

# Lecture 07: Social Cognition

s.butterfill@warwick.ac.uk

## 1. Automatic and Non-automatic Mindreading

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

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.

Southgate et al. (2007) created an anticipatory looking false belief task, originally for use with two-year-olds, which has been adapted to provide evidence for automatic false belief tracking.

There is evidence that some mindreading in human adults is entirely a consequence of relatively automatic processes (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).

Incidentally, belief tracking can also occur without awareness: '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)

## 2. Three Questions about Belief-Tracking

Three questions:

1. Why is belief-tracking in adults sometimes but not always automatic?
2. How could belief-tracking ever be automatic given evidence that it depends on working memory and consumes attention?
3. Why are there dissociations in nonhuman apes' performance on belief-tracking tasks?

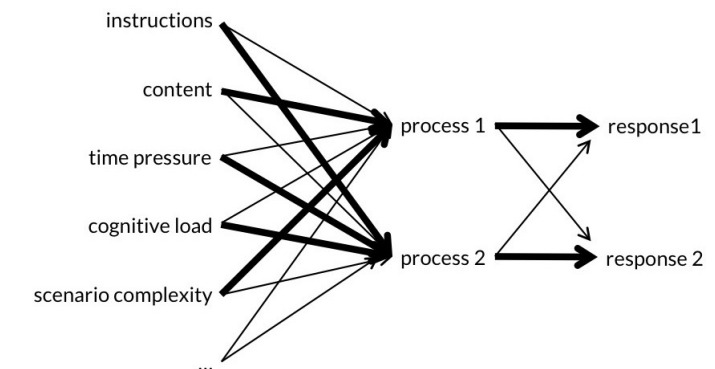
For adults (and children who can do this), representing perceptions and beliefs as such—and even merely holding in mind what another believes, where no inference is required—involves a measurable processing cost (Apperly et al. 2008, 2010a), consumes attention and working memory in fully competent adults 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).

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

## 3. A Dual-Process Theory of Mindreading

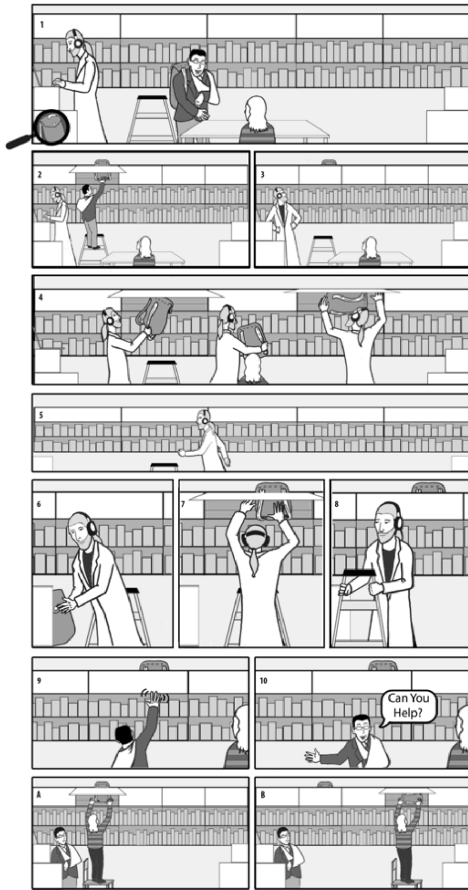
Dual Process Theory of Mindreading (core part):

Two (or more) mindreading processes are distinct: the conditions which influence whether they occur, and which outputs they generate, do not completely overlap.

