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Build-up of Contextual Plasticity in Anechoic and Reverberant Rooms

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Contextual plasticity (CP; Kopčo et al., 2007, J. Acoust Soc Am, 121, 420-432) is a form of spatial auditory plasticity observed in localization experiments in which distractor-target click pairs with a fixed distractor location (the context) are interleaved with target-alone trials. CP is observed as biases in localization of the target-alone target clicks of up to 10° in the direction away from the distractor (which is only presented on the interleaved contextual trials). This adaptation occurs on the time scale of seconds to minutes.
Here we analyze the temporal profile of CP build-up using a combination of linear and exponential models. The models are fitted to data in which distractor location (frontal vs. lateral), context distractor type (single click vs. multiple clicks), target location (near vs. far from distractor), and environment (anechoic vs. reverberant) are manipulated. While the basic profile of CP build-up is best fitted by an exponential function, the dependence of the build-up on the context presentation rate (number of clicks) is modeled sufficiently well linearly.
The modeling results show that the contextual plasticity buildup depends on all the evaluated factors. In particular, CP is stronger and its buildup is faster in the anechoic room. On the other hand, the effect of context presentation rate is faster in reverberation. Thus, contextual plasticity is likely a result of a combination of multiple adaptive processes in auditory spatial representations, sensitive to both the stimulus distribution and the reverberation processing.
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