

Click versus Click-Click: Influence of a Preceding Stimulus on Sound Localization

Norbert Kopco^{1,2}, Virginia Best¹, Barbara Shinn-Cunningham¹

¹*Boston University*, ²*Technická Univerzita, Kosice, Slovakia*

Previous studies of sound localization have observed spatial interactions between sound objects presented simultaneously or with very small inter-stimulus delays. For stimuli presented in rooms, we have observed such interactions at much longer delays (up to 300 ms). The aim of the current study was to better characterize how preceding stimuli influence sound localization over these time scales.

We examined the localization of two-ms-long target clicks presented with or without an identical preceding click. The clicks were presented from loudspeakers located in the frontal horizontal plane in a moderately reverberant room. Preceding and target clicks had angular separations of up to 90° and temporal separations of up to 500 ms. The preceding click had two main effects: (1) it increased the variance in target localization responses and (2) it shifted the mean response, especially for large angular separations (greater than 50°) where the mean was shifted towards the location of the preceding click. Both effects decreased with increased temporal separation.

Analysis of interaural cues for the click-pair stimuli suggest that acoustic interactions between the reverberant tail from the preceding click and the direct sound of the target click cannot explain the observed effects. We hypothesize that neural dynamics in spatial processing, operating over longer time scales than many other known spatial-processing mechanisms (such as the precedence effect), contribute to the observed phenomenon.

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