University of Zurich[UZH]

Department of Economics – Neuroeconomics Seminar

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The cognitive science of complex planning

As DeepMind has revolutionized the AI of planning in combinatorially large problems, our lack of understanding of how humans plan in such situations has come into stark focus. The cognitive science of chess, once considered promising, is now virtually extinct. Planning tasks that are nowadays widely used in the field don't require much thinking ahead. I will show that it is possible to study human complex planning in tasks of intermediate complexity while maintaining experimental tractability and computational modelability. I will describe experiments on a game that we call four-in-a-row - a variant of tic-tac-toe or Go Moku. Inspired by best-first search, we built a heuristic computational model of human play in this game and fitted it to move-level data. The model predicts moves in unseen positions, decisions in unseen tasks, eye fixation patterns, mouse movements, and response times. Moreover, the model allows us to computationally characterize the effects of expertise and time pressure. Linking back to the chess literature, I will discuss how experts differ from novices in remembering game positions and move sequences. I will describe parallel results from a very large online data set, connections to development, and ongoing work on the neural basis of complex planning. Finally, I will comment on some broader themes: resisting reductionism, the use of games to study cognition, and comparisons to other species.