Perception/Cognition

Dharmakirti

- The mind is characterized by its ability to apprehend/cognize objects. (Intentionality)
- Question: What enables the mind to do so?

Dharmakirti's answer

- Theory of *aspect* overlaps with modern notion of mental representation:

Aspects mediate between external world and consciousness/cognition. Aspects must have some properties of objects (resemblance) and be of the nature of consciousness (mental entities).

Perception is unmistaken. World is given to our senses, which causally determine aspects that resemble the represented objects and which are interpreted by our thought processes.

Dharmakirti

- Sharp dichotomy between perception/cognition.
- Perception: unmistaken
- Conception: mistaken

Conceptual categories a construction, nominalist (there is no property of dogness for “dog” to pick out).

Language and language learning plays a crucial role in the construction of conceptual categories.

Modern Cognitive Science

- Denies the resemblance theory of perception.
- Representations have dual aspect: intentional content, and computational role in thought processes.
- Distinction between perceptual/conceptual representations very difficult to draw.
- But, consistent with Dharmakirti's concerns, modern cognitive science seeks to find the natural kinds of representations.

Question

- Can non-linguistic creatures (animals, infants) think? What is the role of language in constituting thought?
- How really do we draw the perception/ cognition distinction?
- A worked example: The Core Knowledge Hypothesis. Core Knowledge of Intentional Agency.

