high tone is unrealized also by devoicing. Experiment 2 found that lexical accent in the devoiced mora is simply lost when there is no place to shift the accent.

INTRODUCTION

Pitch accent requires voicing by its nature. However, accented vowels are sometimes devoiced between voiceless consonants in Tokyo Japanese (1). In such cases, listeners perceive the accent either in that mora (1, 2), or shifted before or after the devoiced region (3). When listeners recover the accent location, the intensity of the devoiced region is not involved (1, 2) but the pitch after the devoiced region is raised (1, 4). When accent is perceived as shifted, it is claimed that the accent does not go beyond a morpheme boundary (3).

However, it is not clear under which condition either pitch raising or accent shifting occurs. The tonal context of the devoiced region might play a role here. In Tokyo Japanese, the phrasal high tone [H] links to the second sonorant mora and a boundary low tone [L%] links to the first mora of an accentual phrase (5). The first experiment investigates whether these phrasal and boundary tones before the devoiced region affects pitch raising.

EXPERIMENT 1

The corpus was designed to place [H] or [L%] tones immediately before the devoiced region. One way to control the tonal context is by manipulating the word length. Three-mora words with two devoiced morae at the end have only room for a [L%] tone to be realized in the first mora. By contrast, four-mora words with two devoiced morae have a [H] tone before the devoiced region. Second way arises when speakers only devoice the accented mora in three-mora words. There are two morae left undevoiced and a [H] tone can appear in the second mora.

Four native speakers of Tokyo Japanese participated. Twelve target words whose last two morae are devoiceable and eight control words embedded in a fixed carrier sentence were presented to each speaker. Subjects repeated the whole set in five different random orders.

Figure 1 and 2 show sample results from two speakers. In Figure 1, a stylized F0 contour of three-mora words (●) and that of four-mora words (□) are compared. Both sets of words have consecutively devoiced morae including the lexically accented penultimate mora. Four-mora words with final two morae devoiced have its [H] tone realized on
the second mora, while three-mora words show no trace of a [H] tone within the word. Pitch raising occurs after the devoiced region only in the three-mora words. In Figure 2, stylized F0 contours of three mora words with consecutive devoicing (□) and single devoicing (●) are compared. In this case, both sets of words have a lexical accent on the final mora. The phrasal [H] tone is not realized when the last two morae are devoiced and pitch raising after the devoiced region only occurs in this case.

These results indicate that the pitch raising after the devoiced region is dependent on the absence of a phrasal high tone. However, these data can also be interpreted as a type of accent shifting: lexical accent shifts to the left and docks onto a phrasal [H] tone. Perceptually, it is difficult to tell the actual location of lexical accent in these cases. The second experiment was thus designed to control accent shifting by manipulating the location of the morpheme boundary in compound words.

**EXPERIMENT 2**

Four sets of words were used in the experiment: seven target words with a morpheme boundary immediately before the devoiceable mora; seven target words with a morpheme boundary immediately after the devoiceable mora; control words for both sets with no devoiceable morae but with the same morpheme boundary locations. Words were also matched in length and accent location. Five native speakers of Tokyo Japanese pronounced the two target word sets twelve times and the two control word sets six times with a fixed carrier sentence.

Sample results from one speaker is depicted in Figure 3. Though the morpheme boundary is before the devoiced mora (□), the accent is not shifted to the right but there is no pitch raising either, which is clear from a comparison with control words (●). Furthermore, the second mora in the target word karishiken is lower in pitch than the third mora in control words with a realized accent. This verifies previous observations that accent shifting cannot go beyond a boundary.

**CONCLUSION**

This study indicates that there are cases where neither pitch raising nor the accent shift occurs even though the accented mora is devoiced. Accent shifting is crucially different from pitch raising in that it cannot go beyond a morpheme boundary. However, pitch raising occurs only in the absence of a phrasal high tone and thus does not work complementarily to the accent shifting. When there is a phrasal high tone and a morpheme boundary before the devoiced region, the lexical accent is lost as far as the production goes.

**REFERENCES**