

Brain activity reflecting social values associated with faces during binocular rivalry

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We learn meaningful information about other individuals through repeated social interactions. However, the influence of the acquired social information on visual perception and the potential interactions between the neural mechanisms of social associative learning and social perception are understudied. Here, we used binocular rivalry (BR) and fMRI to investigate the neural correlates of social associative learning and its impact on perceptual selection. The experiment consisted of three stages: pre-learning BR, Trust Game (TG), and post-learning BR. After performing pre-learning BR outside the MR scanner, the brain activity of the participants was monitored during the latter two stages. During BR, eight face-scene image pairs were presented dichoptically while participants were tracking their dominant perception. During TG, participants played an investment game with several faces presented during BR. Each face was repeatedly presented and was assigned to one of three conditions (generous, intermediate, selfish) based on the portion of payback. Results from TG showed greater BOLD activity in the ventromedial prefrontal cortex (vmPFC) for “generous” faces after learning has occurred, compared to before learning or for other face conditions. In post-learning BR, “generous” faces tended to be perceptually dominant longer compared to pre-learning BR. Also, “better learners” (i.e., participants who made differential investment based on the faces’ generosity during TG) showed greater activation in the face-selective areas including the left fusiform face area and the left amygdala when “selfish” faces were dominant. Functional connectivity analysis revealed that vmPFC showed greater connectivity with two subregions of the anterior cingulate cortex when “generous” faces were dominant. Taken together, the current results show brain activation reflecting social values of faces acquired through associative learning and activation in face-relevant regions modulated by the learned social value, which implies potential linkage between social associative learning and social perception.

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