Behavioral economics and neuroeconomics: Cooperation, competition, preference, and decision making

Stephen Grossberg
Center for Adaptive Systems, Graduate Program in Cognitive and Neural Systems,
Center for Computational Neuroscience and Neural Technology,
and Department of Mathematics, Boston University
steve@bu.edu, http://cns.bu.edu/~steve

Behavioral economics and neuroeconomics concern how humans process multiple alternatives to make their decisions, and propose how discoveries about how the brain works can inform models of economic behavior. Some behavioral economists use formal models to capture important properties of human decision-making. The Nobel prize-winning work of Kahneman and Tversky (1979) on Prospect Theory is illustrative. More recent contributions in neuroeconomics have attempted to apply insights about how brains work towards achieving a better understanding of the neural basis for human decision-making behaviors.

The current talk will show how properties of cooperative-competitive and cognitive-emotional neural systems that were developed to explain large behavioral and neural data bases exhibit emergent properties that are economically relevant, including results about the voting paradox, the Invisible Hand, how to design stable economic markets, irrational decision making under risk (Prospect Theory), probabilistic decision making, preferences for previously unexperienced alternatives over rewarded experiences, and bounded rationality.

The specific results to be reviewed in the talk illustrate several general themes. One theme concerns how neural mechanisms that have been selected by evolution because they support adaptive behaviors that are crucial for survival can nonetheless give rise to irrational behaviors when they are exposed to certain environments. Another theme concerns how properties of cooperative-competitive dynamics may have useful applications in multiple disciplines. For example, one variation on a general class of such systems can guarantee stable storage of information in short-term memory even when an arbitrarily large number of neurons interact with very complicated individual cell properties, whereas another variation can guarantee how a competitive economic market can achieve a stable market price even when multiple competing firms use very different strategies that are not known to their competitors.