

Inferring brain-computational mechanisms by testing representational models

Organizer:

Jorn Diedrichsen

Western University, London, Canada

In the past few years, a number of laboratories have started to go beyond activation mapping and pattern decoding, using functional brain imaging (1) to characterize how information is represented in different brain regions and (2) to adjudicate between alternative brain-computational models. These advances are built on condition-rich experiments and novel data analysis techniques. Encoding models, representational similarity analysis (RSA), and Bayesian approaches such as pattern component modelling (PCM) provide powerful and flexible tools for inferring which of several alternative models best explains a brain representation. While these approaches have been developed relatively independently of each other, they share core conceptual commonalities. This Educational Course will teach (1) how to construct models of brain representations, (2) how to design condition-rich experiments to test them, and (3) how to adjudicate between competing models using encoding analysis, RSA, and PCM. We will teach the mathematical relationship of these approaches, which are closely related by the fact that they all test hypotheses about the second moment of the activity profiles. We will discuss the complementary strengths and weaknesses of the approaches and how they can be combined as part of a larger toolbox for testing representational models.

Symposia Schedule:

14:45-15:05

Using voxel-wise encoding models to study cortical representations

Alexander Huth, UC Berkeley, Berkeley, CA, United States

15:05-15:25

Representational similarity analysis

Niko Kriegeskorte, Cambridge, Cambridge, United Kingdom

15:25-15:45

Pattern component modelling - A practical Bayesian approach to representational model comparison

Jorn Diedrichsen, Western University, London, Canada

15:45-16:00

Questions and Answers