

## **Decision-making: theories, models and cognitive processes**

(Lectures, Tuesday 16-18).

### *Textbooks:*

- 1) Straight choices: the psychology of decision-making., BR Newel, DA Lagnado & D. Shanks. Psychology Press. 2007.
- 2) Thinking & Deciding, Jonathan Baron. Cambridge University Press 2008.

### **Syllabus**

**Lecture 1: Introduction to decision making.** Types of decisions: evidence/value-based, normative/descriptive, risk/multiple-attributes. Description/experience. Judgments of probability. Rationality/optimality. History, choice paradoxes (St Petersburg; invariance; sunk-costs). Affect and unconscious processes in decision-making.

**Lecture 2: Evidence-based decisions.** The signal detection theory ( $d'$ , criterion); speed-accuracy tradeoff; choice-RT, diffusion models and optimality. Decision-confidence.

**Lecture 3: Probability judgments:** Errors/biases of probabilistic judgment. Reminder on probabilities (few basic equations). Being rational about probabilities: Estimating probabilities and the Bayesian model of hypothesis updating. The relation with signal detection and diffusion models.

**Lecture 4: Value-based decision: the normative theory** (expected utility, weighted additive-attribute model). Axioms of rational choice, Utility functions (Bernoulli).

**Lecture 5: Deviations from normativity in human decision-making** (risk/loss aversion; lotteries; Allais paradox; framing; violations of transitivity and of independence between alternatives).

**Lecture 6: A descriptive theory of risky decision-making:** Prospect-theory. Framing, loss- aversion and overestimation of rare events. Regret theory. More paradoxes: preference reversal. Reason-based decision.

**Lecture 7: Multi-attribute decision making and preference reversal** (similarity, compromise and attraction effects). Elimination by aspects; violations of transitivity and the lexicographic model. Compensatory and non-compensatory models.

**Lecture 8: Heuristics, rationality and neurocomputational models of choice** (Priority heuristics; Decision-Field-Theory/Leaky-Competing Accumulators/Decision-by-Sampling).

**Lecture 9: Decision by experience** (underestimation of rare events) and learning rules.

**Lecture 10: Inter-temporal decisions** (hyperbolic discounting); commitment and self-control.

**Lecture 11: Emotional influences in decision-making;** the role of orbital frontal lobe: Damasio's somatic theory; the role of unconscious processing in decision-making.

**Lecture 12: Decision making in social cooperation/competition games:** prisoner dilemma, ultimatum; the problem of self-interested rationality; altruism and its evolution.

**Lecture 13: Improving decision-making;** Revision.