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Detection and Cortical Representations of the Break in Interaural Correlation of Narrowband Noises Are Affected by Center Frequency and Interaural Delay

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When either broadband or narrowband arbitrary noises presented at the two ears are correlated, a fused noise image is perceived inside the head if the interaural interval (interaural time difference, ITD) is sufficiently short, indicating that acoustic-waveform information can be binaurally integrated. At both the perceptual level and neurophysiological level, this study investigated whether the binaural integration of correlated noises is affected by center frequency (for narrowband noise) and ITD. Results of the psychophysical experiment show that the duration threshold for detecting a break in correlation (BIC) in the correlated noises at the two ears was higher for high-frequency noises than for low-frequency noises, and dramatically elevated with the increase of the ITD from 0 to 4 ms. Moreover, the ITD-induced threshold elevation was much larger for high-frequency narrowband noises than for low-frequency narrowband noises. Results of the neurophysiological experiments show that the cortical components of scalp event-related potentials to the BIC were markedly modulated by both the center frequency (for narrowband noise) and ITD. Thus, temporal integration of acoustic waveform details of correlated noises at the two ears is both frequency and ITD dependent. Supported by the National Natural Science Foundation of China.