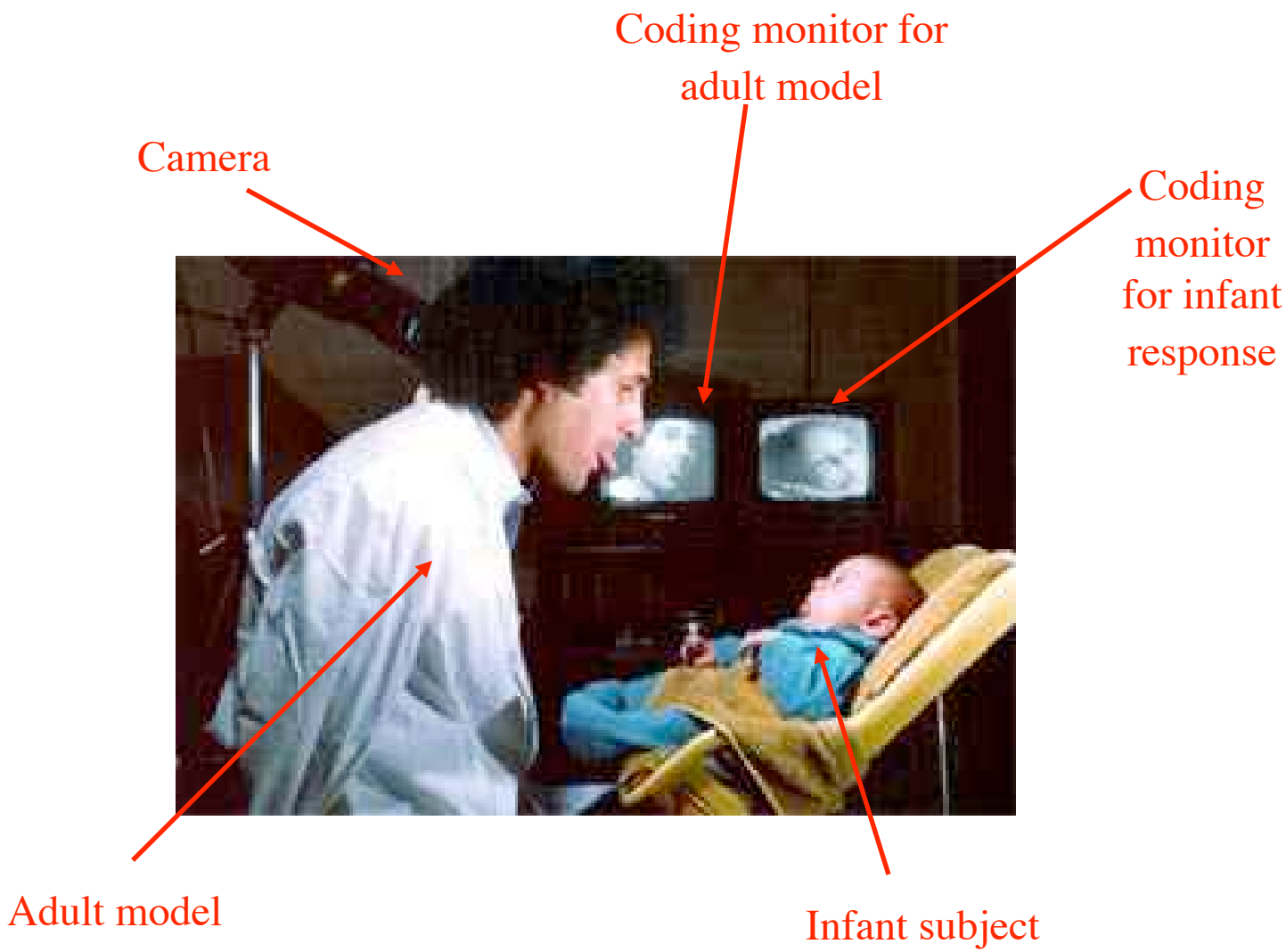
Core Knowledge

- Distinct systems of domain specific mental representations, with *conceptual* content (beyond sense data)
- Acquisition supported by innate, domain specific, learning mechanisms
- Entity identification supported by innate, domain specific input analyzers
- Evolutionarily ancient (often)
- Remain constant throughout development

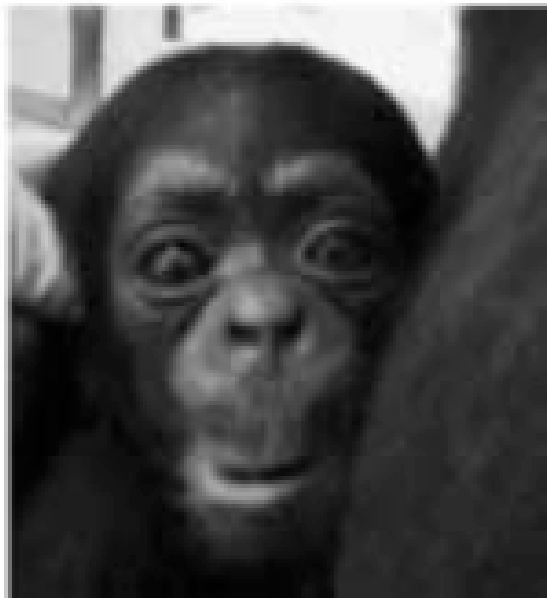
PEOPLE AND OTHER MINDS

Innate representations of faces

Meltzoff and Moore (1977): Neonatal imitation
Experimental set-up







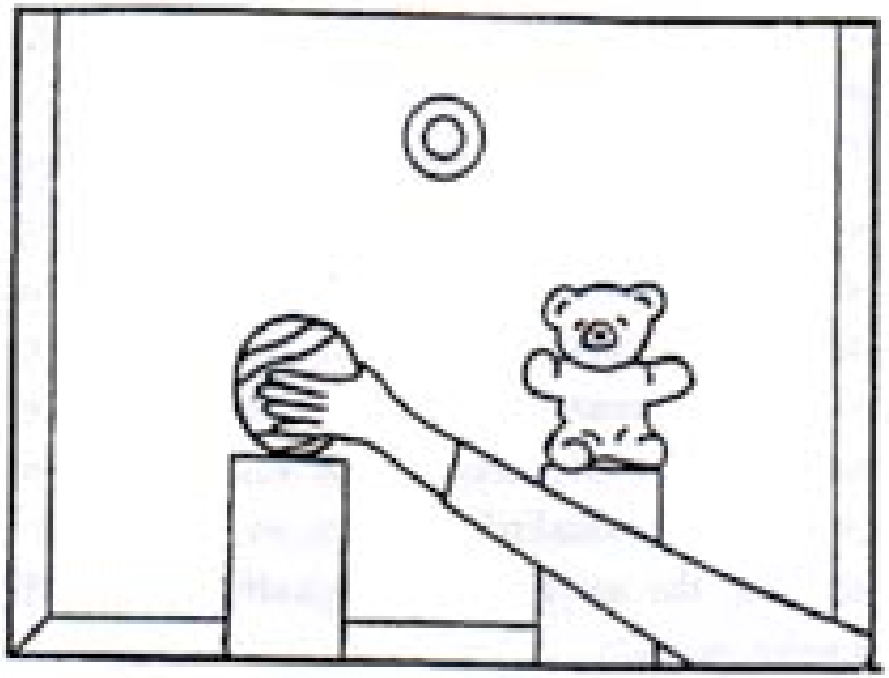
Conclusions

- Humans and non-human primates have innate representations of faces. Go beyond mere resemblance, because innate correspondence between appearance of face and own facial gestures.

