Today's question

Are you even listening?

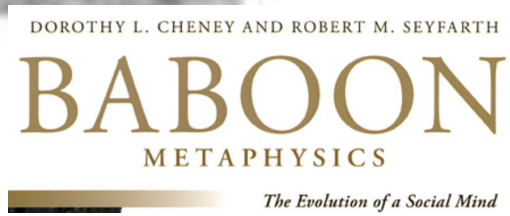
Animal Social Cognition

Today's docket

1. Studying social intelligence
   Relevant variables, anthropomorphism, oversimplification
2. Theory of Mind
   Comparative psychology, mental state inferences
3. Simulation theory
   Opposing theories, dissociation of action and perception

Which variables to measure, and how?

Ahla, the goat-herding baboon



A note of caution

Anthropomorphic descriptions

A troop of chimpanzees goes hunting

The **driver** initiates the hunt by slowly pushing the arboreal prey in a constant direction, **blockers** climb trees to prevent the prey from dispersing in different directions, the **chaser** may climb under the prey and by rapidly running after them try a capture, and the **ambusher** may silently climb in front of the escape movement of the prey to block their flight and close a trap around the prey.

(Boesch, Behavioral Brain Sciences, 2005)

A note of caution

Anthropomorphic descriptions

A troop of chimpanzees goes hunting

One chimpanzee begins by chasing a monkey, given that others are around (which he knows is necessary for success). Each other chimpanzee then goes to, in turn, the most opportune spatial position still available at any given moment in the emerging hunt. In this process, each participant is attempting to maximize its own chances at catching the prey, without any prior joint plan or agreement on a joint goal or assignment of roles.

(Michael Tomasello, Origins of human communication)

A note of caution

Experimental oversimplifications

[…] individuals do not need to hold abstract concepts of family relations and alliances ‘in mind’ because they can assess circumstances by directly monitoring what is happening around them.

[…] According to this view, the active perception of on-going spatial and temporal structure of interacting primates within a social group obviates the need for high level processing involving mental representations. Individuals can use this ongoing structure as an accurate and always up-to-date model, allowing for more efficient action selection and execution

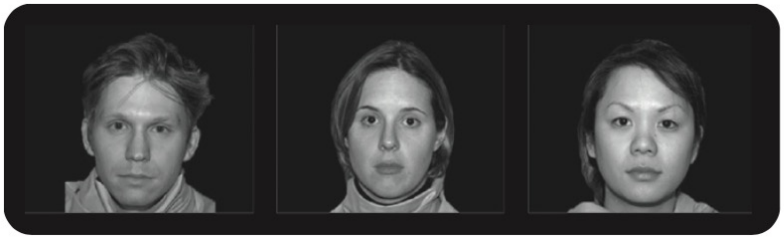
Statistical learning of social signals and its implications for the social brain hypothesis

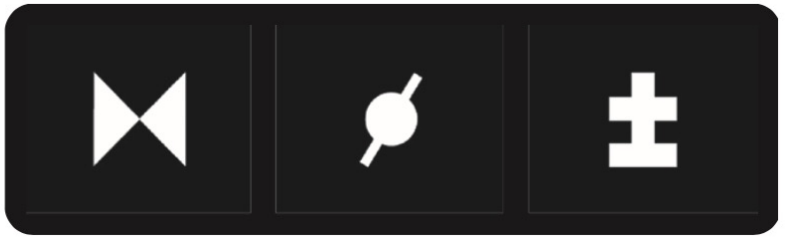
Hjalmar K. Turesson & Asif A. Ghazanfar
Princeton University, USA

A note of caution

Experimental oversimplifications

[...] One pattern recognition mechanism that could be used to actively and rapidly track such cohesion in the social environment is statistical learning. Statistical learning refers to the capacity to segment the sensory environment, based on probabilistically-defined patterns […]. This learning mechanism provides us with the ability to infer, without instruction, which features of an initially unstructured sensory input belong together.





We found that learning of social signals was no better than learning of arbitrary signals. While coupling faces and voices led to parallel learning, the same was true for arbitrary shape and sounds. Overall, our data suggest that statistical learning is a viable domain-general mechanism for learning social group structure.

