Uncertainty in sensory processing and action control

Looking around and interacting with the world brings uncertainty which our sensory and motor systems have to resolve. First, the processing of incoming sensory information is subject to internal noise and processing delays, and the subsequent spread of information across the brain only serves to add additional uncertainty to perception. Second, when we interact with our environment, each transition from motor plan inception to execution is associated with additional inherent uncertainty due to potential motor noise and error. In addition, the sensorimotor system also has to handle challenging and taxing tasks in the real world that often require the simultaneous monitoring of multiple items, which makes it difficult to make decisions about where to allocate limited cognitive and perceptual resources. Therefore, uncertainty, and how to deal with it, is an important theme for many areas of research, ranging from decision-making and the control of simple actions, to behaviour in real-world tasks, using neurophysiological approaches to computational models. Other lines of research investigate whether and how we are aware of our uncertainty, and whether we can use prior experience to inform our perception and future actions. In this workshop, we will bring together researchers from these different, often isolated, fields of research to explore current, common themes for how we deal with uncertainty across the sensorimotor hierarchy, as well as to brainstorm integrative perspectives for future research.

Dates
07-09 August 2023

Location
Castle Rauischholzhausen (https://goo.gl/maps/xppGqdBd4TMA7NAH7)

List of speakers and talk titles

Tarryn Balsdon (University of Glasgow)
- Confidence for efficient decisions in dynamic sensory environments

Biana Baltaretu (JLU Giessen)
- The effect of scene semantics on allocentric spatial coding of object information in naturalistic environments

Ulrik Beierholm (Durham University)
-Three different types of uncertainty in perception

Eli Brenner (VU Amsterdam)
- Dealing with uncertainty by constantly reconsidering one’s actions

Thérèse Collins (Université Paris Cité)
-Serial dependence in brain and behavior

Jolande Fooken (Queen's University Kingston)
- Adaptive Eye-Hand Coordination in Real-World Actions that Compete for Gaze

Alexander Goettker (JLU Giessen)
- From following dots to understanding scenes

Robbe Goris (University of Texas)
-Perception in the face of uncertainty: neuronal and computational mechanisms of visual confidence

Sabrina Hansmann-Roth (University of Iceland)
-What is the real bandwidth of perceptual experience? From summary statistics to full probabilistic representations

Mary Hayhoe (University of Texas)
-How reward and uncertainty shape visuomotor coordination in the natural world

Matteo Lisi (Royal Holloway, University of London)
-Sensorimotor biases reveal rational strategies for dealing with uncertainty

Constantin Rothkopf (TU Darmstadt)
-Why are sensory, internal model, and action uncertainties inseparably intertwined in natural behaviour?

Emma Stewart (JLU Giessen)
- Inference and uncertainty reduction in oculomotor planning

Anne Urai (Leiden University)
- Choice history bias as a window into cognition and neural circuits

David Whitney (UC Berkeley)
-The theoretical and practical consequences of serial dependence in visual perception

Preliminary Schedule

Day 1

2:15 Introduction & Welcome
2:30 Sabrina Hansmann-Roth (University of Iceland)
3:15 David Whitney (UC Berkeley)
4:30 Ulrik Beierholm (Durham University)
5:15 Emma Stewart (JLU Giessen)

Day 2

9:00 Eli Brenner (VU Amsterdam)
9:45 Thérèse Collins (Université Paris Cité)
11:00 Alexander Goettker (JLU Giessen)
11:45 Bianca Baltaretu (JLU Giessen)
2:30 Mary Hayhoe (University of Texas)
3:15 Jolande Fooken (Queen's University Kingston)
4:30 Constantin Rothkopf (TU Darmstadt)

Day 3

9:00 Matteo Lisi (Royal Hollow, University of London)
9:45 Robbe Goris (University of Texas)
11:00 Anne Urai (Leiden University)
11:45 Tarryn Balsdon (Univerity of Glasgow)

Registration
Registration is free. Please register by May 31st date using the following form:
https://forms.gle/4FqbQ7DYrsx3PoB37

Accommodation
Limited accommodation is available at the castle for attendees. If you are interested in staying at the castle for the workshop, please indicate this in the registration form. Additional accommodation is available in Rauischholzhausen town (http://www.zumstern.de/) or in Giessen and Marburg, which are an easy bus or car ride away (see below for transport options).

Transport
Rauischholzhausen can be reached by bus from Giessen and Marburg. Depending on numbers, we may also arrange a shuttle bus to/from the castle.

Meals
Lunch and dinner will be provided, as well as coffee and snacks during break time.

Poster session
We will also have a poster session for PhD students and postdocs. If you're interested in presenting, please submit a short (250 word) abstract by June 30th, using the following form: https://forms.gle/BVwUTqL4iSiMVxCo7

If you have any questions please contact Emma, Bianca or Alex (emma.stewart@psychol.uni-giessen.de, Bianca.Baltaretu@psychol.uni-giessen.de, Alexander.Goettker@psychol.uni-giessen.de)