Probabilistic Specification and Quantitative Testing of Decision Theories

Workshop at the EMPG meeting in Copenhagen, Sunday June 19, 2016

Theory and Basic Concepts

8:30–9:20: Probabilistic specification of decision theories, basic concepts (Michel Regenwetter)

I introduce basic concepts of probabilistic choice models. Choices vary within and across decision makers. Variability of repeated choices among the same options, within a given person and within the same experiment, could be caused by uncertainty/variability in latent preferences, probabilistic errors in responses, or a combination of both. Variability across decision makers could additionally be caused by individual differences.

Dr. Michel Regenwetter is a Professor of Psychology at the University of Illinois at Urbana-Champaign. He specializes in modeling heterogeneity in choice behavior (www.psychology.illinois.edu/people/regenwet).

9:20–10:10: Convex geometry, basic concepts (Jean-Paul Doignon)

Many probabilistic models in mathematical psychology are better understood when looked at from a geometric point of view. Even more, the central problem of characterizing the models then often turns into the question of finding a linear description of some convex polytope whose vertices are known. In this introductory talk, we define the geometrical concepts and illustrate them on probabilistic decision models. Next we review a few useful techniques for the search of linear descriptions.

Dr. Jean-Paul Doignon is Professor in the Mathematics Department of the Université Libre de Bruxelles.

10:10–10:40: Break

10:40–11:30: Relating probabilistic specifications to observed data on choice behavior (Clintin Davis-Stober)

How can we properly evaluate whether a set of choice data support or reject a given model of decision making? In this lecture, we will connect mathematical specifications of decision making models with appropriate statistical models. We will explore the required experimental designs, assumptions, and basic methodology for evaluating choice data in this context.

Dr. Clintin Davis-Stober (psychology.missouri.edu/stoberc) is an Associate Professor in the Department of Psychological Sciences at the University of Missouri. He is a mathematical psychologist with primary interest is the development and evaluation of mathematical models of individual and group decisions.
11:30–12:30: *Bayesian approaches* (Daniel Cavagnaro)

Probabilistic models of decision making are often formulated by imposing ordinal restrictions on a set of parameters, such as choice probabilities. In this lecture, we introduce a Bayesian inference framework and associated statistical procedures for evaluating and selecting among such models based on empirical data.

Dr. Daniel Cavagnaro ([mihaylofaculty.fullerton.edu/sites/dcavagnaro](mihaylofaculty.fullerton.edu/sites/dcavagnaro)) is a Lecturer of Information Systems and Decision Sciences at California State University Fullerton, specializing in computational approaches to building and testing models of judgment and decision making.

12:30–13:30 Lunch

**Afternoon Interactive Session: QTEST Software: Let’s try things out**

13:30–14:50: Using QTEST to test transitivity
14:50–16:10: Using QTEST to test cumulative prospect theory
16:10–16:40: Break
16:40–18:00: Discussion and miscellanea (bring your own theory and data)

**Software**

We strongly recommend that participants bring a laptop with QTEST pre-installed ([regenwetterlab.org/software/qtest/](regenwetterlab.org/software/qtest/)).

**Readings**


