

## **“The role of attention and awareness in face repetition priming: evidence from fMRI, EEG and MEG”**

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I will describe four recent neuroimaging experiments that argue that attention, but not awareness, is necessary to observe behavioural and neural correlates of repetition priming (in this case, with faces). While some have argued that priming effects can occur in the absence of attention, or at least are less sensitive to attentional manipulations than, for example, recognition memory, such claims are either questionable, or in the latter case, can be explained by the lower sensitivity of typical priming tasks. Indeed, others have argued that spatial and temporal attention is necessary for priming effects. In an fMRI experiment, we found no evidence of "repetition suppression" (a reduced haemodynamic response for repeated vs initial stimulus presentations) for faces that were not attended spatially on either their initial or repeated presentation. However, one can attend to a location in space (and time) but still not be aware of a stimulus, such as when it is presented briefly between a forward and backward mask (ie, subliminal). In three further experiments using fMRI, EEG and MEG, we found behavioural priming for faces that was not simply explicable by measures of participants' ability to see the prime. This was accompanied by repetition suppression in occipital and fusiform face areas, demonstrating that modulation of activity in such ventral stream areas can occur without awareness. This occurred across different views of both familiar and unfamiliar faces. An EEG version of this paradigm revealed two subliminal repetition effects: an early one (100-150ms post-prime onset), which was sensitive to view but not familiarity (much like the fMRI data), and a later one (300-500ms post-prime onset), which was sensitive to familiarity (much like the behavioural priming). More recently, we replicated these effects with MEG, and are trying to relate the generators to the fMRI data. We are also extending this work to subliminal semantic (categorical) priming, though here effects appear largely explicable in terms of response-learning. More generally, masked priming would appear a useful way to investigate the extent of unconscious processing in the brain that does not rely on the more typical attentional manipulations.