

**International Conference, Friday 31 October
Council Room, Institute of Advanced Legal Studies, University of London**

Constructing perceptual objects: Binding within and across the senses

Sensory information is processed in a distributed way, not just across the senses but also within the same sense (e.g. vision). Yet our conscious experience seems to present itself as of unified perceptual objects: Our perception seems to be of red apples, singing birds or our own bodies, not of scattered colours, shapes, sounds, and tactile sensations. How this unification is achieved, and what makes binding accurate, has been a long standing problem for cognitive neuroscientists and philosophers alike. How are attention and consciousness involved in this binding, and how should we think of cases of mis-binding? Leaving these 'how' questions aside, several voices have started to suggest that the so-called 'binding problem' has been mis-articulated or misleading. Others have pointed at crucial differences between unisensory cases and multisensory cases. The present conference is meant to shed a new light on these latest debates.

9.30am: Registration & Tea/Coffee

10.00am: Introduction

10.15am: Liad Mudrik (California & Tel-Aviv)

Binding senses and integrating concepts: the role of consciousness

11.30am-11.45am: Coffee break

11.45am: Roger Newport (Nottingham)

Things that make you go weird

1.00pm-2.30pm: Lunch break

2.30pm: Pascal Mamassian (CNRS & ENS, Paris)

Representation and access to sensory uncertainty in multisensory interactions

3.45pm-4.15pm: Coffee break

4.15pm: Charles Spence (Oxford & RTS project), presenting a paper co-authored by Yi-Chuan Chen (Oxford & RTS project) and Ophelia Deroy (London & RTS project)

Do we perceive multisensory objects?

5.30pm: Roundtable session, chaired by Naomi Eilan (Warwick)

6.15pm: Conference end



Abstracts

Pascal Mamassian

In their seminal paper, Ernst & Banks (2002, Nature) offered a probabilistic framework to study the integration of multiple senses. Within this framework, the reliability of each sense, inversely related to the uncertainty of the sensory signal, determines the strength with which a sense will interact with others. How is this reliability estimated, used, and accessed remain big issues. In this presentation, I will summarize two bodies of work. In collaboration with Thomas Otto, we studied how uncertainties affected the processing time of each sense and their interaction. In collaboration with David Alais, we studied the extent to which we have access to the uncertainty of each sense once the senses are integrated. Altogether, this work helps us better understand the critical role of sensory uncertainty for multi-sensory interactions.

Liad Mudrik

Conscious experiences inherently involve sensory integration; we perceive a barking dog, rather than the sight of a dog and the sound of a bark. But is such integration unique to conscious experiences, or can it also be unconsciously performed? Recent empirical work supports the latter. This is in sharp contrast with the widely held assumption that consciousness is necessary for information integration – especially one that involves the combination of sensory signals from different modalities, or the combination of semantic information related to high-level concepts. In this talk, I will first describe the link between consciousness and integration and show its dominance in current and past thinking about consciousness and its functions. Then, I will present my work on multisensory and semantic integration with and without awareness; based on this work I will suggest that consciousness does not serve as an immediate necessary condition for sensory and semantic integration. Rather, it may operate as an enabling factor that establishes mechanisms for future unconscious integration of sensory and semantic information.

Roger Newport

Perhaps the most familiar example of a unified perceptual object is that of our own body. The conscious experience of our body is built largely upon the integration and interpretation of low-level sensory input which usually results in a stable and permanent representation of the body in our brain.

However, because that representation is being constantly updated by incoming sensory information, it is incredibly flexible and the perceived, once permanent, nature of our body can change in moments. I will present examples of rapid and extraordinary changes to the perception of the body in both health and disease, including misshapen, mistaken, misattributed and even missing body parts.

Charles Spence, Yi-Chuan Chen & Ophelia Deroy

The majority of researchers appear to take the notion that multisensory objects (MSOs) exist in perception for granted. However, while there are clearly MSOs out there in the environment, it is not so obvious that what is studied in the majority of laboratory-based studies purporting to investigate MSO representations in perception actually do 'what they say on the packet'. Indeed, a closer look at the empirical literature soon reveals that there are a number of ways in which stimuli from different sensory modalities might be associated neutrally. Crucially, not all of them require the binding, or grouping, that would give rise to MSOs in perception. After reviewing the literature, we are left wondering whether the binding of features from different sensory modalities necessarily gives rise to a MSO representation in perception; or whether the fact that attention may spread from a feature or object in one modality to a simultaneously-presented feature or object in another modality necessarily implies the existence of a MSO representation. Finally, we raise the question of whether the existence or otherwise of MSOs in perception has any necessary consequences for the debate about whether consciousness is itself multisensory. Taken together, we believe that the putative existence of MSO representations in perception should not be taken for granted in the way that it currently is by so many of the researchers working in the field. Finally, we highlight why the answer to the question of whether MSOs exist in perception has important implications for a number of other debates.

