

How to construct a Minimal Theory of Mind

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A black and white photograph of two young children, a boy and a girl, standing close together against a dark background. The boy, on the left, has light-colored hair and is wearing a patterned long-sleeved shirt under dark overalls. He is smiling and looking towards the camera. The girl, on the right, also has light-colored hair and is wearing a dark top with a subtle pattern. She is also smiling and looking towards the camera. They appear to be in a playful or happy mood.

challenge

Explain the emergence, in evolution or development, of full-blown theory of mind cognition.

A black and white photograph of two young children, a boy and a girl, standing close together and smiling. The boy is on the left, wearing overalls, and the girl is on the right, wearing a patterned dress. They appear to be in a joyful mood.

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Explain the emergence, in evolution or development, of full-blown theory of mind cognition.

conjecture

We need to understand how theory of mind cognition could come in degrees.

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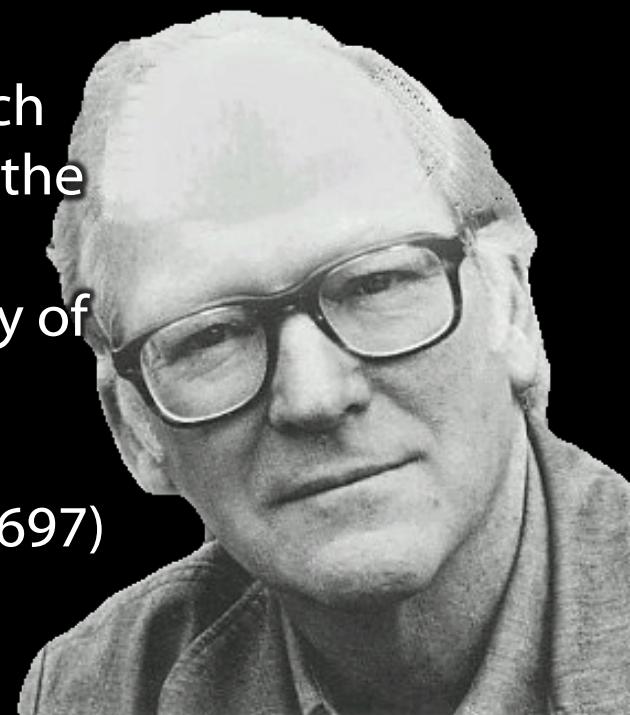
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obstacle

Grasp of everyday psychological concepts like belief, desire, knowledge and intention is all-or-nothing.

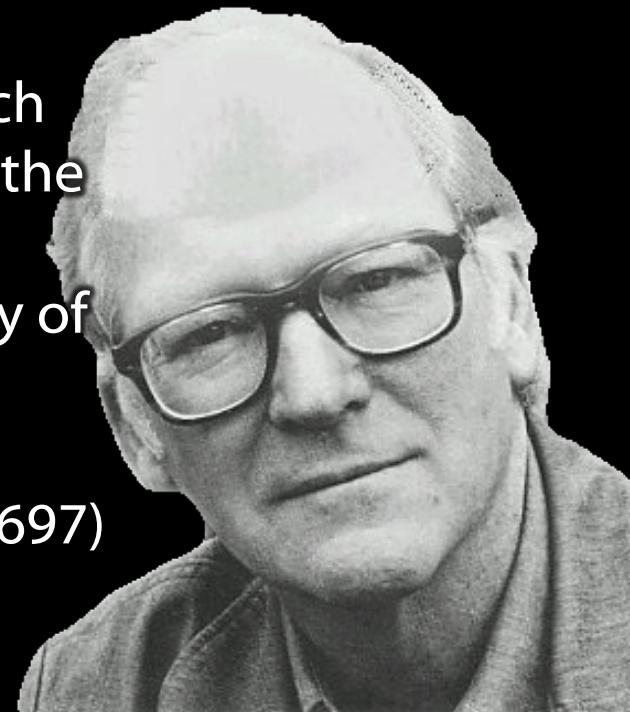
“We are stuck with our two main ways of describing and explaining things, one which treats objects and events as mindless, and the other which treats objects and events as having propositional attitudes. I see no way of bridging the gap by introducing an intermediate vocabulary.”