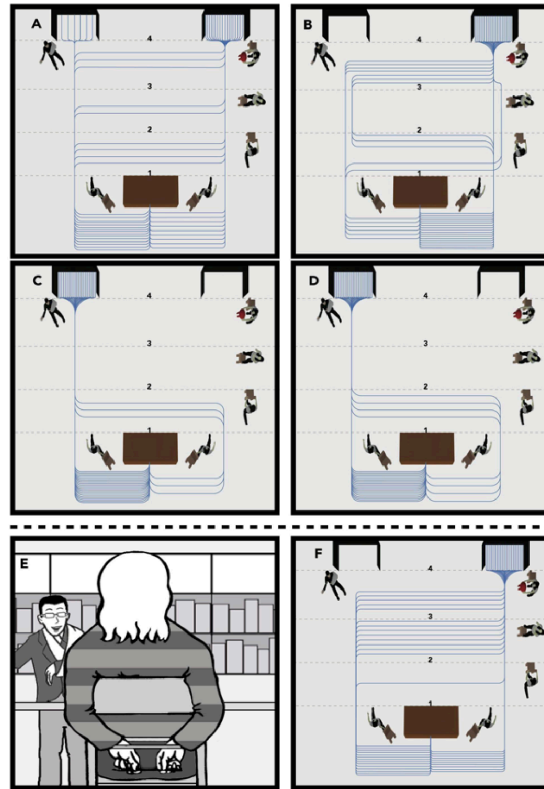


(See Wang et al. 2015; Low 2010; Low et al. 2014; Edwards & Low 2017; contrast Scott et al. 2015.)

#### 4. Maymon, Sivanantham, Low & Butterfill (pilot)



Sequence of events (1 – 10) in the FB-identity condition.

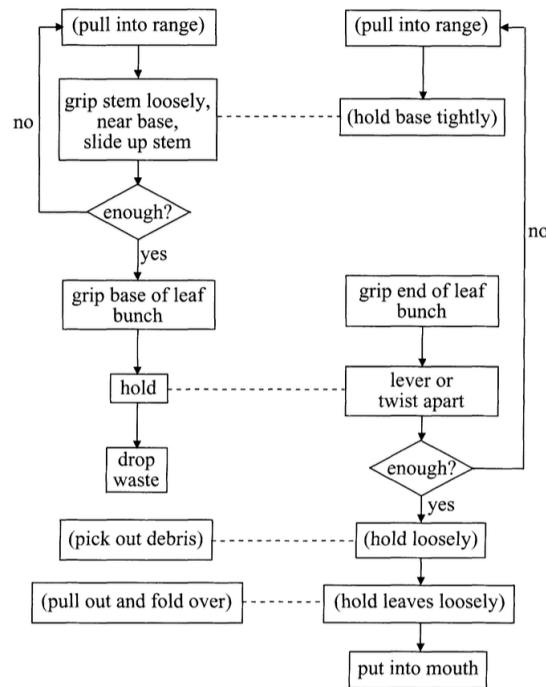


Schematic representation of individuals' (N = 96) course of action in Experiment 1 between conditions: (A) FB-identity, (B) FB-location, (C) TB-identity, and (D) TB-location. The course was divided into 4 stages: (1) swerving, (2) advancing, (3) reaching, and (4) ultimately handing over the actual or non-actual bag (dotted lines represent thresholds for each stage). In Experiment 2, we examined how stalling of motor representations, by temporarily tying individual observers' hands (E), affected the course of their (N = 24)

helping action in the FB-identity condition (F).

## 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), identifying 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 also Sonnweber et al. 2015).

## References

- Apperly, I. A., Back, E., Samson, D., & France, L. (2008). The cost of thinking about false beliefs: Evidence from adults’ performance on a non-inferential theory of mind task. *Cognition*, 106(3), 1093–1108.
- Apperly, I. A., Carroll, D., Samson, D., Humphreys, G., Qureshi, A., & Moffitt, G. (2010a). Why are there limits on theory of mind use? evidence from adults’ ability to follow instructions from an ignorant speaker. *The Quarterly Journal of Experimental Psychology*, 63(6), 1201–1217.
- Apperly, I. A., Carroll, D. J., Samson, D., Humphreys, G. W., Qureshi, A., & Moffitt, G. (2010b). Why are there limits on theory of mind use? evidence from adults’ ability to follow instructions from an ignorant speaker. *The Quarterly Journal of Experimental Psychology*, 63, 1201–1217.
- Apperly, I. A., Samson, D., Chiavarino, C., & Humphreys, G. (2004). Frontal and temporo-parietal lobe contributions to theory of mind: Neuropsychological evidence from a false-belief task with reduced language and executive demands. *Journal of Cognitive Neuroscience*, 16(10), 1773–1784.
- Apperly, I. A., Samson, D., & Humphreys, G. W. (2009). Studies of adults can inform accounts of theory of mind development. *Developmental Psychology*, 45(1), 190–201.
- Baldwin, D., Baird, J. A., Saylor, M. M., & Clark, M. A. (2001). Infants parse dynamic action. *Child Development*, 72(3), 708–717.
- Bull, R., Phillips, L., & Conway, C. (2008). The role of control functions in mentalizing: Dual-task studies of theory of mind and executive function. *Cognition*, 107(2), 663–672.
- Byrne, R. W. (1999). Imitation without intentionality. using string parsing to copy the organization of behaviour. *Animal Cognition*, 2(2), 63–72.

