

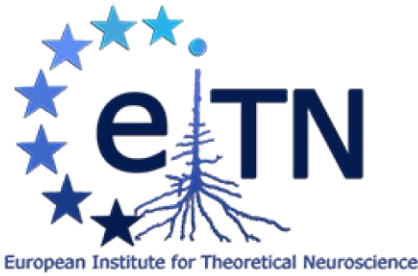


COLLÈGE
DE FRANCE
— 1530 —



Chaire de Psychologie cognitive expérimentale

Human Brain Project



WORKSHOP

Probabilistic inference and the brain

When September 2015 – Thursday 10th and Friday 11th
Where Collège de France, **11 Place Marcelin Berthelot, 75005 Paris** (amphitheater Guillaume Budé)
Co-chairs Stanislas Dehaene (Collège de France), Alain Destexhe (CNRS, France), Wolfgang Maass (Univ. Graz, Austria), Florent Meyniel (CEA, France – organizer)

This meeting is funded by the Human Brain Project

Description

The purpose of this workshop is to gather researchers from the theoretical and experimental fields working on the underpinning of probabilistic inference in the brain, in order to make the link between both perspectives. Results from the theory will be reviewed to present state-of-the-art models of probabilistic inference in the brain. Key experimental data characterizing the inferential capabilities of the brain will also be presented. Both perspectives will be confronted in order to identify existing and missing data that could refute particular models.

THURSDAY 10th

9:30 – 10:00 Welcome around a coffee

10:00 – 10:10 Opening – Stanislas Dehaene

10:10 – 12:50 Session 1: Models of probabilistic inference – Chair: Wolfgang Maass

What are the theoretical models currently available to implement probabilistic computations in the brain, what are the neural codes for probabilities, uncertainty and related metrics?

10:00 – 10:50 Jean Daunizeau (ICM, Paris, France) *On the adaptive fitness of the bayesian brain*

10:50 – 11:30 Sophie Denève (ENS, Paris, France) *Circular inference in Schizophrenia*

11:30 – 12:10 Jozsef Fiser (CEU, Budapest, Hungary) *Learning-based cross-modal suppression of ongoing activity in primary cortical areas and the descriptive power of sampling based models*

12:10 – 12:50 Robert Legenstein (Graz University, Austria) *Sampling-based probabilistic inference through neural and synaptic dynamics*

14:30 – 18:00 Session 2: Experimental data on probabilistic inference – Chair: Alain Destexhe

What are the main experimental results demonstrating specific capabilities and constrains for probabilistic inference in the brain?

14:30 – 15:10 Tobias Donner (Univ. Medical Center Hamburg, Germany) *Brainstem modulation of cortical inference processes*

15:10 – 15:50 Antonio Kolossa (Univ. Braunschweig, Germany) *A computational analysis of the Bayesian brain*

15:50 – 16:15 Poster teasers

16:15 – 16:40 Break

16:40 – 17:20 Wulfram Gerstner (EPFL, Switzerland) *Interplay of synaptic plasticity and probabilistic theories*

17:20 – 18:00 Florent Meyniel (CEA, Saclay, France) *A rational sense of confidence during probabilistic inference in the human brain*

18:00 – 19:00 Posters

FRIDAY 11th

9:30 – 10:00: Welcome around a coffee

9:30 – 12:10 Session 3: Critical data to arbitrate between models – Florent Meyniel

What are the key predictions arising from theoretical models that should be tested experimentally? Can they provide, and have they already provided evidence to arbitrate between competing models, supporting some models and refuting some others?

9:30 – 10:10 Floris de Lange (Donders Institute, the Netherlands) *Empirical support for predictive coding in sensory circuits?*

10:10 – 10:50 Etienne Koechlin (ENS, Paris, France) *Probabilistic inference and human executive control*

10:50 – 11:30 Pascal Mamassian (CNRS, ENS, France) *Bayesian accounts of the central tendency of judgment*

11:30 – 12:10 Christopher Summerfield (Univ. Oxford, UK) *Hierarchical predictive coding and adaptive gain control*

13:30 – 15:30 Session 4: Critical gaps in the models – Chair: Stanislas Dehaene

What are the new challenges for theoretical models arising from experimental data?

13:30 – 14:10 Mate Lengyel (Univ. Cambridge, UK) *Sampling-based representation of uncertainty: time is of essence*

14:10 – 14:50 Wolfgang Maass (Graz University, Austria) *Gaps between the observed stochasticity of neural systems and probabilistic inference models*

14:50 – 15:30 Karl Friston (UCL, UK) *Joining the dots in theoretical neurobiology*