1) Experimenter's brain does all the work
2) Does it scale up?
3) How to account for one-trial learning?

A note of caution

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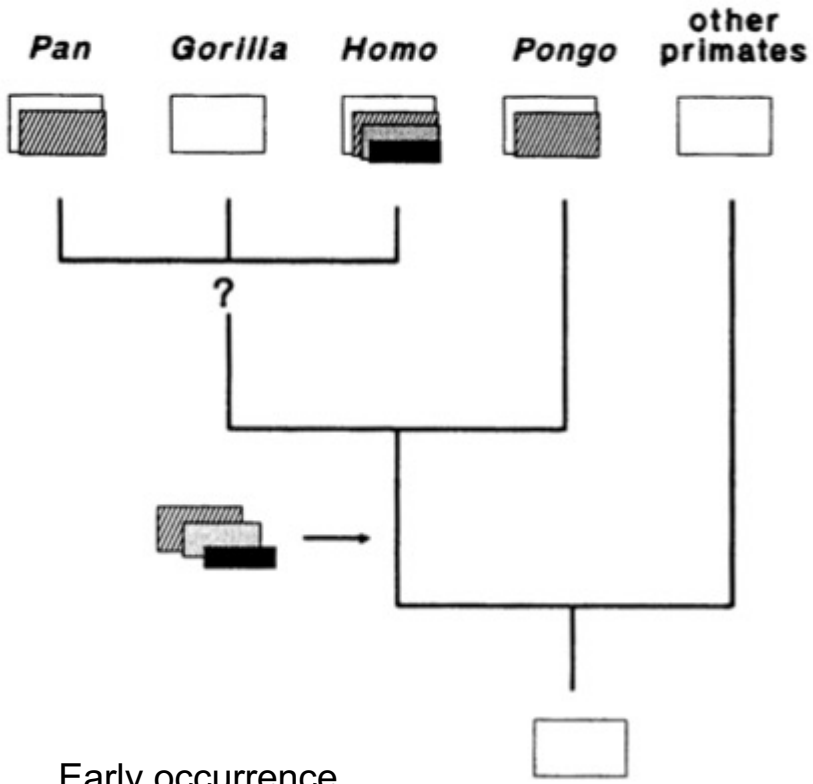
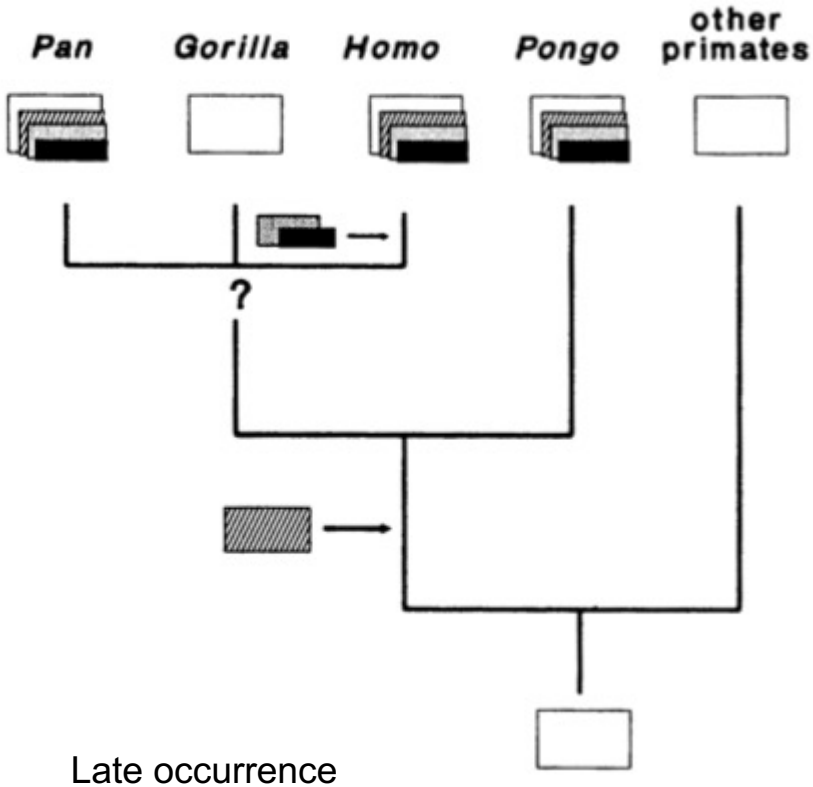
Comparative psychology



Early occurrence



Late occurrence

Evolution of cognitive faculties across primate species

Are we so different?

