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The effects of stimulus repetition probability in the ventral visual stream

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Several functional magnetic resonance imaging (fMRI) studies point currently towards the role of perceptual expectations in determining adaptation or repetition suppression in humans. These studies suggest that adaptation reduces the predictive error of a decision and they contrast the currently accepted bottom-up theories of adaptation. In our current experiment we tested whether stimulus repetition probability affects fMRI adaptation (fMRIa) when the adaptor and target stimuli are (1) overlapping (OL) each other on the periphery and (2) when they are presented in opposite hemifields (non-OL). We reasoned that if perceptual expectation affects fMRIa then it should be independent of the relative position of adaptor and target stimuli. Subjects (n=9) were exposed to either two identical (rep trials) or two different face stimuli (alt trials). Both types of trials were presented either in blocks consisting of 75% (rep block) or 25% (alt block) of rep trials. We found that the probability of rep trials affected fMRIa equally for OL and non-OL arrangements: the signal reduction after rep trials was bigger in rep blocks than in alt blocks for both OL and non-OL trials. This effect was similarly present in bilateral fusiform and occipital face areas, as well as in the lateral occipital cortex. Our results support the role of stimulus repetition probability in determining fMRIa. Surprisingly, however, this effect is not limited to the face specific areas but occurs in lower-level object-specific areas as well.

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