- Byrne, R. W. (2003). Imitation as behaviour parsing. *Philosophical Transactions: Biological Sciences*, 358(1431), 529–536.
- Edwards, K. & Low, J. (2017). Reaction time profiles of adults' action prediction reveal two mindreading systems. *Cognition*, 160, 1–16.
- Heyes, C. (2015). Animal mindreading: what's the problem? *Psychonomic Bulletin & Review*, 22(2), 313–327.
- Kovács, Á. M., Téglás, E., & Endress, A. D. (2010). The social sense: Susceptibility to others' beliefs in human infants and adults. *Science*, 330(6012), 1830–1834.
- Krupenye, C., Kano, F., Hirata, S., Call, J., & Tomasello, M. (2016). Great apes anticipate that other individuals will act according to false beliefs. *Science*, 354(6308), 110–114.
- Kurby, C. A. & Zacks, J. M. (2008). Segmentation in the perception and memory of events. *Trends in Cognitive Sciences*, 12(2), 72–79.
- Lin, S., Keysar, B., & Epley, N. (2010). Reflexively mind-blind: Using theory of mind to interpret behavior requires effortful attention. *Journal of Experimental Social Psychology*, 46(3), 551–556.
- Low, J. (2010). Preschoolers' implicit and explicit False-Belief understanding: Relations with complex syntactical mastery. *Child Development*, 81(2), 597–615.
- Low, J., Drummond, W., Walmsley, A., & Wang, B. (2014). Representing how rabbits quack and competitors act: Limits on preschoolers' efficient ability to track perspective. *Child Development*, forthcoming.
- McKinnon, M. C. & Moscovitch, M. (2007). Domain-general contributions to social reasoning: Theory of mind and deontic reasoning re-explored. *Cognition*, 102(2), 179–218.
- Newson, D., Engquist, G. A., & Bois, J. (1977). The objective basis of behavior units. *Journal of Personality and Social Psychology*. Vol. 35(12), 35(12), 847–862.
- Ravignani, A., Sonnweber, R.-S., Stobbe, N., & Fitch, W. T. (2013). Action at a distance: dependency sensitivity in a New World primate. *Biology Letters*, 9(6), 20130852.
- Samson, D., Apperly, I. A., Kathirgamanathan, U., & Humphreys, G. W. (2005). Seeing it my way: a case of a selective deficit in inhibiting self-perspective. *Brain*, 128(5), 1102–1111.
- Schneider, D., Bayliss, A. P., Becker, S. I., & Dux, P. E. (2012). Eye movements reveal sustained implicit processing of others' mental states. *Journal of Experimental Psychology: General*, 141(3), 433–438.
- Scott, R. M., Richman, J. C., & Baillargeon, R. (2015). Infants understand deceptive intentions to implant false beliefs about identity: New evidence for early mentalistic reasoning. *Cognitive Psychology*, 82, 32–56.
- Sonnweber, R., Ravignani, A., & Fitch, W. T. (2015). Non-adjacent visual dependency learning in chimpanzees. *Animal Cognition*, 18(3), 733–745.
- Southgate, V., Senju, A., & Csibra, G. (2007). Action anticipation through attribution of false belief by two-year-olds. *Psychological Science*, 18(7), 587–592.
- Swallow, K. M. & Zacks, J. M. (2008). Sequences learned without awareness can orient attention during the perception of human activity. *Psychonomic Bulletin & Review*, 15, 116–122.
- van der Wel, R. P. R. D., Sebanz, N., & Knoblich, G. (2014). Do people automatically track others' beliefs? evidence from a continuous measure. *Cognition*, 130(1), 128–133.
- Wang, B., Hadi, N. S. A., & Low, J. (2015). Limits on efficient human mindreading: Convergence across chinese adults and semai children. *British Journal of Psychology*, 106(4), 724–740.