Agents and Other Minds

- Agents and intentionality. People are totally different from other objects. People are agents with minds. Any evidence for innate representations of agents as intentional beings?
- Agents' actions are directed toward the external world.
- Agents have perceptual/attentional states directed at external objects. Intentional in the sense of referential (points/eye gaze).

Do infants view human actions as unpredictable, or as goal-directed?

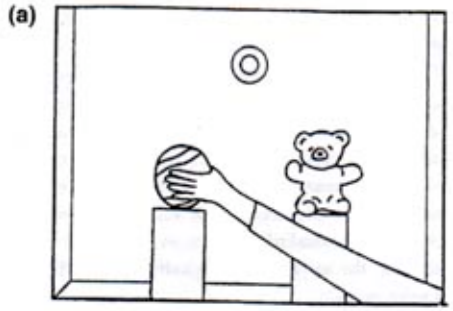


Random movement?
Movement on specific path?
Movement to specific goal?

(Woodward, 1998)

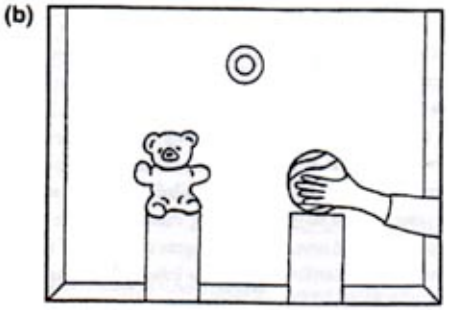
A habituation study of goal-directed action

Habituation event



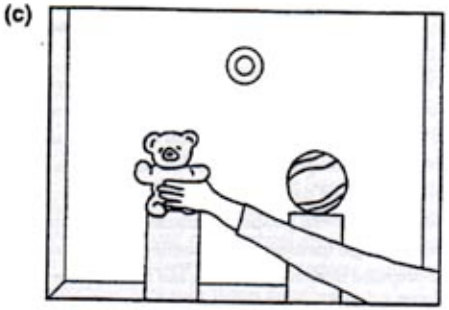
(for 1/2 infants, reach to ball; for others, reach to bear)

New location Test event



(then switch the locations of the two objects. On alternating test trials, reach for each object)

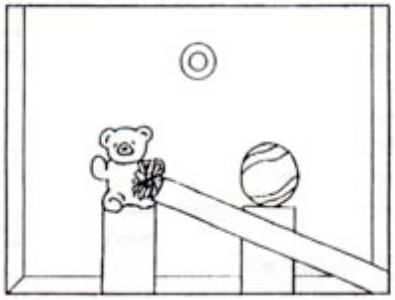
New object Test event



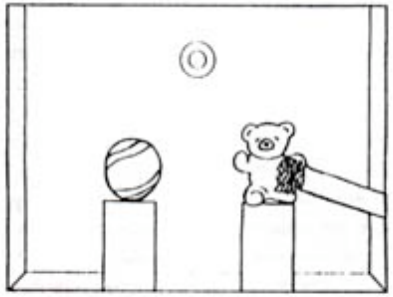
(Woodward, 1998)

Do infants represent all motions as goal-directed? How about the motions of inanimate objects?

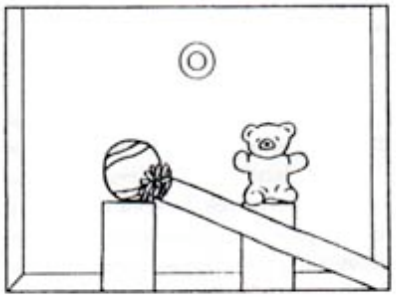
Habituation event



New location Test event



New object Test event



(same events, but with a stick instead of an arm)

5-month-old infants

(Woodward, 1998)

Goal directed Action

- Woodward's work. 5 months. Hand yes, sponge on end of stick, no.
- During habituation, stick/sponge approaches goal from 3 different paths. Infants now treat this event as goal directed, dishabituate when entity approaches different goal object.
- Infants represents hands as likely to engage in goal directed activity, but also analyze goal-directedness from patterns of motion alone.

