Intentionality in action

Chairperson
Cristina Becchio (cristina.becchio@unito.it)
Department of Psychology, University of Turin, and
Department of Robotics, Brain and Cognitive Sciences, Italian Institute of Technology, Italy

Speakers
Andrea Cavallo (andrea.cavallo@unito.it)
Department of Psychology, University of Turin, Italy

Antonia Hamilton (a.hamilton@ucl.ac.uk)
Institute of Cognitive Neuroscience, University College London, UK

Dimitrios Kourtis (Dimitrios.Kourtis@UGent.be)
Department of Experimental psychology, Ghent University, Belgium

Sasha Ondobaka (s.ondobaka@ucl.ac.uk)
Wellcome Trust Centre for Neuroimaging and Sobell Department of Motor Neuroscience and Movement Disorders,
University College London University College London, UK

The ability to interpret and predict the behavior of other people hinges crucially on judgments about the intentionality of their actions – whether they act purposefully (with intent) or not – as well as on judgments about the specific intentions guiding their actions – whether they performed a given action with an individual, a social, or a communicative intent. Until recently, direct investigation of these skills has been rare (Baldwin and Baird, 2001). One obstacle to such investigation has been the framing of the problem of intention understanding as a problem of access to mental states which are hidden away in the other person's mind and therefore inaccessible to perception. The supposition has been that intentions are not "things that can be seen" (Gallagher, 2008).

Recent findings challenge this perspective by positing that intentions shape movement and are thus specified at a tangible and quantifiable level in the movement kinematics (Ansuini et al., 2015; Becchio et al. 2010). This raises the intriguing possibility that covert mental state dispositions may become 'visible' in a person's overt motor behavior (Runeson and Frykholm 1983).

The purpose of this symposium is to consider whether and to what extent our cognitive system has the ability to use intention-from-movement information to understand others' behavior. Speakers from neuroscience, psychology, and movement sciences will present their latest findings, providing a state-of-the-art view of action and intention understanding to the audience of the EAP Cogsci 2015 Conference.

Decoding intentions from kinematics: when 'hidden' mental states become visible

Andrea Cavallo

When we perform actions in daily life, these actions are usually driven by a prior intention. Current accounts, based on a one-to-many assumption, hypothesize that the same intention can be achieved with different movements, and more problematically, that the same movement can be used for different goals and intentions (Csibra 2007; Kilner et al. 2007; Jacob 2013). However, by means of the study of kinematics involved in reach-to-grasp movements, here I introduce how and the extent to which intentions are encoded in kinematics. In other words, I show that from early phases of actions, intentions behind an action play a trivial role in influencing response properties and shaping movement kinematics during movement execution. Then, by taking the 'action execution' as a starting point, the inevitable questions is: Is it possible to understand the intentions of others by merely observing their movements? Do visual kinematics provide a sufficient basis for discriminating intentions? To answer these questions we asked participants to observe video clips depicting reach to grasp movements and discriminate between different intentions. Since they could rely only on kinematic information to perform the task, we demonstrate that observers are sensitive to early differences in visual kinematics and can use them to discriminate between movements performed with different intentions.

The Joint action modulates the sensorimotor representation of another person's action: Evidence from EEG studies

Dimitrios Kourtis

Previous research has shown that the sensorimotor representation of another person's action may take place before the onset of the action and may depend on the motor abilities of the observer and on "social factors" such as the bodily and face orientation of the actor. I will discuss EEG (electroencephalography) findings from two studies where I investigated triadic social interactions and examined whether the sensorimotor representation of another person's action depends on occasional present and past interactions between the actor and the observer, and also on the distribution of the joint task between two interaction partners. The analysis of 10-Hz mu oscillations showed that observation of an individual action of an interaction partner induces greater activation of sensorimotor areas compared to observation of the same action of a person performing only individual actions, unless this person had interacted with the observer in the recent past. In addition, it is likely that an observer simulates in advance the action onset of an individual action of an interaction partner, but only when the partner is the one who initiates the joint action. These results demonstrate that action representation can be enhanced by present and past interactions between an actor and an observer and that is influenced by the way a joint task is distributed between interaction partners.

Mechanisms of imitation: insights from typical and autistic cognition

Antonia Hamilton

Imitation is a ubiquitous human behaviour which provides a useful model of nonverbal social interaction. Though imitation is easy to recognise, the cognitive processes underlying it are very complex. Here I describe studies of when and why people chose to copy some actions but not others. This includes studies of children, adults and people with autism. I make a key distinction between imitation of action goals (emulation) and imitation of action forms (mimicry), and suggest that there are different cognitive and neural mechanisms involved in each. In particular, mimicry seems to be strongly driven by social demands and controlled by brain regions linked to social cognition. I present a neurocognitive model which can account for these findings. Finally, I will present new data on how people imitate and recognise imitation in virtual reality, and will consider how human-avatar interactions can help in the study of social neuroscience.

The role of interoceptive and proprioceptive inference in Theory of Mind

Sasha Ondobaka

Inferring the intentions and beliefs of another is an ability that is fundamental for social and affiliative interactions. A substantial amount of empirical evidence suggests that making sense of another's intentional and belief states (i.e. theory of mind) relies on exteroceptive (e.g. visual and auditory) and proprioceptive (i.e. motor) signals. Yet, despite its pivotal role in the guidance of behaviour, the role of the observer's interoceptive (visceral) processing in understanding another's internal states remains unexplored. Predicting and keeping track of interoceptive bodily states – which inform intentions and beliefs that guide behaviour – is one of the fundamental purposes of the human brain. In this talk, I will focus on the role of interoceptive and proprioceptive predictions, prescribed by the free-energy principle, in making sense of internal states that cause another's behaviour. We will discuss how multimodal expectations induced at deep (high) hierarchical levels – that necessarily entail interoceptive predictions – contribute to inference about others that is at the heart of theory of mind.

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