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Neural Correlates of Decision-Making Under Ambiguity and Conflict

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Abstract : Studies of decision making under uncertainty generally focus on imprecise information about outcome probabilities ("ambiguity"). It is not clear, however, whether conflicting information about outcome probabilities affects decision making in the same manner as ambiguity does. Here we combine functional Magnetic Resonance Imaging (fMRI) and a simple gamble design to study this question. In this design, the levels of ambiguity and conflict are parametrically varied, and ambiguity and conflict gambles are matched on both expected value and variance. Behaviorally, participants avoided conflict more than ambiguity, and attitudes toward ambiguity and conflict did not correlate across subjects. Neurally, regional brain activation was differentially modulated by ambiguity level and aversion to ambiguity and by conflict level and aversion to conflict. Activation in the medial prefrontal cortex was correlated with the level of ambiguity and with ambiguity aversion, whereas activation in the ventral striatum was correlated with the level of conflict and with conflict aversion. This novel double dissociation indicates that decision makers process imprecise and conflicting information differently, a finding that has important implications for basic and clinical research.

Keywords : decision making, uncertainty, ambiguity, conflict, fMRI
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