Pointing and Gaze Following

- Between 7 and 9 months, infants begin to reliably follow eye gaze and points.
- Understand these as referential--as indicating what in the world the person is attending to or perceiving?

Why so late?

- Children don't understand gaze as indicating perception/attention until 7 to 9 months of age?
- Performance problem: Disengaging attention.

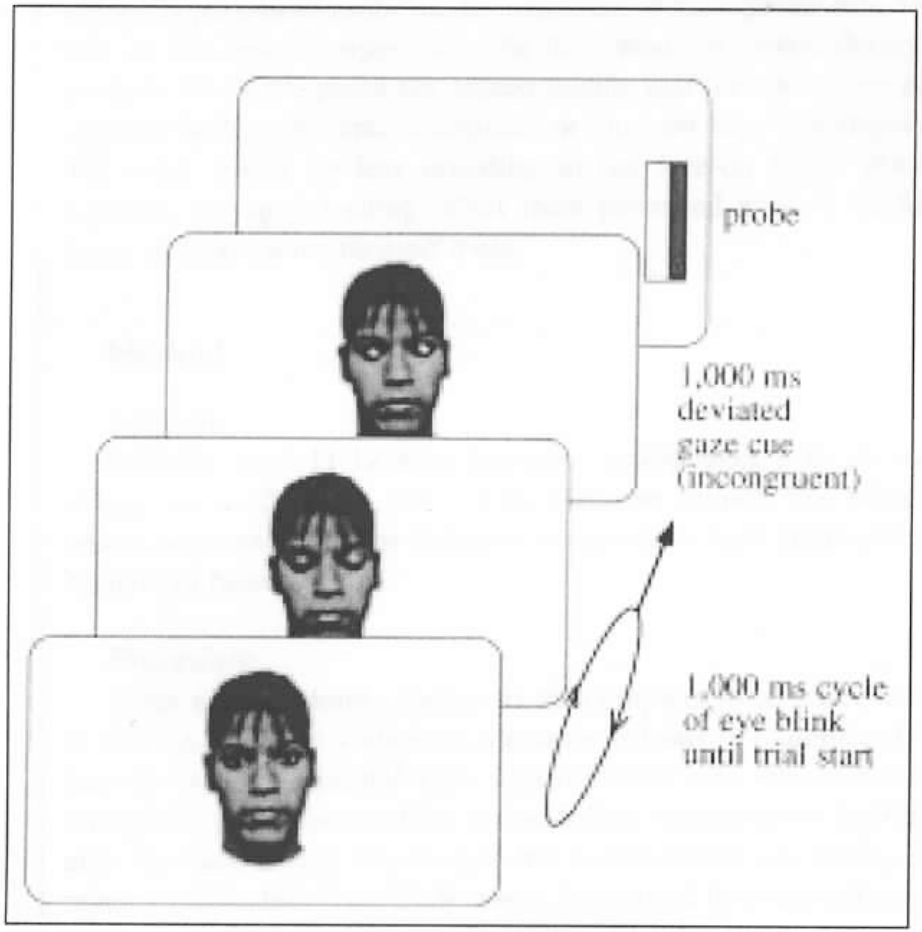


Fig. 1. Example of the stimulus sequence on an incongruent trial in Experiment 1. In Experiment 2, the face remained visible, with eyes open and deviated to the side, during presentation of the probe on some trials.

Conclusions

- Infants follow eye gaze, not tongue movements.
- Infants understand referential intentionality—eye gaze has referential content.

Baldwin and Moses Social Referencing Study

Conclusions

- Agents are identified by patterns of contingent interaction with entities in the world.
- Agents' actions are represented as intentional (goal directed, referential).
- These representations go beyond (wildly) sensory representations

Human Infant Theory of Mind

- Onishi and Baillargeon; Surian and Sperber
- Flombaum and Santos have comparable results with rhesus macaques.

