

Theory of Mind

Definitions

- "the ability to attribute knowledge, feelings, and intentions to others." (de Waal, *Good Natured*, 232.)
- "the knowledge that any one person had could differ from the knowledge that others had. Minds are viewed as existing in different states of awareness." (Savage- Rumbaugh and Lewin, *Kanzi*, 86.)
- "our ability to explain and predict other people's behavior by attributing to them independent mental states, such as belief and desires. (Gallagher and Frith, *Functional Imaging of "Theory of Mind"*, 77.)
- "the individual imputes mental states to himself and others, (either to conspecifics or to other species as well), these states are not observable and can be used to make predictions about the behavior of other organisms. (Premack and Woodruff, *Does the Chimpanzee Have A Theory of Mind?*, 515.)

Mental States

- Purpose or intention
- Knowledge
- Belief
- Thinking
- Trusting
- Wanting
- Guessing
- Doubt
- Pretending
- Deceit

Names Other than "Theory of Mind"

- Mental state attribution
- Mental state concepts
- Machiavellian intelligence
- Metarepresentation
- Mind-reading
- Pan-or-pongo morphism

(Heyes, *Theory of Mind in Non-human Primates*, 101.)

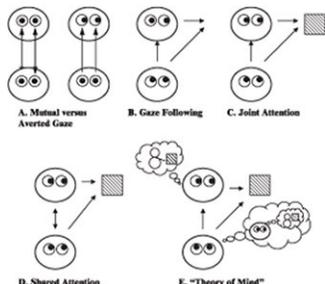
Origins of Theory of Mind

- "Does a Chimpanzee have a Theory of Mind?" David Premack and Guy Woodruff (1978)
- Sarah
- Learning theorist – from ignorance to knowledge.
- Self-knowledge – attributing mental states not only to others, but to own self.

Types of Experiments

- False Belief Task (Sally-Ann Tasks)
- Mirror-self Recognition
- Teaching (of behavioral patterns)
- Gaze-Following
- Joint Visual Attention

Gaze-Following and Joint Visual Attention



Kinds of Animals Observed

- Apes
- Birds
- Dogs
- Elephants



Deceiving or Pretend Play?

- "the key lies in the ability to deceive." (Savage-Rambaugh and Lewin, *Kanzi*, 272.)
- Survival strategies - Does mimicry or "broken wing" syndrome play a part in animals having a theory of mind?
- Pretend-play?
 - Alex
 - Figan and Goliath

Koko

Koko: THAT ME. (Pointing to a photo of a bird.)
 Experimenter: Is that really you?
 Koko: KOKO GOOD BIRD.
 Experimenter: I thought you were really a gorilla.
 Koko: KOKO BIRD.
 Experimenter: Can you fly?
 Koko: GOOD. ("Good" can mean "yes".)
 Experimenter: Show me.
 Koko: FAKE BIRD, CLOWN. (Koko laughs.)
 Experimenter: You're teasing me. (Koko laughs.) What are you really?
 Koko: (Laughs, and after a minute signs:) GORILLA KOKO.



Scott, *Chimpanzee Theory of Mind: A Proposal from the Armchair*, 2001.

Where Does Theory of Mind Fit in with Social Intelligence?

- Theory of Mind is a part of social intelligence
- "Adaptive response to increasing complex primate structure interaction" and
- "Group living puts direct pressures on competing for resources and mates. It could have evolved to facilitate cheating detection and reinforce cooperation."

(Brune and Brune-Cohrs, *Theory of Mind – evolution, ontogeny, brain mechanisms and psychopathology*, 437-455.)

THIS IS THE LAST SLIDE!

(almost)

"Neither chimpanzees nor evolutionary theory will be insulted if the very idea of 'mental states' turns out to be an oddity of our species' way of understanding the social world."

(Povinelli and Vonk, *Chimpanzee Minds: Suspiciously Human?*, 160.)

References

- Penn, Derek C. and Povinelli, Daniel J. On the lack of evidence that non-human animals possess anything remotely resembling a "theory of mind." Philosophical Transactions of The Royal Society. January 30, 2007. 362:731-744.
- Bugnyar, Thomas and Kotrschal, Kurt. Observational learning and the raiding of food caches in ravens. Cortex.cora: is it tactical deception? Animal Behavior. 2002. 64:185-195.
- Gallagher, Helen L. and Frith, Christopher D. Functional Imaging of "Theory of Mind." TRENDS in Cognitive Sciences. February, 2003. 7(2):77-83.
- Premack, David and Woodruff, Guy. Does a chimpanzee have a theory of mind? The Behavioral and Brain Sciences. 1978. 4:515-526.
- Heyes, C. M. Theory of mind in nonhuman primates. Behavioral and Brain Sciences. 1998. 21:101-148.
- Berraly, David. Deceit of the Raven. The New York Times Magazine. September 4, 2005. 20.
- Bloom, Paul and German, Tim P. Two reasons to abandon the false belief task as a test of theory of mind. Science. 2000. Cognition 77:B25-B31.
- Scott, Sam. Chimpanzee Theory of Mind: A Proposal from the Armchair. Carleton University Cognitive Science Technical Report. November, 2001. p. 2001-2006.
- Byrne, Richard W. Animal Cognition: Know Your Enemy. Current Biology. 2006. 16(17):R686-688.
- Brune, Martin and Brune-Cohrs, Ute. Theory of Mind – Evolution, Ontogeny, Brain Mechanisms, and Psychopathology. Neuroscience and Biobehavioral Reviews. 2006. 30:437-455.
- Plotnik, Joshua M.; de Waal, Frans B. M. and Reiss, Diana. Self-recognition in an Asian Elephant. PNAS. November 7, 2006. 103(45).
- Povinelli, David J. and Vonk, Jennifer. Chimpanzee minds: suspiciously human? TREND in Cognitive Sciences. April 2003. 7(4):157-160.
- Itakura, Shoji. Gaze following and joint visual attention in non-human animals. Japanese Psychological Review. 2004. 46(3):219-225.
- Leslie, Alan M. Pretense and Representation: The Origins of Theory of Mind. Psychological Reviews. 1987. 94(4):412-426.
- Kuroshima, Kuro; Fujita, Kazuo; Adachi, Ikurra; Iwata, Kana and Fuyuki, Akira. A Capuchin Monkey (*Cebus apella*) recognizes when people do and do not know the location of food. Animal Behavior. 2003. 6:283-291.
- Savage-Rumbaugh, Sue and Lewin, Roger. *Kanzi*. 1994. John Wiley & Sons, Inc. New York, NY.
- de Waal, Frans. *Good Natured* 1996. Harvard University Press. Cambridge, MA.
- Goodall, Jane. *Through a Window: My Thirty Years with the Chimpanzees of Gombe*. 1990. Houghton-Mifflin Company. Boston, MA and New York, NY.
- Nisani, Moti. *Comparative Vertebrate Cognition: Are Primates Superior to Non-primates?* Kluwer Academic/Plenum Publishers. New York, NY. January, 2004. p.227-261.

What do you think?

- What would be the advantages and disadvantages of a theory of mind in animals?
- Does theory of mind play a part in social intelligence?
- Does social intelligence help develop a theory of mind?

What do you think?

- Does deceiving in the animal world prove that animals have a theory of mind?
- Does a theory of mind mean that there is self-awareness?
- What kinds of tests would you do to prove or disprove a theory of mind?

What do you think?

- Can a theory of mind help an animal predict what another animal is going to do?
- Does empathy play a part in the theory of mind concept?
- Do the animals that you research have a theory of mind?