

# Intelligibility of English mosaic speech: Influence of manipulating mosaic block duration

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### 論 文 審 査 の 結 果 の 要 旨

The objective of the doctoral research was to investigate temporal aspects of speech processing by using so-called mosaic speech. Mosaic speech is degraded speech that is segmented into time  $\times$  frequency blocks. The first purpose of the doctoral research was to investigate the intelligibility of English mosaic speech, and whether its intelligibility would vary if it was compressed, preserved, or stretched in time. The second purpose was to investigate whether the effects of compressing, preserving or stretching mosaic speech would be similar among listeners with different language backgrounds. To achieve these purposes, two experiments were conducted, each described in a different chapter of the thesis.

In the experiments, English mosaic words were presented to listeners from three different language groups (native-English, Indonesian, and Chinese), and they typed what they had heard. The intelligibility of English mosaic speech (individual words) was obtained by counting the number of correct words given by the participants. For the first purpose, from the two experiments conducted, it was found that listeners from the three language groups (native-English, Indonesian, and Chinese) showed the same trends in intelligibility scores: English mosaic speech was most intelligible when the original mosaic block durations (OMBDs) were preserved or stretched into 20- or 40-ms mosaic block durations (MBDs). Intelligibility decreased when the OMBDs were compressed, or stretched into MBDs of 80 ms or longer.

Regarding the second purpose, the results showed that the intelligibility was relatively high for stimuli with preserved OMBDs of 20 ms and 40 ms for all language groups, and also for stimuli with an MBD of 40 ms after stretching the OMBD of 20 ms, but only for the native-English group. The OMBD was manipulated by compressing or stretching it without changing its linguistic information. However, the speed of speech changed and this caused the intelligibility to change as well. Both non-native listener groups showed the same trend regarding the speed of speech, that is, the intelligibility was highest for the preserved speech.

In general, the results of the thesis research suggest that humans can extract new information from individual speech segments of about 40 ms, but that there is a limit to the amount of linguistic information that can be conveyed within a block of about 40 ms or below. Overall, the rigorous experimenting, the level of the research in general and the conclusions described in the doctoral thesis merited a high evaluation by all committee members. As a result, the committee decided that a doctoral degree (Doctor of Philosophy in Design) can be conferred upon Mrs. Santi. 本論文は博士（芸術工学）の学位に値すると認めた。