

Study on Effects of Speech Production during Delayed Auditory Feedback for Air-Conducted and Bone-Conducted Speech

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Abstract : *In this paper, speaking styles and performance under DAF for air- and bone-conducted speech were investigated. As a result, for both air- and bone-conducted presentation, speech duration was largely prolonged under 100-200 ms delay. DAF for not only air-conducted but also bone-conducted speech seems to affect one's speech production.*

Keywords : *Speech, Auditory feedback, Air-conduction, Bone-conduction*

1. Introduction

Speaking styles and performances of speakers have been investigated during speech production under delayed auditory feedback (DAF) [1][2]. However, previous studies have focused on only the delay in feedback for air-conducted speech although speakers perceive their own voice for both air-conducted and bone-conducted speech. In this paper, the phenomena between speech production and perception were investigated under DAF presented as both air-conducted and bone-conducted speech. It was then confirmed whether the speaking styles and performances were similar or different for these two types of presentation.

2. Method

2.1 Participants and Procedure

Four male Japanese speakers aged 22 to 26 participated in the experiments. They uttered three Japanese words consisting of 4 morae (/sjabusjabu/, /takabisja/, /yuuwaku/) in a soundproof room. Their voices were recorded and were fed back to themselves through a headphone or a bone-conduction transducer. At this time, the feedback signal was temporally delayed by a PC depending on the experimental conditions. At first the utterances were repeated five times per word under a non-delay condition. Then they were repeated 30 times per word while delay conditions (25, 50, 100, 150, 200, and 400 ms) were randomly changed.

2.2 Analysis

The ratio of speech duration under a delay condition to that under the non-delay condition (R_d) was determined in order to investigate the effect of delayed speech on the speaking style.

3. Results

Figure 1 shows the R_d of the word /sjabusjabu/ spoken by speaker-A as a function of delay. For both air- and bone-conducted presentation, the increase in R_d was observed in the 100-200 ms delays and no large increase/decrease in R_d was observed as the delay exceeds 200 ms. Overall, R_d for bone-conducted presentation tended to be a little larger than that for air-conducted presentation.

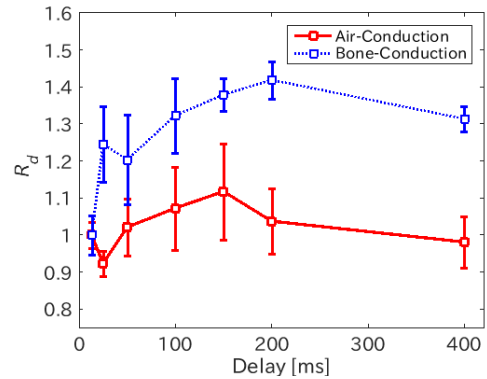


Figure 1. R_d of /sjabusjabu/ by speaker-A as a function of delay.

4. Discussion and Conclusion

From the experimental results, it was indicated that the effects of delayed feedback for bone-conducted speech might be stronger than that for air-conducted speech. It will be investigated how auditory feedback due to air- and bone-conducted speech separately works for speech communication by considering the transmission properties of both air- and bone-conducted speech.

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References

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