Duration adaptation improves time sensitivity

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Abstract (1902 char / max. 2300 char without spaces)
The ability to precisely estimate time intervals is crucial in many aspects of perception and action. A recent neuroimaging study suggested that time perception may be mediated by a neural population tuned for specific durations: Regions in the right parietal cortex showed duration-specific repetition suppression (Hayashi et al., 2015 PLoS Biology). This hypothesis is further supported by psychophysical work showing that adaptation to a specific duration produces a negative aftereffect: Stimulus durations are over-estimated following exposure to a short adaptor and under-estimated following exposure to a long adaptor. Here, we show that adaptation to a specific duration produces, not only systematic biases in perceived durations for longer and shorter durations than the adaptor, but also improvements of sensitivity for the adapted duration. Participants were tested on two perceptual discrimination tasks. On each trial, they were presented with an auditory white noise of 500 ms (standard duration) and asked to judge if a visual stimulus of variable duration (comparison duration, 200 – 800 ms) was shorter or longer than the standard (Experiment 1) or same or different (Experiment 2). In adaptation blocks, the perceptual judgments were preceded by an adaptation period in which a visual stimulus of 500 ms duration was repeatedly presented. In baseline blocks, the adaptation period was absent. We used a cross-modal comparison (auditory standard/visual comparison) so that the effects of adaptation would be limited to the comparison stimulus. In both experiments, there was no change in the point of subjective equality. However, adaptation resulted in a steeper psychophysical function compared to the no-adaptation condition. Moreover, in the same-different judgment task (Experiment 2), adaptation condition showed a higher accuracy in judging the two stimuli as "same" when both stimuli were of 500 ms duration, suggesting that repeated exposure to a specific duration produces higher sensitivity for that duration. The duration-specific repetition suppression found in the previous neuroimaging study may reflect sharpening tuning curves of duration tuned units rather than neural fatigue/saturation.