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Viewpoints in Embodied Objectivity

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This research explores a novel sense of objectivity for understanding perception and perceptual imagery, as a continuing endeavor after Grush (2000) on the topic of objectivity in the embodied cognitive science. The profile of building this sense of objectivity uses the embodied nature of deictic codes as source materials of consideration, as discussed in Ballard *et al.* (1997). They see deictic codes as (visual or haptic) frames set up on different points in the scene; an agent can continually fixate on various such points. A frame consists of several inter-related (visual or hand-motor) routines, thereby the points on which frames are set up can be regarded as viewpoints of perception and imagery.

A Novel Sense of Objectivity

Perception is seen as objective in the sense that perceptual understanding explores the intra-relations of the object as a whole and the inter-relations of object-world connection. Objectivity in such a sense concerns the objecthood in relation, as opposed to neutral objecthood that grounds traditional sense of objectivity. The objecthood in relation is three-fold: the between-parts relations of the object, object's viewpoints of the environment from the various standpoints of object parts (in brief, *object-centered viewpoints*), and the objecthood from the viewpoint of environmental parts. The objectivity in this particular sense is intriguing as it is intrinsically viewpoint-dependent or viewpoint-specific, quite unlike the traditional sense.

A sense of subjectivity in contrast to our sense of objectivity is that object features are collected from an egocentric frame. A representation, for example 'the book on my left side', is subjective in the sense that it is built from an egocentric viewpoint.

Non-Piagetian Objectivity

Above is a philosophical account of objectivity; a psychological counterpart of it appears in Rutkowska's (1997) exposition of deictic codes. As Rutkowska (1997) construes, the Piagetian picture of object location is objective in the traditional sense. Knowledge in general is represented by dispensing with the viewer's position, and space in particular is understood as a container in which neither a cognizer and her activity have a privileged place. By contrast, we can understand a visual representation as objective in the sense of being raised *from objects' standpoints*. An agent constantly maintains her gaze at selective positions where she builds object-centered visual frames for establishing visual representations or builds hand-centered frames for grasping activity. The hand, here, is an external object with its own organization of grasping

activities. Rutkowska analyzes this sense of objectivity by asserting that the built representations are controlled by a viewer but not necessarily viewer-centered like the egocentric spatial codes. A viewer's exploitation of object-centered frames would establish various landmarks to "aid fixation during infants' movements, supporting updating of what remains *self-referential code* (p. 755, italics added)".

Viewpoints

According to our novel sense of objectivity, a scene of the world/environment can be perceived from a variety of viewpoints. This may not be surprising, as visual fixations can be directed *to* different locations in the visual scene where different frames are built. However, more strongly, it remains true that the representation of a visual scene may include various subjective *and* objective viewpoints, because perceptual information can be gathered both from the viewer's eye view and various environmental standpoints. There are a variety of subjective viewpoints as an animal can move freely, hence sense data can be collected *from* various visual angles. There are, in addition, a variety of objective viewpoints as above contend. The mixture of both objective and subjective viewpoints is evident in the fact that imagery may be an amalgam of mixed objective and subjective representations.

A Key to Solving a Perplexing Problem

This novel sense of objectivity *and its inherent viewpoints* may help to explain the subtle and perplexing connection between visual experience and visuomotor actions discussed by Clark (2001). This is because the former is objective and the latter is full of perceptual and motor standpoints.

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