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Temporal weighting of interaural level differences in high-rate click trains

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When high-carrier-frequency stimuli are amplitude modulated at rates above ~ 200 Hz, lateralization based on envelope interaural time differences (ITD) becomes dominated by onset ITD. The role of onset cues in interaural-level-difference (ILD) processing, however, is less well understood. Although theoretical predictions suggest that onset dominance should have similar effects upon ILD as upon ITD, some experimental data suggest that ILD processing retains greater sensitivity during post-onset segments of a high-rate stimulus. In this study, subjects lateralized ILDs carried by trains of 16 Gaussian-filtered clicks (carrier frequency 4000 Hz) that varied in interclick interval (ICI) from 2 to 10 ms (modulation rate 100-500 Hz). ILDs of individual clicks in each train were randomly perturbed. Multiple linear regression of listener responses onto the perturbed ILD values was used to generate temporal weighting functions (TWFs) that describe how a listener's sensitivity to ILD changes over the stimulus duration. The resulting TWFs were compared to predictions from models of onset dominance as well as to TWFs measured for ITD and in free-field conditions. The results have implications for binaural processing of high-rate pulsatile stimuli experience by users of bilateral cochlear implants.