Mental state inferences

In assuming that other individuals *want, think, believe* and the like, one infers states that are not directly observable and ones uses these states anticipatorily, to predict the behaviour of others as well as one's own. These inferences, which amount to a *theory of mind*, are to our knowledge, universal in human adults.

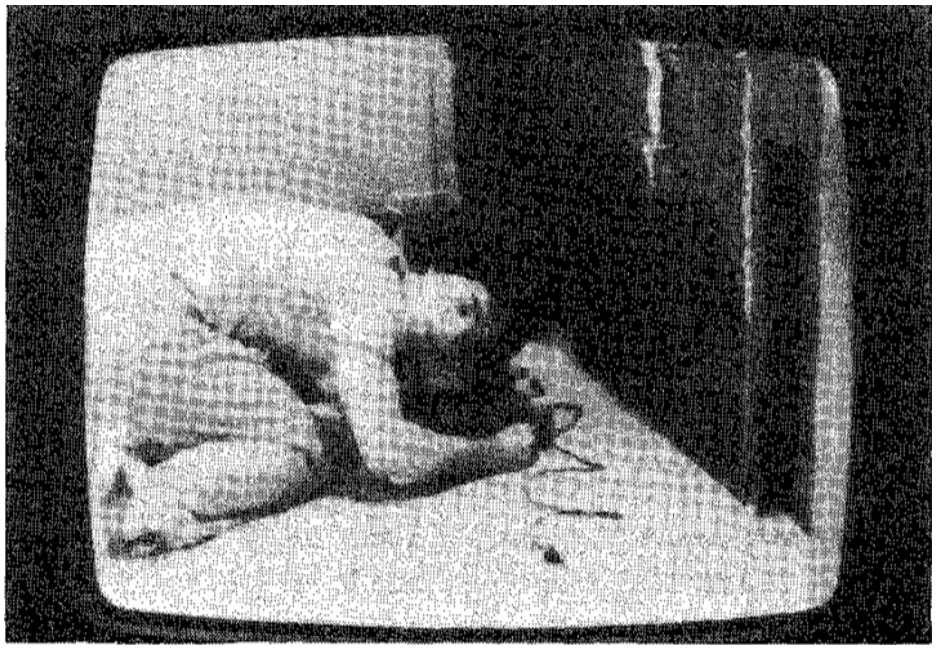
Does the chimpanzee have a theory of mind?

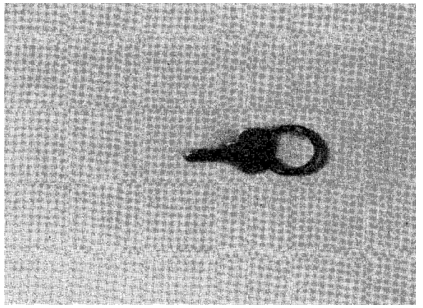
David Premack
Department of Psychology, University of Pennsylvania, Philadelphia, Penna. 19104

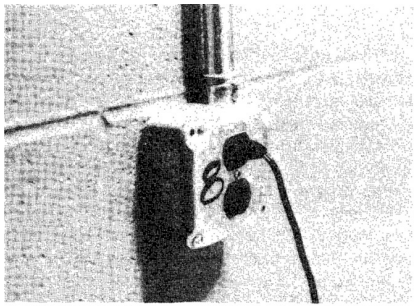
Guy Woodruff
University of Pennsylvania Primate Facility, Honey Brook, Penna. 19344

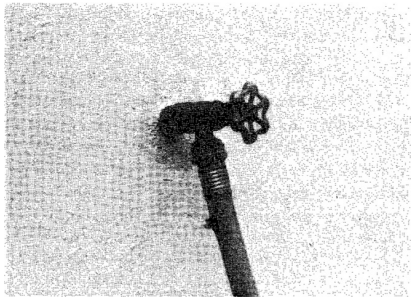
Imputing non-observable states to oneself and to others