(Davidson 2003:697)



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“our [typical adult humans’] fundamental conception of what it is to know that P is itself an explanatory conception [...] we think of S’s knowledge that P as something that can properly be explained by reference to what S has perceived or remembered or proved or ...”

(Cassam 2007:356)



A black and white photograph of two young children, a boy and a girl, smiling and looking at each other. The boy is in the foreground, wearing overalls, and the girl is behind him, wearing a patterned top.

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puzzle

Theory of mind *abilities* are widespread



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18-month-olds point to inform, and predict actions based on false beliefs

(Liszkowski et al 2006)

(Onishi & Baillargeon 2005;
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Scrub-jays selectively re-cache their food in ways that deprive competitors of knowledge of its location

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- takes years to develop
- development tied to acquisition of executive function and language
- development facilitated by training and siblings

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(b) scarce cognitive resources

- attention
- working memory

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Propositional attitudes ...

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What could infants, chimps and scrub-jays represent that would enable them, within limits, to track others' perceptions, knowledge, beliefs and other propositional attitudes?

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challenge

Explain the empirical evidence for evolution or development of the capacity of mind cognition.

puzzle

What could infants, chimps and other primates know about the world? What would enable them, within limits, to learn about the world? How do they learn about the world? What are the limitations, if any, on what they can learn?





