

Towards Behavioural and Biological Foundations of Decisions with Uncertainty: A Mission Incomplete

We know a lot about how humans deal with one type of uncertainty, where trial-and-error (reinforcement learning) works effectively, such as in foraging, in gambling, or in repairing, tuning, and even in strategic games. Animals such as monkeys, rats or mice approach this type of uncertainty in the same way, and hence, we have a fantastic animal model, with which to study the biological foundations. The findings have generated some of the algorithms that are at the core of Artificial Intelligence (AI). But what if uncertainty is generated by computational complexity? Theoretically, one cannot deal effectively with it by means of trial-and-error. A more methodical approach is called for. And indeed, humans follow fundamentally different strategies when faced with complexity. The talk will summarize ten years of research on human attitudes towards complexity. It will show what makes a decision difficult for humans, how the theory of computation sheds light on it, how humans are in one important respect still ahead of computers, how drugs affect the quality of decisions, and how markets can help individual decision-making.