Mental state inferences









Imputing non-observable states to oneself and to others

Types of understanding

- Perceptual ToM

  Understanding of seeing and attention

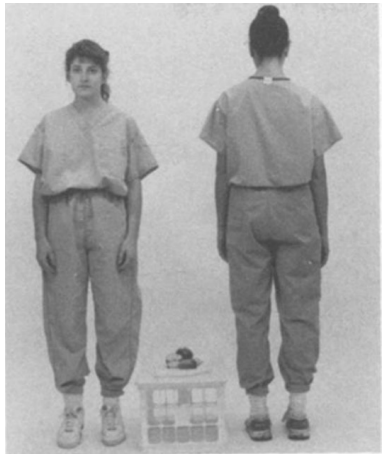
- Motivational ToM

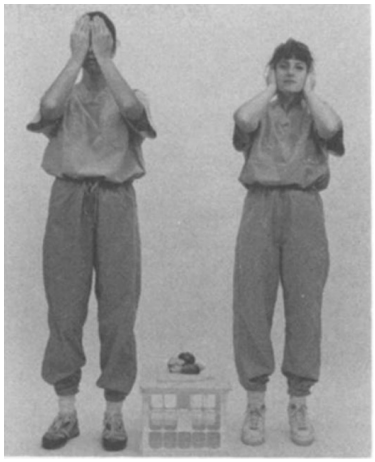
  Understanding of desires, goals, and intentions

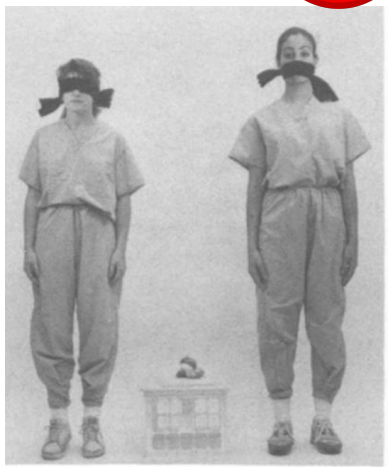
- Informational ToM

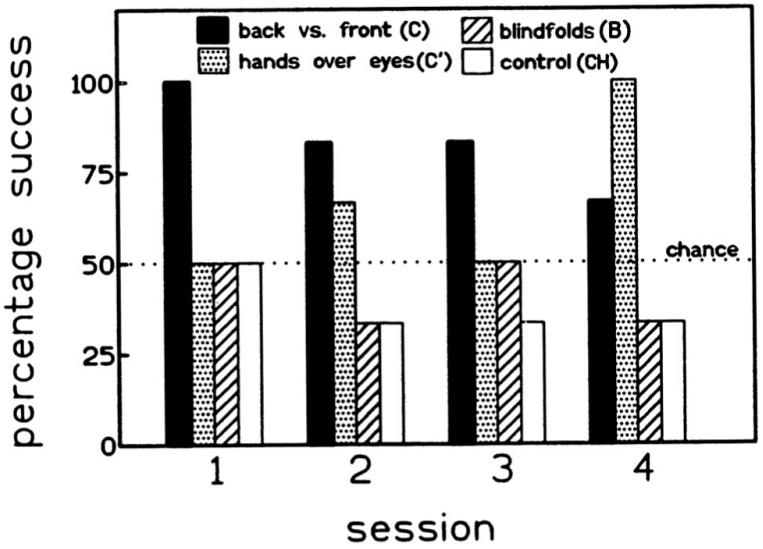
  Understanding of knowledge and beliefs

Perceptual ToM ✗ ?