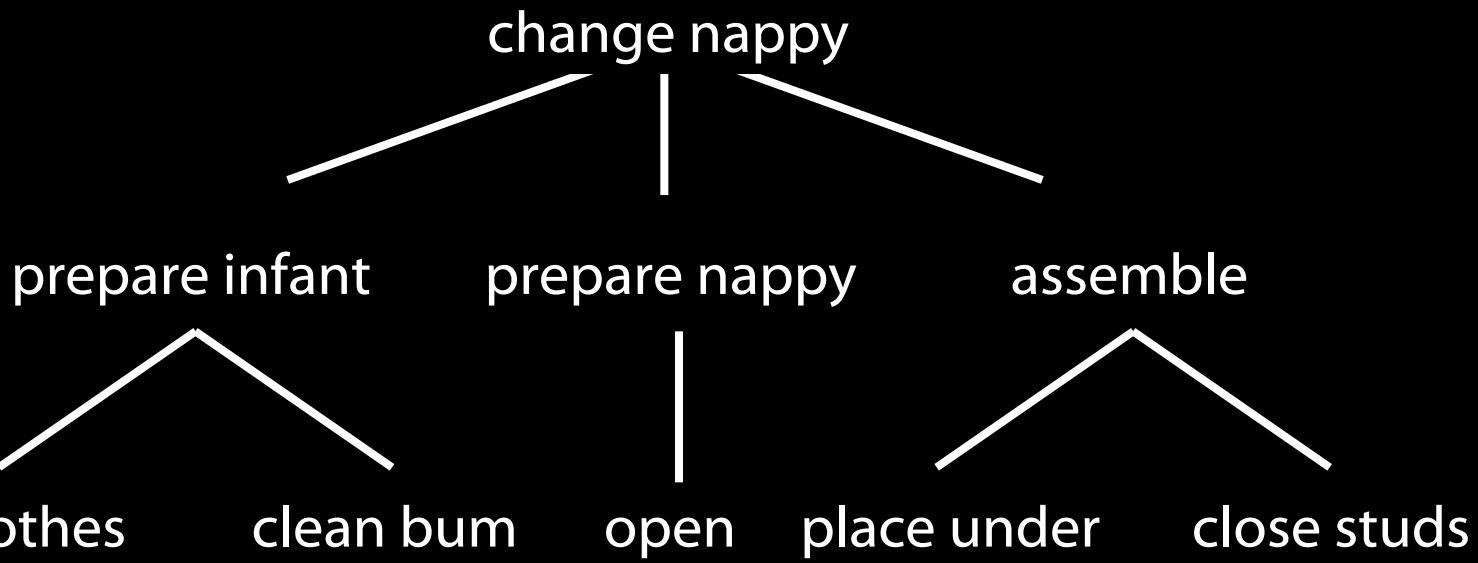


change nappy

plans

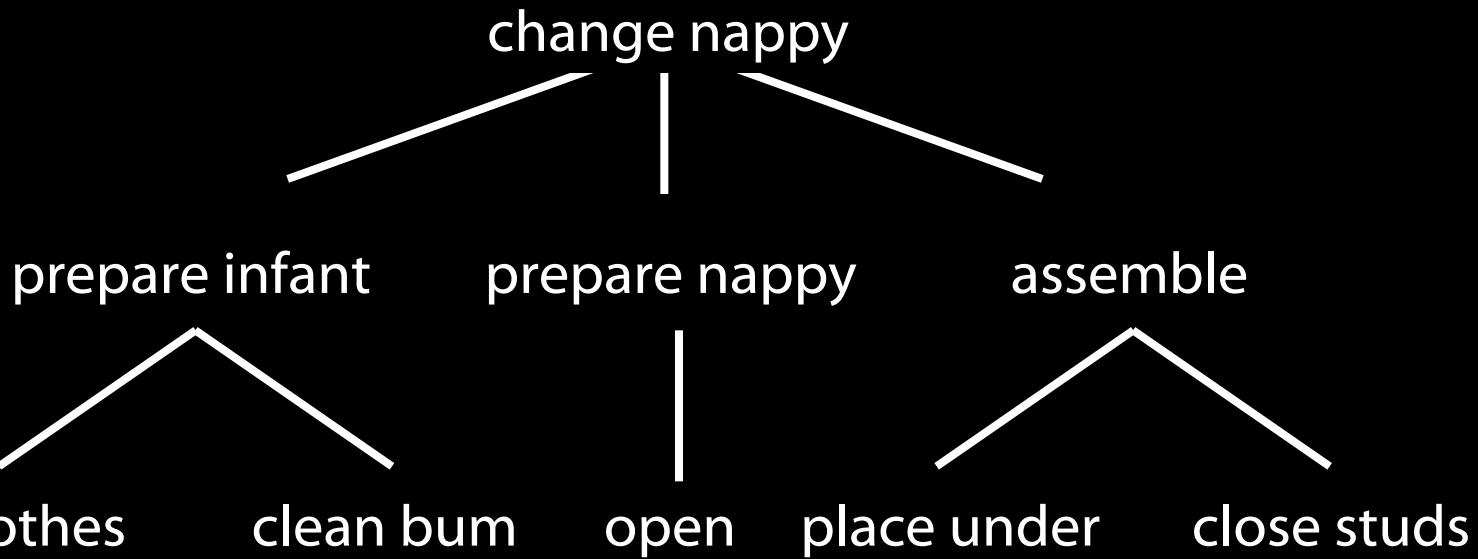


plans



goals

plans

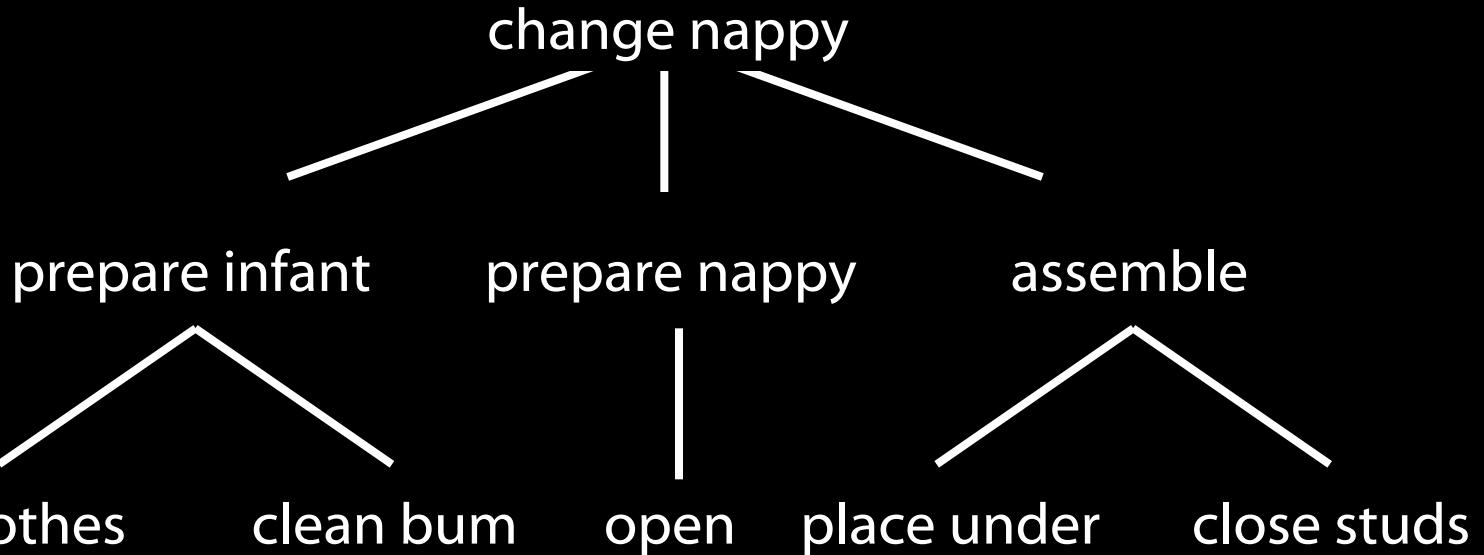


goals

motor action

. /reach X/ /grasp X/ /grasp Y/ /pull Y/ /scoop X/ /Y out of X/ ...

plans



