Lecture 08: Mindreading in Nonhumans

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1. Some Evidence

'In saying that an individual has a theory of mind, we mean that the individual [can ascribe] mental states' (Premack & Woodruff 1978, p. 515)

'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).

'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).

'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).

2. The Question, version 0.1

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. 2015a) 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?

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.

What could make others' mental states intelligible (or identifiable) to a chimpanzee, infant or scrub-jab?

What could make others' behaviours intelligible (or identifiable) to a chimpanzee, infant or scrub-jab?

3. The Behaviour Reading Demon

'an intelligent chimpanzee could simply use the behavioural abstraction [...]: 'Joe was present and oriented; he will probably go after the food. Mary was not present; she probably won't.'' (Povinelli & Vonk 2003)

> For any food (x) and agent (y), if any of the following do not hold:
>
> (i) the agent (y) was present when the food (x) was placed,
>
> (ii) the agent (y) was oriented to the food (x) when it was placed,
>
> and:
>
> (iii) the agent (y) can go after the food (x)
>
> then probably not:
>
> (iv) the agent (y) will go after the food (x).
>
> Also, if all of (i)–(iii) do hold, then probably (iv).

'Don't go after food if a dominant who is present has oriented towards it' (Penn & Povinelli 2007, p. 735)

'since mental state attribution in [nonhuman] animals will (if extant) be based on observable features of other agents' behaviors and environment ... every mindreading hypothesis has ... a complementary behavior-reading hypothesis. Such a hypothesis proposes that the animal relies upon certain behavioral/environmental cues to predict [... the behaviour which], on the mindreading hypothesis, the animal is hypothesized

to use as its observable grounds for attributing the mental state in question.' (Lurz 2011, p. 26); also (Lurz & Krachun 2011, p. 453)

'Behavior-reading animals can appeal only to … reality-based, mind-independent facts, such as facts about agents' past behavior or their current line of gaze to objects in the environment.

'Mindreading animals, in contrast, can appeal to the subjective ways environmental objects perceptually appear to agents to predict their behavior.' (Lurz & Krachun 2011, p. 469)

Experimental implementations: e.g. (Karg et al. 2015b)

'"self-informed" belief induction variables [… are those] that, if the participant is capable of mentalizing, he or she knows only through extrapolation from her own experience to be indicative of what an agent can or cannot see and, therefore, does or does not believe' (Heyes 2014, p. 139)

'because behavioural strategies are so unconstrained … it is very difficult indeed, perhaps impossible, to design experiments that could show that animals are mindreading rather than behaviour reading.' (Heyes 2015, p. 322)

'the logical problem … is not solvable … any experiment aimed at testing mindreading will fail to reject the hypothesis that subjects are reasoning in terms of observable regularities alone. … the logical problem is a general skeptical problem' (Halina 2015, pp. 483–5)

4. The Question, version 0.2

'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).

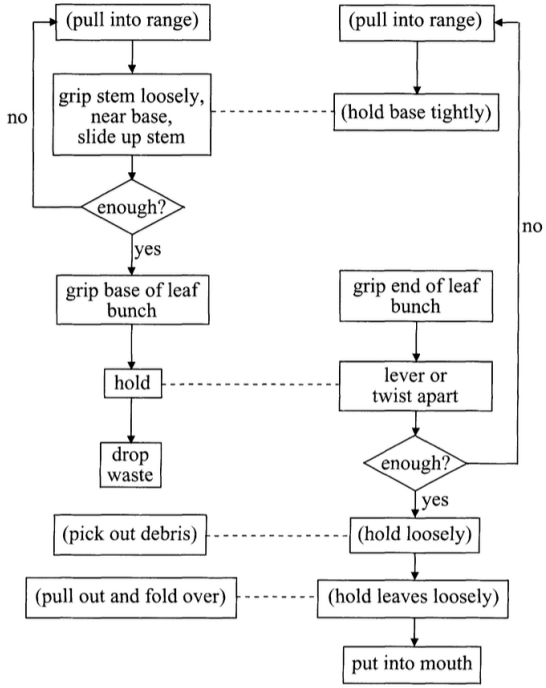
'chimpanzees understand … intentions … perception and knowledge,' but 'chimpanzees probably do not understand others in terms of a fully human-like belief–desire psychology' Call & Tomasello (2008, p. 191).

'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)

'the present evidence may constitute an implicit understanding of belief' (Krupenye et al. 2016, p. 113)

5. Ingredients for a Theory of Behaviour Reading

'a better conception of 'not mindreading' would be more disparate and less dependent on common sense than the current conception of behaviour reading' (Heyes 2015, p. 322)



'great apes [are] able to acquire complex and elaborate local traditions of food acquisition, some of them involving tool use' (Byrne 2003, p 513)

Our primary concern here with behaviour reading is as a potential basis for abilities to track others' mental states without representing them. But behaviour reading is plausibly important in other ways. In mindreaders, behaviour reading is thought to be useful or even necessary for identifying intentions and other mental states (Newtson et al. 1977, p. 861; Baldwin et al. 2001, p. 708). Behaviour reading may also matter for efficiently representing events (Kurby & Zacks 2008), identifing the likely effects of actions (Byrne 1999), predicting when an event likely to be of interest will occur (Swallow & Zacks 2008, p. 121), and learning through observation how to do things (Byrne 2003). And of course a special case of pure behaviour reading, 'speech perception', underpins communication by language in humans.

The *Birdsong Limit*: structures not found in birdsong cannot be extracted in pure behaviour reading.

'The current study tested the hypothesis that a non-human primate species could detect abstract, non-adjacent dependencies in acoustic stimuli, even when dependencies occurred over an arbitrary variable number of intervening sounds … Squirrel monkeys consistently recognized and generalized the pattern ABnA at different levels, showing sensitivity to arbitrary-distance dependencies' (Ravignani et al. 2013; see alsoSonnweber et al. 2015).

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