

How elderly listeners perceive Japanese geminate/non-geminate words with devoiced vowels

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Vowels /i, u/ between voiceless consonants or at the end of the words, are frequently devoiced in Japanese speech, especially in Tokyo dialect [1]. Moreover, devoiced vowels and geminate consonants co-occur in some words [2]. For normal hearing listeners, speech recognition are not affected by devoiced vowels. However, we can predict that devoiced vowels would affected the speech recognition of elderly listeners with age-related hearing loss, because the energy of vowels (which have stronger energy than the energy of consonant) is lost.

In Iwagami (2018) [3], perception experiments were conducted to investigate whether the misperception of geminate/non-geminate words in Japanese increases when the vowels are devoiced. In experiment 1 (EXP1), the perception experiment for young normal hearing listeners (YNH) was conducted under both noisy and clean (without noise) conditions. The results of EXP1 showed that the correct rate with both devoiced and non-devoiced vowels was almost 100% under clean condition, whereas, the correct rate with devoiced vowels was lower under noisy condition. In experiment 2 (EXP2), the perception experiment for elderly listeners was conducted using the same stimuli as EXP1 (without noise). The results of EXP2 showed that the correct rate of words, especially geminate words with devoiced vowels, was lower than under non-devoiced conditions (see Fig 1). Moreover, there was a strong tendency for elderly listeners to misperceive consonants, including high frequency components, especially /ʃ(u)/ as /ʃ(i)/ (the parentheses shows devoiced vowels). Elderly listeners also tended to misperceive geminate as non-geminate. These results indicated that the misperception rate with devoiced vowels by elderly listeners increases due to the age-related hearing reduction. Hence, these results suggest that the energy of vowels is important for elderly listeners to recognise Japanese geminate/non-geminate words correctly.

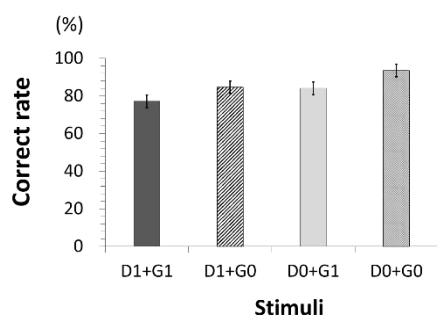


Fig 1: Correct rate in EXP2. D1: devoiced, D0: non-devoiced,

G1: geminate, G0:non-geminate.

References

- [1] T. J. Vance, "An Introduction to Japanese Phonology," New York, SUNY Press, 1987.
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