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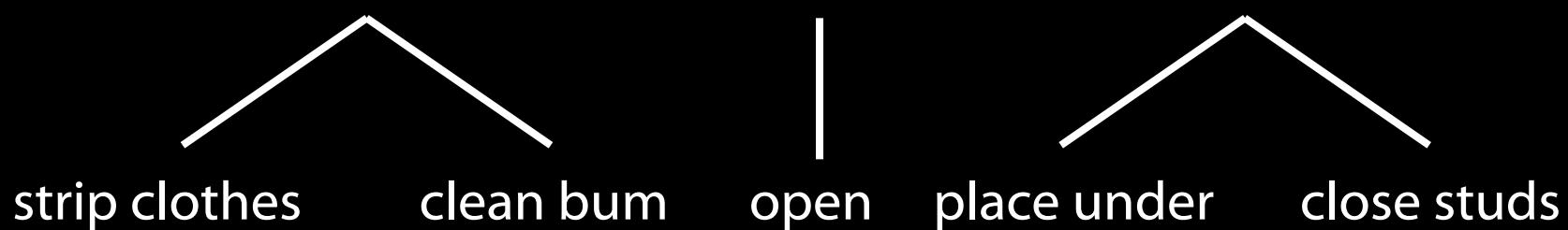
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motor action

plans



goals



motor action

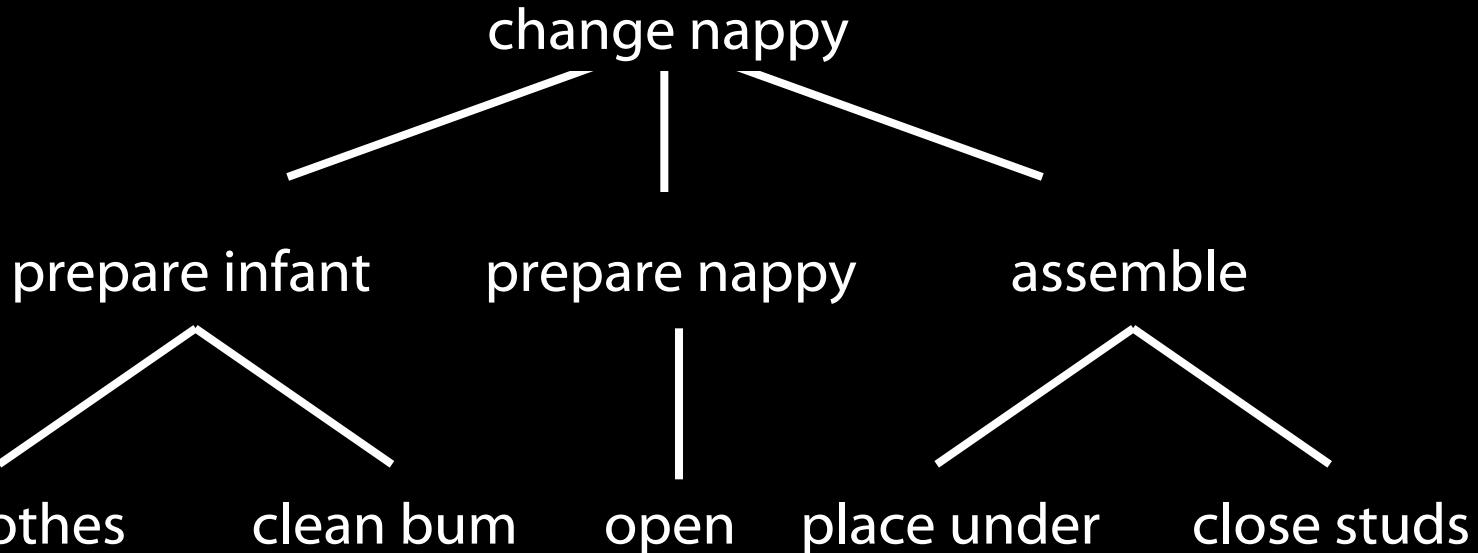
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motion



