Lecture 06

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1. Crossing the Gap

1. Core knowledge exists.

2. There is a gap between core knowledge and knowledge knowledge.

3. Crossing the gap involves social interactions, perhaps involving words.

2. Action: The Basics

When do human infants first track goal-directed actions rather than mere movements only?

Background assumption: 'intention attribution and action understanding are two separable processes' (Uithol & Paulus 2014, p. 617).

'by the end of the first year infants are indeed capable of taking the intentional stance (Dennett, 1987) in interpreting the goal- directed behavior of rational agents.' (Gergely et al. 1995, p. 184)

'12-month-old babies could identify the agent's goal and analyze its actions causally in relation to it' (Gergely et al. 1995, p. 190)

'Six-month-olds and 9-month-olds showed a stronger novelty response (i.e., looked longer) on new-goal trials than on new-path trials (Woodward 1998). That is, like toddlers, young infants selectively attended to and remembered the features of the event that were relevant to the actor's goal.' (Woodward et al. 2001, p. 153)

'Early in life, action expectations measured on-line seem to be organized around goal locations whereas action expectations measured post-hoc around goal identities. With increasing age, children then generally organize their action expectations primarily around goal identities' (Daum et al. 2012, p. 10)

3. The Teleological Stance

'in perceiving one object as having the intention of affecting another, the infant attributes to the object [...] intentions' (Premack 1990, p. 14) (Woodward 2009, p. 53)

'to the extent that young infants are limited [...], their understanding of intentions would be quite different from the mature concept of intentions' (Woodward et al. 2001, p. 168).

'by taking the intentional stance the infant can come to represent the agent's action as intentional without actually attributing a mental representation of the future goal state' (Gergely et al. 1995, p. 188)

'an action can be explained by a goal state if, and only if, it is seen as the most justifiable action towards that goal state that is available within the constraints of reality' (Csibra & Gergely 1998, p. 255)

4. Marr's Threefold Distinction

If I apply the Teleological Stance successfully, do I thereby come to know a fact about the goal of an action?

Marr (1982, p. 22ff) distinguishes:

– computational description—What is the thing for and how does it achieve this?

– representations and algorithms—How are the inputs and outputs represented, and how is the transformation accomplished?

– hardware implementation—How are the representations and algorithms physically realised?

'when taking the teleological stance one-year-olds apply the same inferential principle of rational action that drives everyday mentalistic reasoning about intentional actions in adults' (Gergely & Csibra 2003; compare Csibra et al. 2003, Csibra & Gergely 1998, p. 259)

'Such calculations require detailed knowledge of biomechanical factors that determine the motion capabilities and energy expenditure of agents. However, in the absence of such knowledge, one can appeal to heuristics that approximate the results of these calculations on the basis of knowledge in other domains that is certainly available to young infants.

5.   Action Observation by Adults

Flanagan & Johansson (2003) showed that 'patterns of eye–hand coordination are similar when performing and observing a block stacking task'.

In human adults, motor representations and processes enable anticipatory looking that is driven by goal ascription (e.g. Costantini et al. 2014; Ambrosini et al. 2012).

See Sinigaglia & Butterfill (2016) for an outline of the Motor Theory of Goal Ascription.

6.   Performing vs Understanding Actions in Infancy

From at least three months of age, some of infants' abilities to identify the goals of actions they observe are linked to their abilities to perform actions (Woodward 2009).

In adults, tying the hands impairs proactive gaze (Ambrosini et al. 2012); in infants, boosting grasping with 'sticky mittens' facilitates proactive gaze (Sommerville et al. 2005; see also Sommerville et al. 2008, Ambrosini et al. 2013).

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