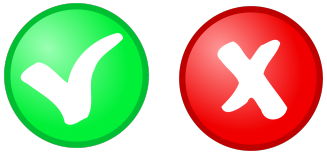


WHAT YOUNG CHIMPANZEES KNOW ABOUT SEEING

Daniel J. Povinelli
Timothy J. Eddy

Understanding of seeing and attention

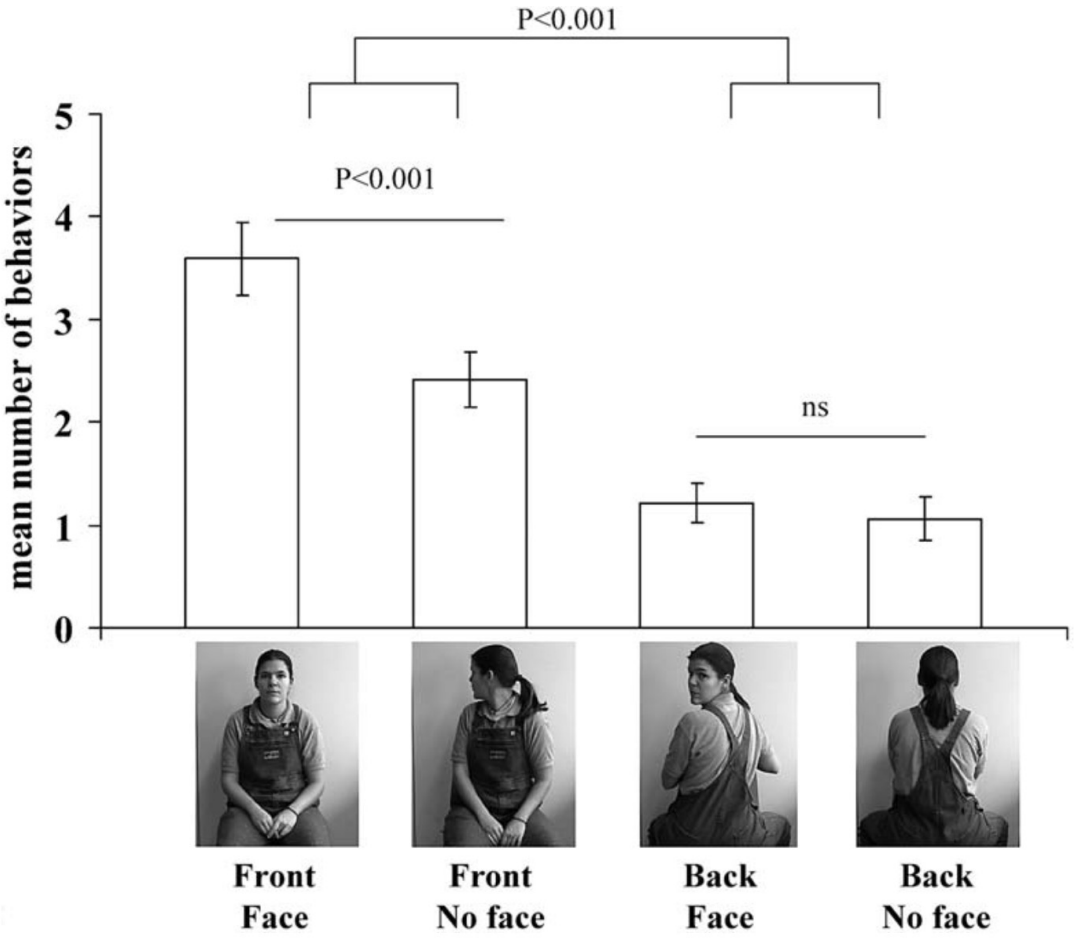
Perceptual ToM



Face Eyes

Juliane Kaminski · Josep Call · Michael Tomasello

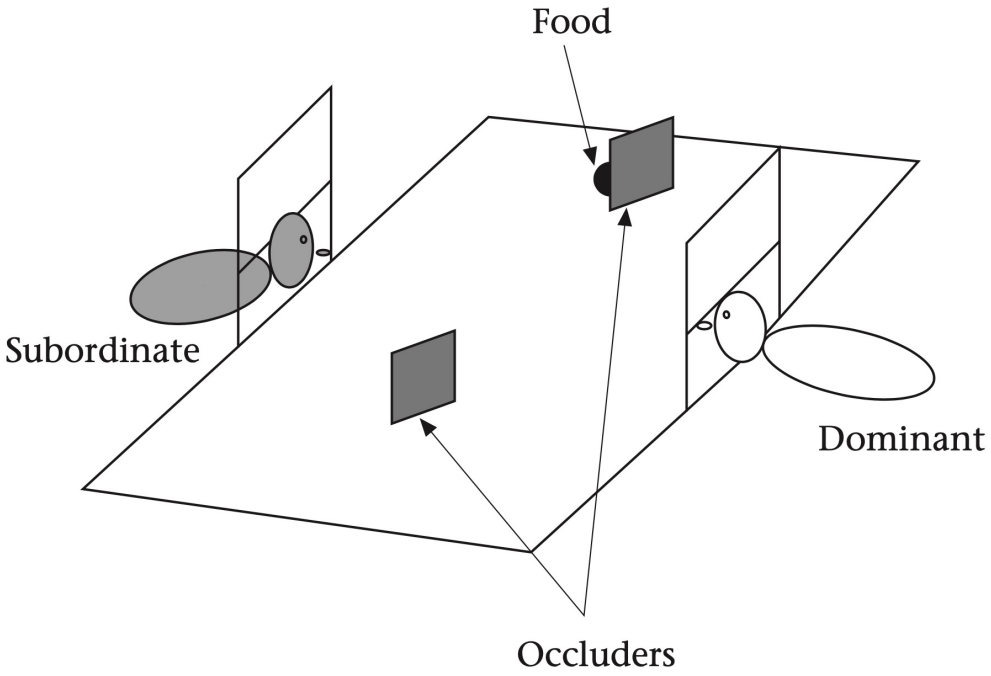
Body orientation and face orientation:
two factors controlling apes' begging behavior from humans



Understanding of seeing and attention

Informational ToM

False belief ToM ?



