Departmental Seminar on July 17, 2023

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(Host: Jürgen Eichberger, absent due to conference attendance, will be represented by Stefan Trautmann and Sebastian Ebert)

Attention Theory, Soft and Hard

The human brain, consuming a mere 20 watts, is miserly in minimizing energy expenditure constantly and unconsciously, giving rise to a volatile and context-sensitive attentional process. This talk builds on both "soft" modeling based on revealed choice and "hard" modeling which seeks additionally biological accuracy. In our soft attention theory (SAT), the generally varying and potentially stochastic utility of a lottery emerges from volatile and partially stimulus-driven decision weights. The resulting SAT can account for a broad range of choice anomalies under different combinations of top-down attention and bottom-up salience. It also delivers an attentional loss aversion which helps link observed variability in revealed loss aversion to the loss-gain asymmetry in biological responses, including amygdala activation (fMRI), alerting function of norepinephrine (PET), physiological arousal (galvanic skin response), and fixation and pupillometry (eye tracking). In binary choice, SAT satisfies Savage's Postulate 2 if and only if its bivariate attention function is symmetric, which corresponds formally to Regret Theory (Bell, 1982; Loomes and Sugden, 1982, 1987) and Salience Theory (Bordalo, Gennaioli, Shleifer, 2012) as part of the class of skew-symmetric correlation-sensitive preference (Lanzani, 2022). We further offer a hard attention theory (HAT) through a quartet of neurotransmitters – dopamine (DA), serotonin (5HT), acetylcholine (ACh), and norepinephrine (NE). Building on Zhong et al's (2009) application of DA and 5HT tones to model the loss-gain sensitivity in valuation sensitivity, we hypothesize that ACh and NE tones modulate respectively the top-down and bottom-up components of the attention function in SAT. This yields predictions on revealed choice behavior which can be tested in randomized controlled trials (RCT) using drugs which influence the brain's attention networks. Preliminary findings from RCT experiments using nicotine (ACh agonist) and Ventolin (NE agonist) will be discussed.