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EXPECTATION EFFECTS ON FACE PERCEPTION – NEURAL AND BEHAVIOURAL EVIDENCE OF THE ROLE OF EXPERTISE

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Background: Perceptual decisions are derived from the combination of priors and sensorial input. While priors are broadly understood to reflect experience developed over one's lifetime, the role of perceptual expertise at the individual level has seldom been directly explored.

Aims: Here we sought to better understand the role of expertise in forming expectations, and its downstream effect on perception itself. Across a series of experiments we assess this question in the contexts of categorization, individuation (i.e. identity processing), and low level processing (perceiving a face across different viewpoints).

Method: Here, we will focus on the first study, where we explored the role of expectation on stimuli categorization by manipulating probabilistic information associated with a high and low expertise category (faces and cars respectively). 67 participants learned the association between a color cue and each target category (face/car) in a behavioural categorization task. We then recorded neural activity (EEG) in a second task that used a similar paradigm (featuring the previously learned contingencies) and participants performed an orthogonal letter detection task to keep attentive. Finally, we measured individual level expertise for faces and cars (faces, CFMT+; cars, CCMT).

Results: Behaviourally, perception of the higher expertise category (faces) was modulated by expectation ($p = .009$), indicating both facilitatory (i.e. correct expectation facilitated object categorization) and interference effects (i.e. incorrect expectation hindered object categorization). These were associated with individual levels of face expertise ($p = .018$ and $p = .015$ respectively). Multivariate pattern analysis of the EEG signal classifying high and low face expectation revealed clear effects of expectation from 100 ms post stimulus both when participants saw faces or cars (one-tailed paired samples t-test comparing decoding of classifiers and chance level across all participants, FDR corrected, $p < 0.05$). Latency of peak decoding when viewing faces was directly associated with individual level facilitation effects in the behavioural task ($p = .033$).

Conclusions: These results highlight the role of expectations on informing perception. At the neural level, our data provides time sensitive evidence of expectation effects on early perception at a latency of around 100 ms. Importantly, the present findings reveal the critical role of higher-level expertise on forming priors.

Keywords: Prediction, Expertise, Face processing, EEG, MVP

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