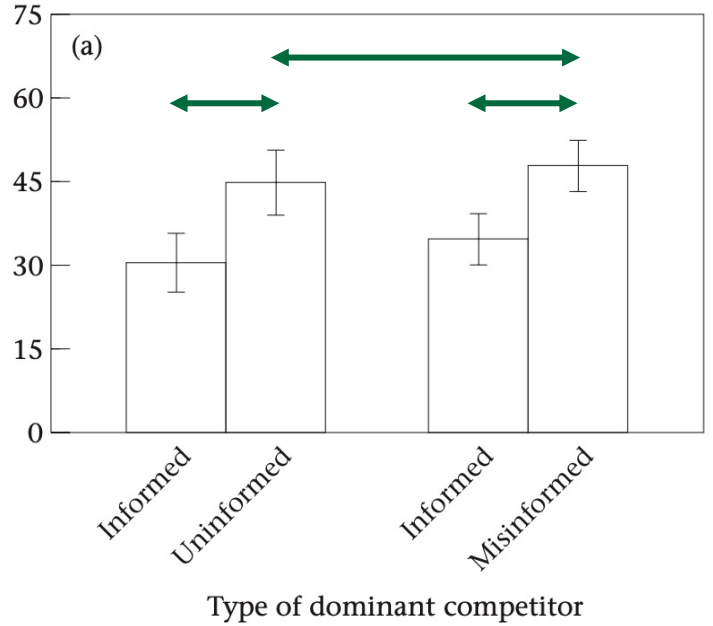


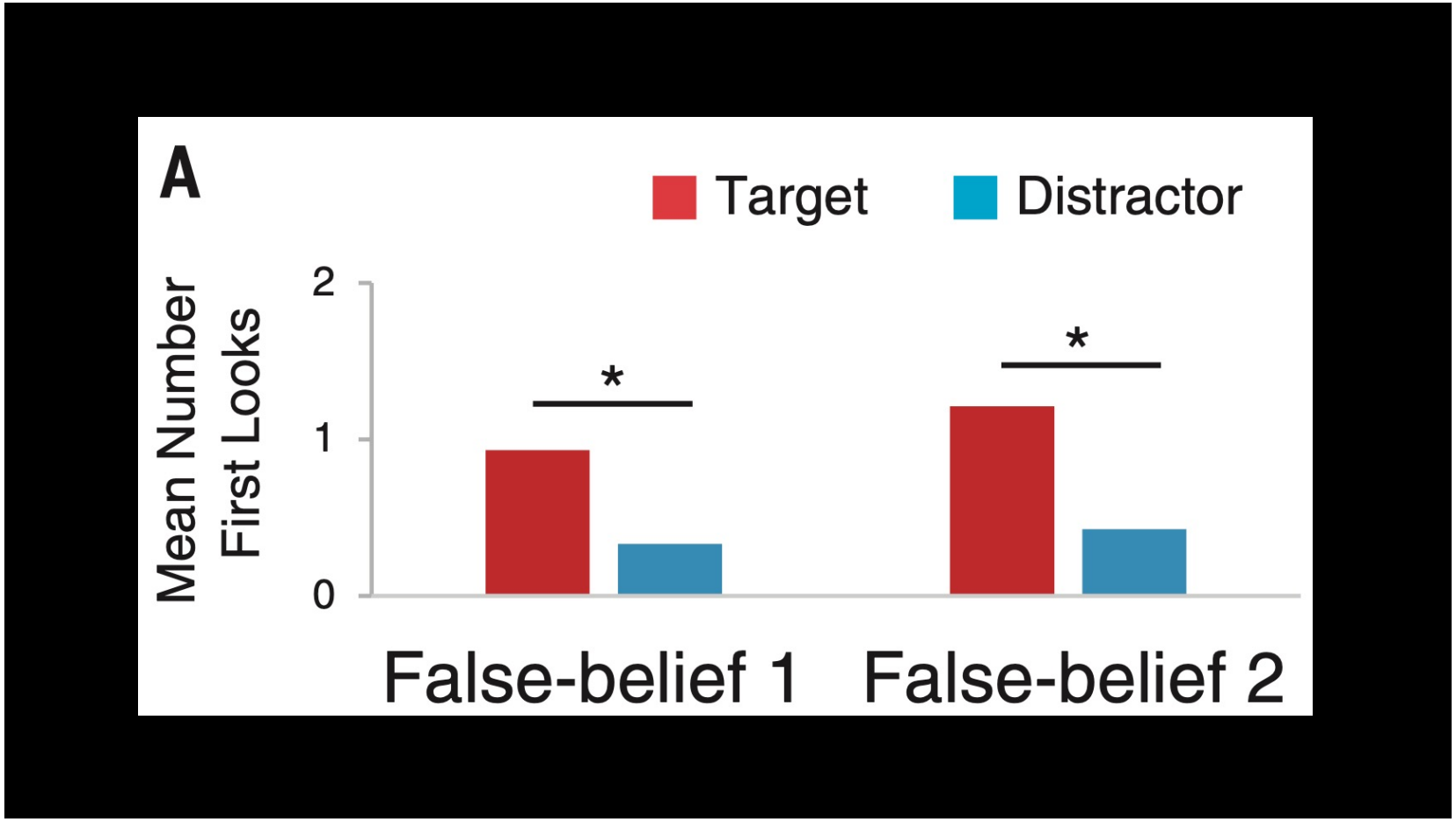
Figure 2. Mean percentage ±SE of (a) pieces of food obtained by subordinate subjects

Do chimpanzees know what conspecifics know?

BRIAN HARE*†, JOSEP CALL*‡ & MICHAEL TOMASELLO*‡
*Department of Psychology and Yerkes Regional Primate Research Center, Emory University
†Department of Biological Anthropology, Harvard University
‡Max-Planck-Institute for Evolutionary Anthropology

Understanding of knowledge and beliefs

False belief ToM



Great apes anticipate that other individuals will act according to false beliefs

Christopher Krupenye,[1*†] Fumihiro Kano,[2,3*†] Satoshi Hirata,[2] Josep Call,[4,5] Michael Tomasello[5,6]

Understanding of knowledge and beliefs

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Opposing theories

Theory of Mind

Use a pre-existing database of psychological regularities (abstract mental states) and observable behavior

Premack & Woodruff, 1978

Does the chimpanzee have a theory of mind?

