



Biophysics of risk aversion based on neurotransmitter receptor theory

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Decision under risk and uncertainty has been attracting attention in neuroeconomics and neuroendocrinology of decision-making. This paper demonstrated that the neurotransmitter receptor theory-based value (utility) function can account for human and animal risk-taking behavior. The theory predicts that (i) when dopaminergic neuronal response is efficiently coupled to the formation of ligand-receptor complex, subjects are risk-averse (irrespective of their satisfaction level) and (ii) when the coupling is inefficient, subjects are risk-seeking at low satisfaction levels, consistent with risk-sensitive foraging theory in ecology. It is further suggested that some anomalies in decision under risk are due to inefficiency of the coupling between dopamine receptor activation and neuronal response. Future directions in the application of the model to studies in neuroeconomics of addiction and neuroendocrine modulation of risk-taking behavior are discussed.

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