Cheater or unachiever? How the brain develops an impression on people’s behavior in relation to rules and desires

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Forming and updating impressions about others is critical in people’s everyday life and engages specific portions of the dorsomedial prefrontal cortex (dMPFC), the posterior cingulate cortex (PCC) and the amygdala. Some of these activations are attributed to general “mentalizing” functions, associated with theory of mind and necessary to represent people’s mental states, such as beliefs or desires. Developmental studies, however, suggest that social inferences can also be obtained more superficially, through the aid of deontic heuristics which dictate what must (or must not) be done in given circumstances. We used fMRI and engaged 18 participants in a task in which they had to predict whether unknown characters would follow their desires or obey to external rules. Participants had no means, at the beginning, to make accurate predictions, but slowly learned (throughout the experiment) each character’s behavioral profile. We isolated brain regions whose activity changed during the experiment, as a neural signature of the impression formation. We found a striking dissociation between dorsal and ventral prefrontal regions: whereas dMPFC was involved in learning characters’ behavior in relation to their desires, the rectal gyrus and left amygdala were involved in learning characters’ rule-based behavior. PPC and ventral striatum activity did also show a gradual increase over the course of learning, but with no differentiation between the two conditions. Our data provide unprecedented evidence of a neural dissociation between deontic inference and mentalizing, and support dissociation between ventral and dorsal prefrontal cortex in terms low- and high-level social cognition.