plans



goals

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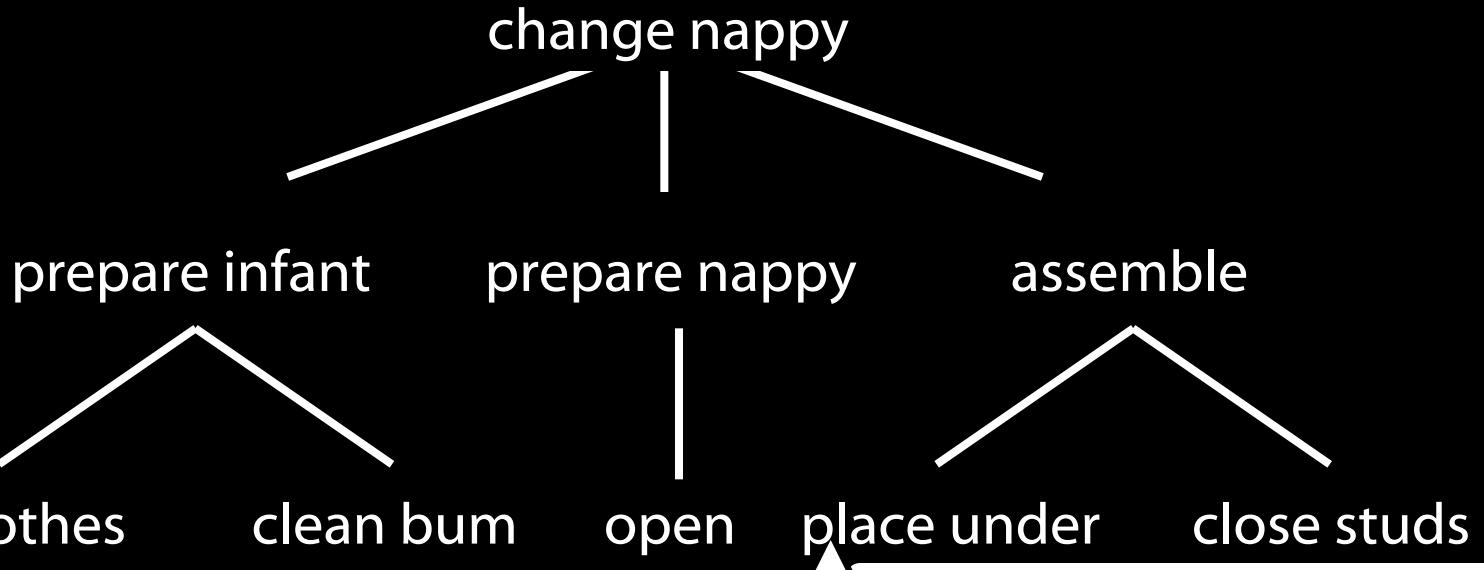
[reach-left-hand X] [left-wholehand-grasp X1] [right-wholehand-grasp ...]

