

INTEGRATION AND SEGREGATION OF AUDITORY STREAMS DURING RHYTHM PERCEPTION

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Among auditory information, rhythm is one of the important factors in human language (Tachibana et al., 2013), and in vocalization of other species (Fitch, 2013). In the present study, we examined the rhythm perception of human, especially in relation with the effect of timbre.

Research on rhythm perception has mainly focused on temporal structure, including periodicity (Bendixen et al., 2010). However, research on the auditory stream segregation has reported that sounds with different timbres are difficult to perceive as a single unit (Bregman, 1990). This suggests that rhythmic sequences composed of multiple timbres might be more difficult to discriminate their rhythmic patterns than those composed of single timbre.

In the present study, we aimed to reveal the perception of rhythmic pattern including different timbres, and investigated the accuracy of rhythm discrimination by 2 Alternative Forced Choice Task. The center frequency of the band noise stimuli was manipulated to provide conditions with and without frequency difference. In the experiment, participants listened to two rhythmic stimuli, standard stimuli and comparative stimuli, and were asked to choose the bouncing one. Point of subjective equality (PSE) and discrimination accuracy (σ) were estimated by sigmoid approximation.

The result (Fig. 1) showed that the accuracy of rhythm discrimination decreased in the condition with frequency difference. A paired t-test for σ showed significant differences between conditions ($p < 0.001$, $t = 5.36$, $df = 39$). There effects were found even when the standard rhythm pattern was varied from 2:1, 1:2, to 1:1. This suggests that rhythm perception is affected not only by temporal structure but also by sequential grouping. Similar experiments on other species would give an insight into the origin of language.

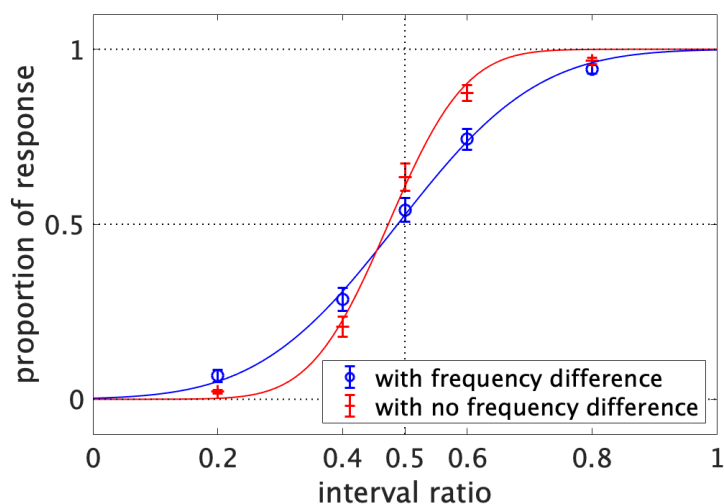


Figure 1. Proportion of response that the comparative stimulus was "bouncing" for each interval ratio. The blue line indicates the condition with frequency difference, and the red line indicates the condition without frequency difference. Error bars are standard errors. Curves are sigmoidal approximations.

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