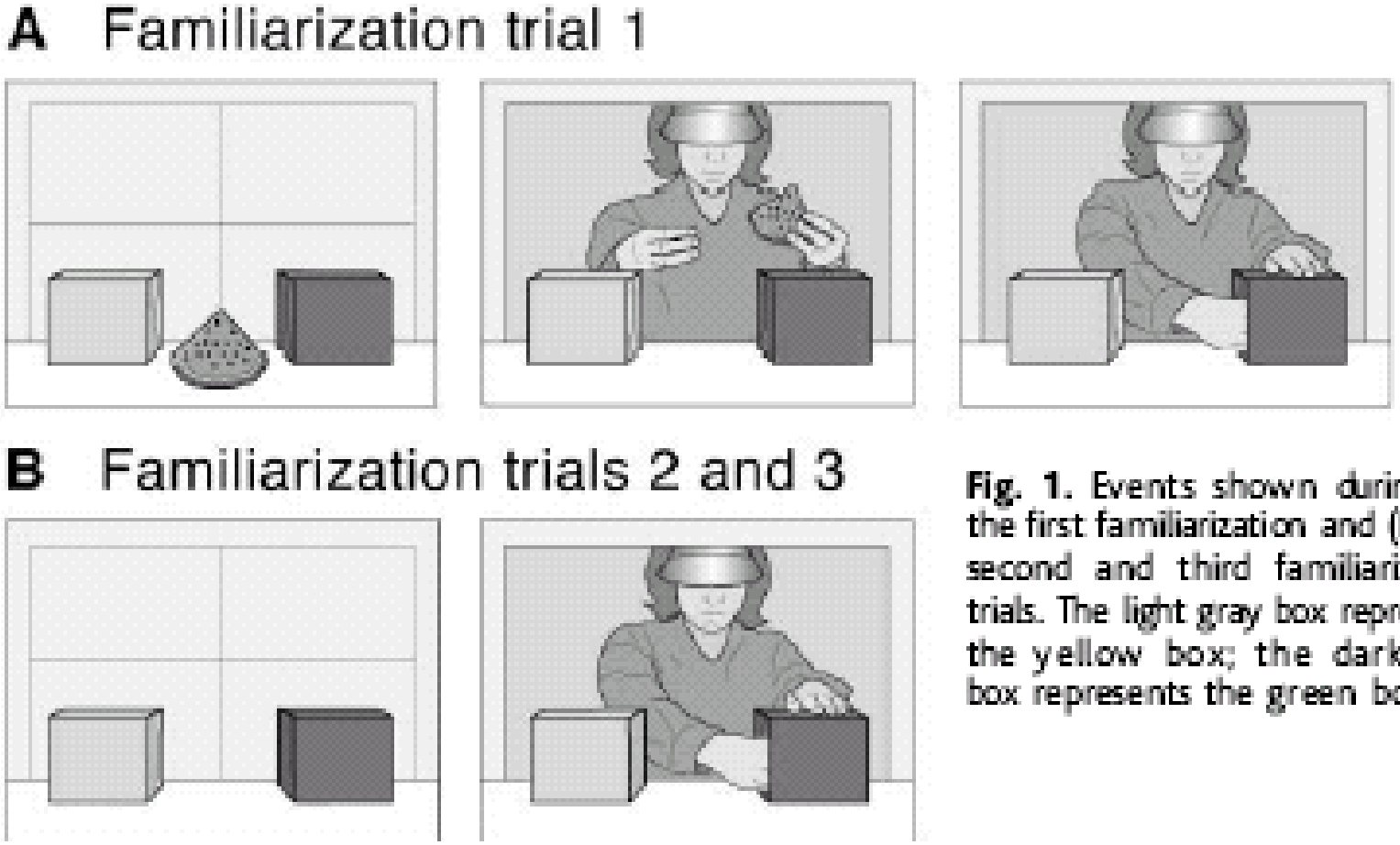
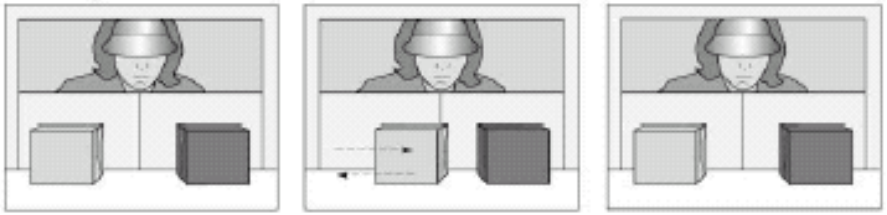