motor emulation

motion



plans



goals

strip clothes clean bum open place under close studs

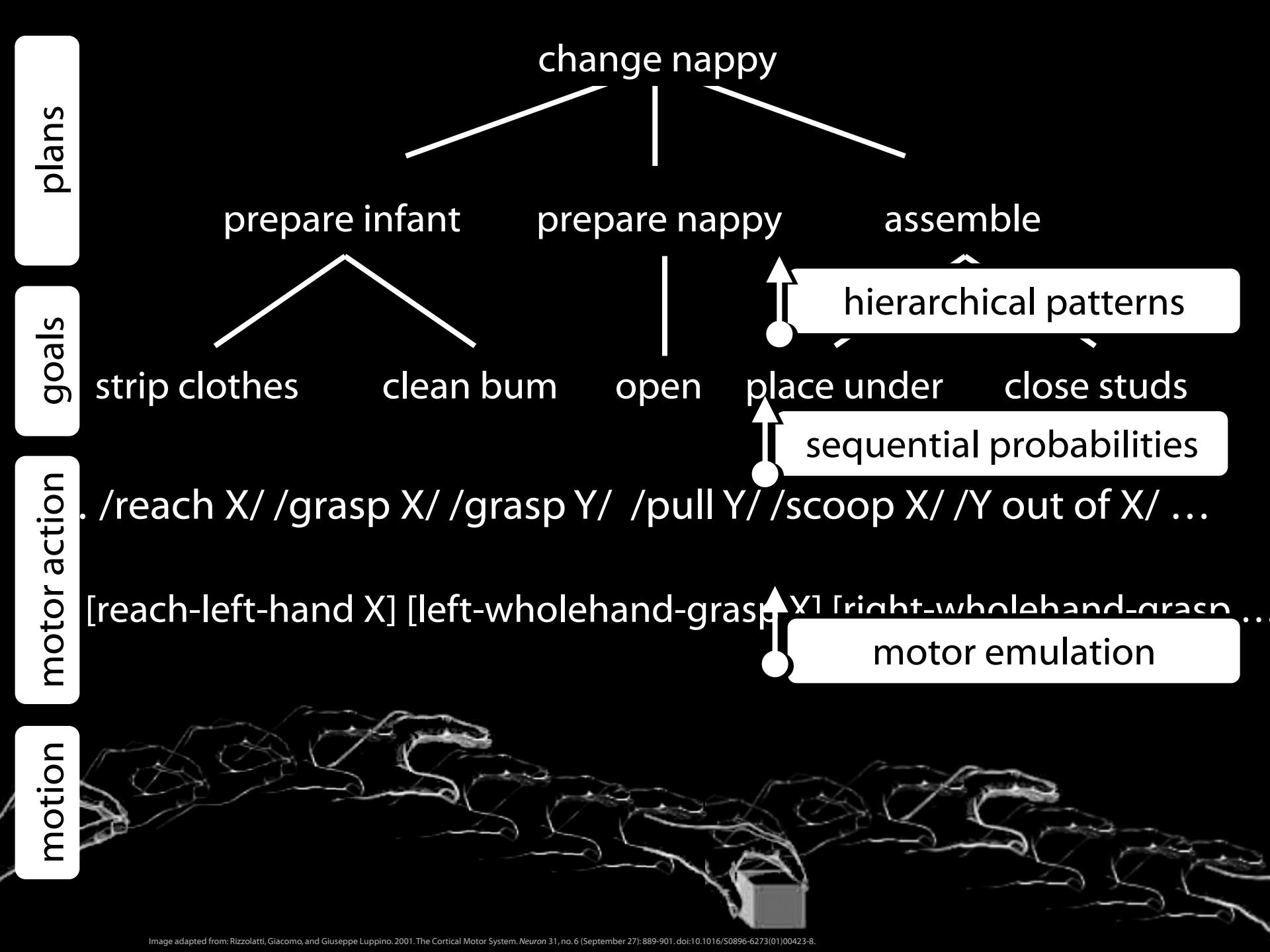
motor action

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motion





plans



goals

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object-directed actions

/reach X/ /grasp X/ /grasp Y/ /pull Y/ /scoop X/ /Y out of X/ ...

