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Temporal dynamics of stimulus specific processing in the human auditory cortex as revealed by electroencephalography

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When the same sound is presented repeatedly, the electrical brain response recorded over the scalp decreases in amplitude, an effect known as adaptation. Adaptation is dependent on both the similarity of the sounds and the time between them. It has been particularly well studied for a deflection of the electrical response known as the N100, which peaks about 100 ms after sound onset and receives major contributions from auditory cortical sources. Adaptation may reflect decreased sensitivity to repetitive stimuli, but could also indicate more efficient processing of familiar events.
Research on adaptation has often employed an alternating tone paradigm (A-B-A-B), examining the effects of changing inter-stimulus interval (ISI) or the frequency separation between A and B tones. Decreasing the frequency separation leads to an increase in N100 adaptation, and it has been suggested that the frequency specificity of this adaptation sharpens with decreasing ISI. In contrast, some studies have used A-B pairs with long inter-pair gaps and have found an enhancement of the N100 response to the B tone at short ISIs.
In order to gain a better understanding of the processes contributing to adaptation and enhancement, this study investigates the temporal dynamics and the frequency selectivity of these effects.