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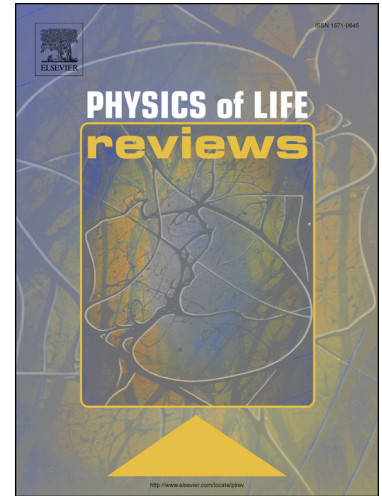
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Can we identify others' intentions from seeing their movements? Comment on "Seeing mental states: An experimental strategy for measuring the observability of other minds" by Cristina Becchio et al.

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In their review, Becchio and colleagues describe the 'unobservability principle' and the 'direct social perception thesis' as two competing accounts of how people identify others' intentions (Becchio et al., 2017). The former treats intentions as private information that is hidden within individual minds. The latter treats intentions as public information that can be directly perceived from observed movements. The authors propose a new method for quantifying cues to intention from human movement, providing support for the 'direct social perception thesis' in the domain of instrumental actions. Without doubt this new approach is valuable in establishing whether there is a dissociation between the presence of movement cues in the perceptual input and people's ability to make use of these cues for identifying intentions. It is also valuable in identifying movement parameters that could be crucial for improving the planning of instrumental actions in robotic agents so that their movements become better identifiable for human observers.

What is less clear in Becchio and colleagues' review is how radical one should be in adopting the 'direct social perception thesis'. The less radical reading of their claims is that observing human movements can provide systematic cues to identifying the intentions underlying movements. Many proponents of what the authors call the 'unobservability principle' would not disagree with such a weak reading because they postulate that intentions (and other mental states) are sometimes but not always hidden from observers. The more radical reading of Becchio and colleagues' claims that is in line with ecological psychology (Gibson, 1978, Turvey & Shaw, 1995) and philosophy in the phenomenological tradition (Zahavi & Gallagher, 2008) can be stated as follows: the perception of movement cues is necessary and sufficient to identify intentions. In our commentary, we will provide three challenges for this more radical claim and conclude that the research performed by the authors so far does not (yet) support this claim.

### ***1) Is perception of human movement necessary and sufficient for identifying intentions?***

The 'direct social perception thesis' is not the only theory in Social Cognition postulating that inferential processes are not always necessary to represent others' intentions and other mental states. Developmental theories of how infants are able to distinguish agents from objects (attributing intentionality to the former but not to the latter) stress that, for identifying intentions, inference is not always necessary. However, unlike the 'direct social perception thesis', they highlight that perception alone is not sufficient. These accounts postulate that identifying intentions relies on perceptual heuristics that are biased towards cues to intentional action, such as whether an observed action is performed in an efficient way (Gergely & Csibra, 2003) or whether

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