motor action

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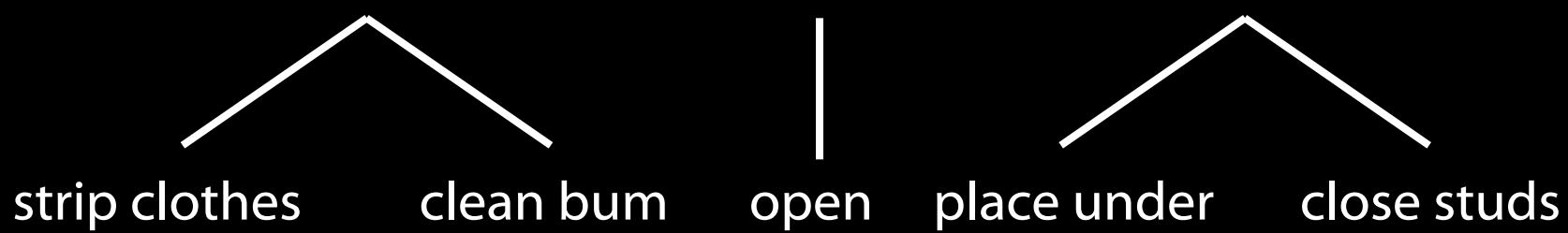
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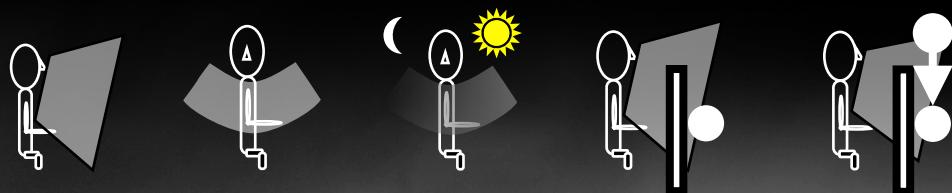




Your *field* = a set of
objects related to you by
proximity, orientation,
lighting and other factors



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proximity orientation lighting

barriers trajectory

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You *encounter* an object = it is in your field



proximity orientation

lighting

barriers

trajectory

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Principle 3: one can't goal-directedly act on an object unless one has encountered it.



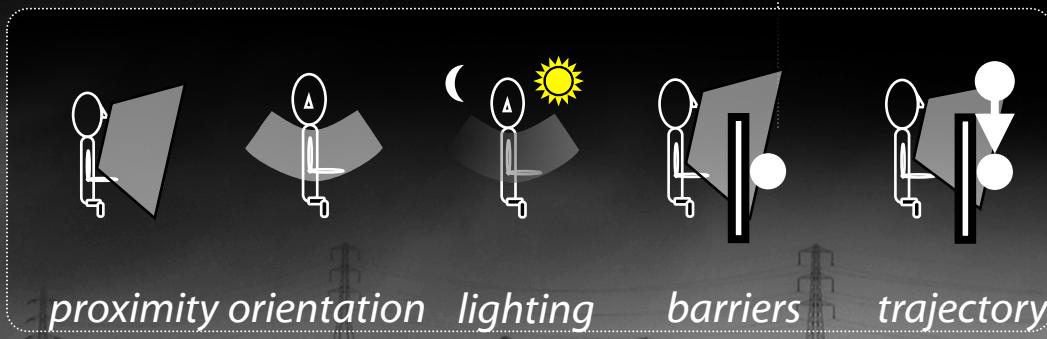
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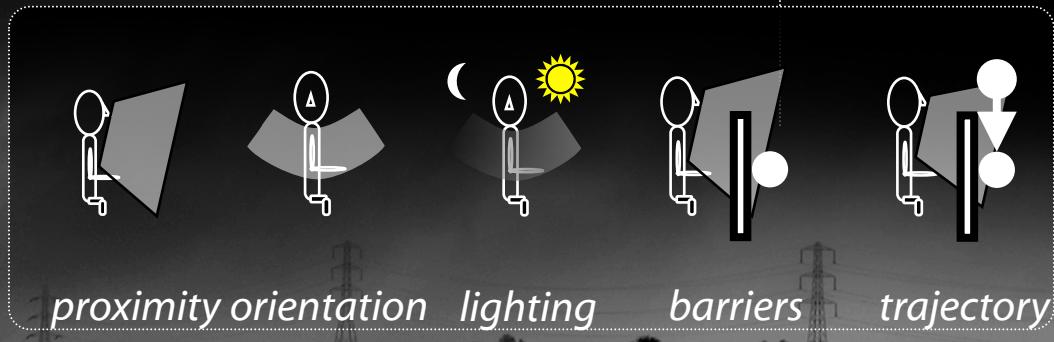