Simulation theory

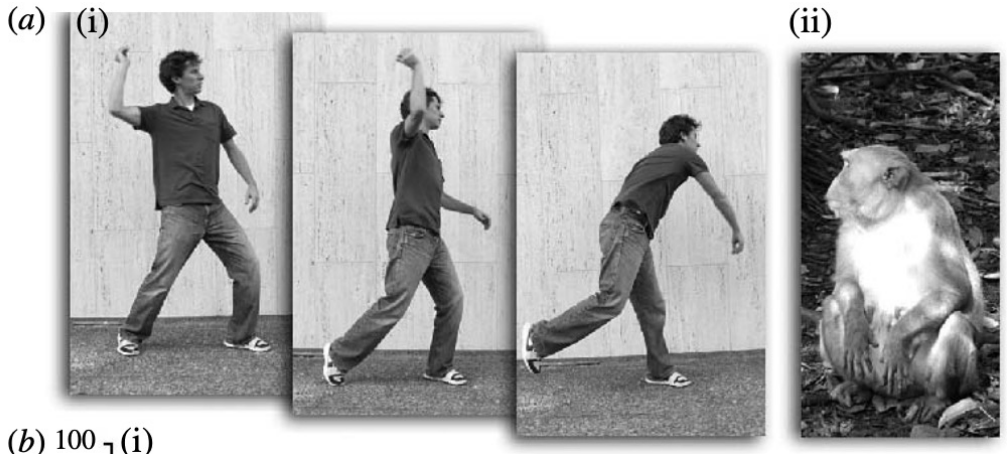
Generate a simulation of the observed behavior, taking our own conceptual and sensorimotor machinery offline, and then reading the intentions generated by the simulation

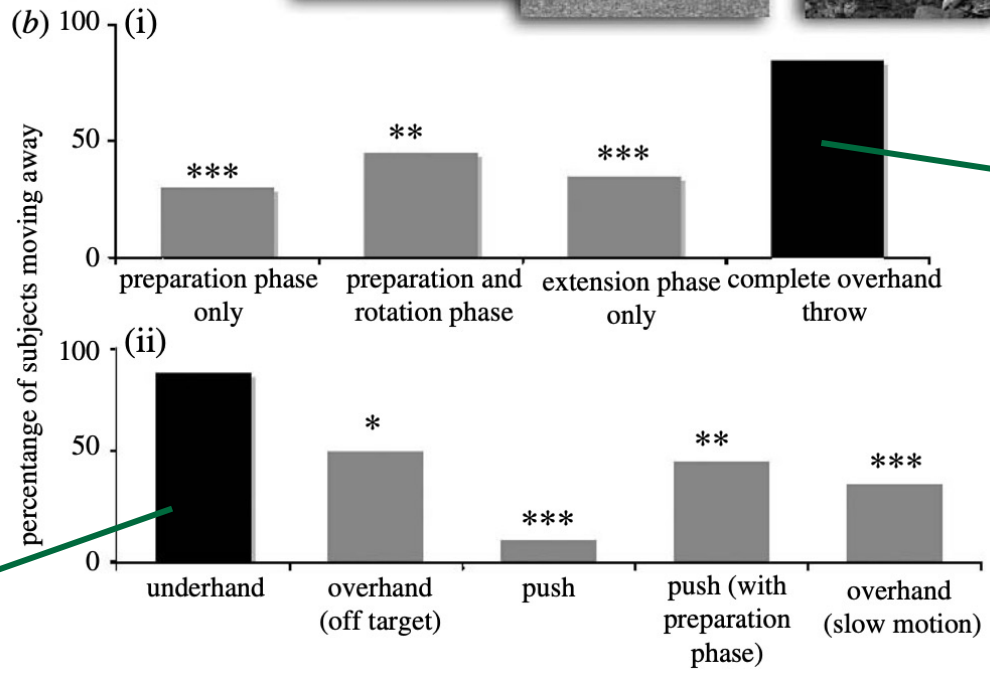
Goldman, 2006

Simulating minds: the philosophy, psychology, and neuroscience of mindreading

Connecting intentions with actions

Dissociating action and perception





incapable

unfamiliar

The uniquely human capacity to throw evolved from a non-throwing primate: an evolutionary dissociation between action and perception

Justin N. Wood[1,*], David D. Glynn[1] and Marc D. Hauser[1,2,3]

Understanding unfamiliar actions

Take-home concepts

- Experimental design is important, as seen in how we first thought chimps had no ToM
- In fact, great apes share with humans several social-cognitive skills
- Raises the question of what sets us apart that allowed us to develop language and culture

Next up

- Game Theory
- *Team Assignments*