Modelling Eye Movements in Risky Decision Making

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When people make risky decisions, they move their eyes over the attributes of the decision in quite a complicated pattern. For example, when choosing between a "50% chance of £100, otherwise nothing" and a "80% chance of £40, otherwise nothing", people will make saccades (eye movements) between 50%, £100, 80%, and £40. People often revist attributes several times during a single decision. There is no correct answer to this choice; one might prefer a smaller but more likely outcome (the safer choice) over a larger but less likely outcome (the riskier choice). Obviously the exact outcomes and probabilities predict how likely someone is to make (say) a risky choice. But over and above these outcomes, the pattern of eye movements adds significantly to the prediction. That is, even for choices with the same outcomes and probabilities, differences in the patterns of eye movements predict the choices people ultimately make.

This project would investigate how the pattern of transitions between attributes varies within a large data set collected in a series of experiments in 2010. The researcher will gain experience of eye-tracking in humans, mathematical modelling of risky decisions, and the statistical analysis of eye movements. The project will involve constructing a statistical model of the frequency of the saccades between each pair of attributes as a function of the attribute values and other properties of the choice. The results will be of crucial importance for understanding the processes by which people make risky choices and are likely to have profound impact on the main contemporary models.

This project would suit a researcher with an interest in behavioural economics or economic psychology. Some mathematical competence would be required, and a familiarity with (any) programming language will help. Training will be given in the modelling techniques used. The intention is to submit the work for publication. This work is part of a larger collaboration between psychologists and economists, and could certainly form the beginnings of a PhD in this field.

Suggested background reading:

Krajbich, I., Armel, C., & Rangel, A. (2010). Visual fixations and the computation and comparison of value in simple choice. *Nature Neuroscience, 13,* 1292-1298.

Stewart, N. (2009). Decision by sampling: The role of the decision environment in risky choice. *Quarterly Journal of Experimental Psychology, 62,* 1041-1062.