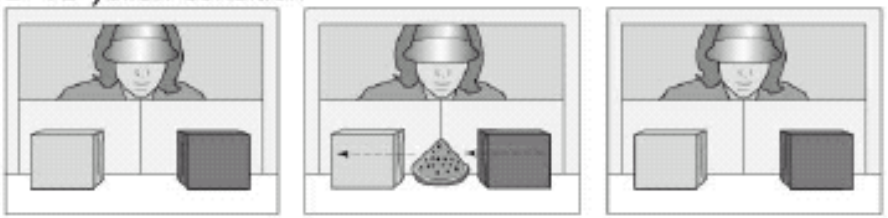
Fig. 1. Events shown during (A) the first familiarization and (B) the second and third familiarization trials. The light gray box represents the yellow box; the dark gray box represents the green box.

Belief-induction trial

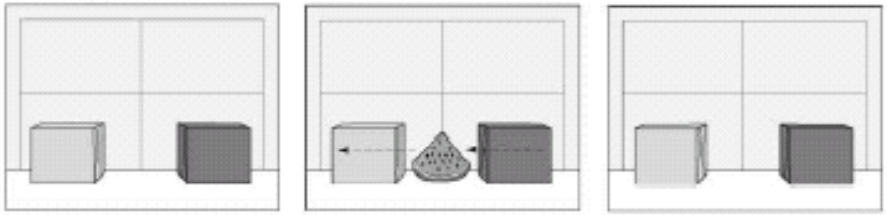
A TB-green condition



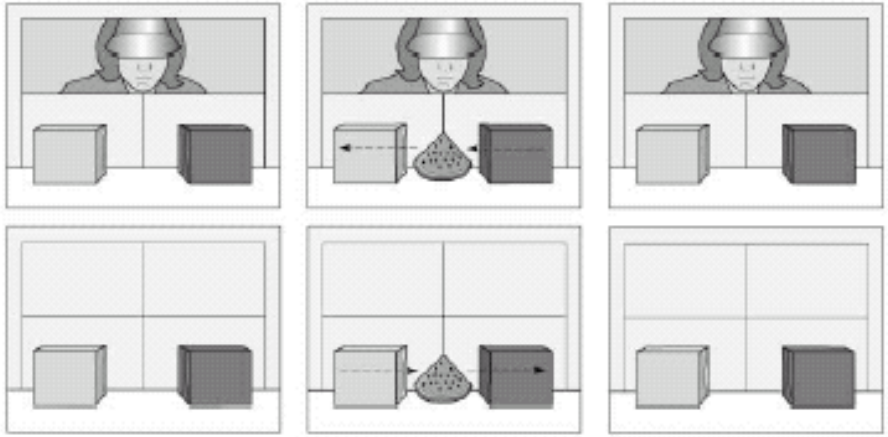
B TB-yellow condition



C FB-green condition



D FB-yellow condition



Conclusions

- Infants have innate eye-detectors.
- Understand referental function of gaze and pointing.
- Understand that people gain information from what they attend to.
- These representations integrated with representations of goals of actors.
- Rich inferential role; rich system of core knowledge.
- Long evolutionary history.

Representations of Intentional Agents

- The finding that human infants have representations of intentional agency is not meant to bear on Dharmakirti's questions concerning what it is about minds that makes intentionality possible
- Rather, an example of core knowledge that questions his theory that language is constituitive of clearly conceptual representations such as *agent* (as well as the British empiricists' related theory).

Core Knowledge

- Distinct systems of domain specific mental representations, with *conceptual* content (beyond sense data)
- Acquisition supported by innate, domain specific, learning mechanisms
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Conclusions

- Core knowledge has some properties of Dharmakirti's perceptual representations and some of his conceptual representations.
- Core knowledge differs from later developing, fully explicit, linguistically mediated knowledge.
- Distinction between core knowledge/explicit knowledge important, because mechanisms of content fixation for core knowledge are the same as for sensori/perceptual knowledge.