

Lecture 06: Three Questions about Mindreading

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1. Nonhuman Mindreading

Many animals including scrub jays (Clayton et al. 2007), ravens (Bugnyar et al. 2016), goats (Kaminski et al. 2006), dogs (Kaminski et al. 2009), ringtailed lemurs (Sandel et al. 2011), monkeys (Burkart & Heschl 2007; Hattori et al. 2009) and chimpanzees (Melis et al. 2006; Karg et al. 2015; Krupenye et al. 2016) reliably vary their actions in ways that are appropriate given facts about another's mental states. What could underpin such abilities to track others' mental states?

Example 1: 'In informed trials dominant individuals witnessed the experimenter hiding food behind one of the occluders whereas in uninformed trials they could not see the baiting procedure. In misinformed trials, dominants witnessed the experimenter hiding food behind one of the occluders, and once the dominant's visual access was blocked, the experimenter switched the food from its original location to the other occluder' (Hare et al. 2001).

Example 2: 'the jays were much more likely to re-cache if they had been observed by a conspecific while they were caching than when they had cached in private. By re-caching items that

the observer had seen them cache, the cachers significantly reduce the chance of cache theft, as observers would be unable to rely on memory to facilitate accurate cache theft' (Clayton et al. 2007, p. 516).

Example 3: 'ravens can transfer knowledge from their own experience in a novel context—using peepholes to look into an adjacent room—to a caching situation in which they can hear but not see a conspecific in that room' (Bugnyar et al. 2016).

Q1: What do infants, chimps and scrub-jays reason about, or represent, that enables them, within limits, to track others' perceptions, knowledge, beliefs and other propositional attitudes?

For you to *track* someone's mental state (such as a belief that there is food behind that rock) is for there to be a process in you which nonaccidentally depends in some way on whether she has that mental state.

'Comparative psychologists test for mindreading in non-human animals by determining whether they detect the presence and absence of particular cognitive states in a wide variety of circumstances. They eliminate potential confounding variables by ensuring that there is no one observable state to which subjects might be responding' (Halina 2015, p. 487).

'chimpanzees understand ... intentions ... perception and knowledge,' but 'chimpanzees prob-

ably do not understand others in terms of a fully human-like belief-desire psychology' Call & Tomasello (2008, p. 191).

'the core theoretical problem in contemporary research on animal mindreading is that the bar—the conception of mindreading that dominates the field—is too low, or more specifically, that it is too underspecified to allow effective communication among researchers, and reliable identification of evolutionary precursors of human mindreading through observation and experiment' (Heyes 2015, p. 318)

2. Human Infants

One-year-old children predict actions of agents with false beliefs about the locations of objects (Clements & Perner 1994; Onishi & Baillargeon 2005; Southgate et al. 2007; but see Kulke et al. 2017), and about the contents of containers (He et al. 2011), taking into account verbal communication (Song et al. 2008; Scott et al. 2012). They may also choose ways of helping (Buttelmann et al. 2009; but see Crivello & Poulin-Dubois 2017) and communicating (Knudsen & Liszkowski 2012; Southgate et al. 2010) with others depending on whether their beliefs are true or false. And in much the way that irrelevant facts about the contents of others' beliefs modulate adult subjects' response times, such facts also affect how long 7-month-old infants look at some stimuli (Kovács et al. 2010).

Q2: Why do infants manifest abilities to track beliefs in some cases but not all?

An *A-Task* is any false belief task that children tend to fail until around three to five years of age.

1. Children fail A-tasks because they rely on a model of minds and actions that does not incorporate beliefs.
2. Children pass non-A-tasks by relying on a model of minds and actions that does incorporate beliefs.
3. At any time, the child has a single model of minds and actions.

3. Human Adults

Are human adults' abilities to track others' beliefs automatic?

For our purposes, a process is *automatic* to the degree that whether it occurs is independent of its relevance to the particulars of the subject's task, motives and aims. *automatic mindreading* is mindreading that is a consequence of automatic processes only.

There is evidence that some mindreading in human adults is automatic (e.g. Kovács et al. 2010; Schneider et al. 2012; van der Wel et al. 2014) and that not all mindreading in human adults is (Apperly et al. 2008, 2010b; van der Wel et al. 2014).

'Participants never reported belief tracking when questioned in an open format after the experiment ("What do you think this experiment was about?"). Furthermore, this verbal debriefing about the experiment's purpose never triggered participants to indicate that they followed the actor's belief state' (Schneider et al. 2012, p. 2)

For adults (and children who can do this), representing perceptions and beliefs as such—and even merely holding in mind what another believes, where no inference is required—involves a measurable processing cost (Apperly et al. 2008, 2010a), consumes attention and working memory in fully competent adults Apperly et al. 2009; Lin et al. 2010; McKinnon & Moscovitch 2007, may require inhibition (Bull et al. 2008) and makes demands on executive function (Apperly et al. 2004; Samson et al. 2005).

Q3 Why is belief-tracking in adults sometimes but not always automatic? (And how could belief-tracking ever be automatic if it significantly depends on working memory and consumes attention?)

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