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“children could ... think about what the other person saw rather than what they saw”

(Flavell, Shipstead & Croft 1978: 1210)

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proximity orientation lighting

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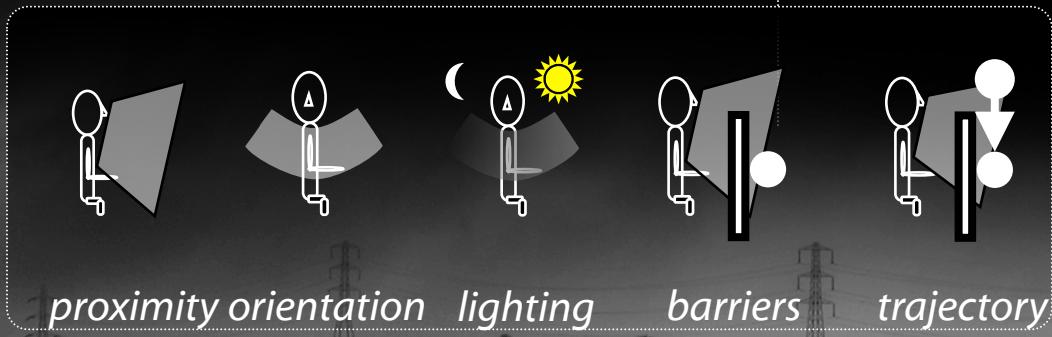
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proximity

orientation

lighting

barriers

trajectory





source: Liszkowski et al (2008)



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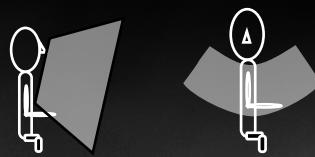


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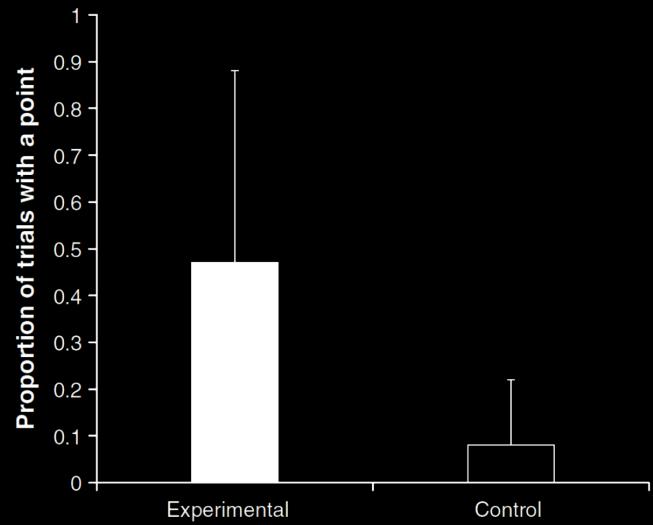
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“Helping by informing inextricably involves ... an understanding of others’ goals and ... of others’ ignorance.”

(Liszkowski, Carpenter & Tomasello 2008: 738-9)



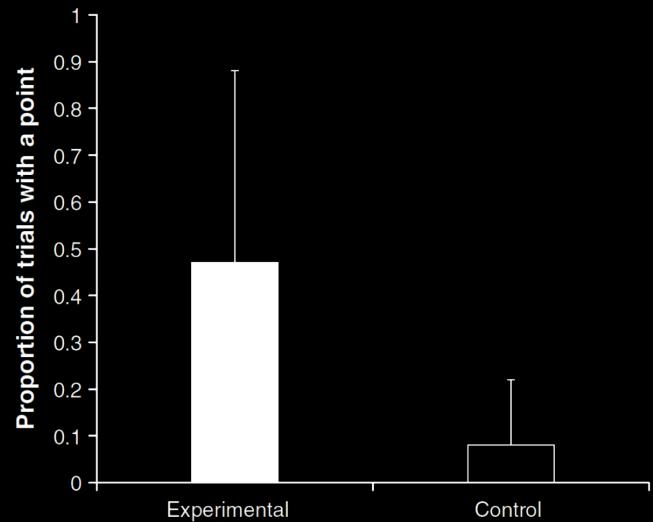
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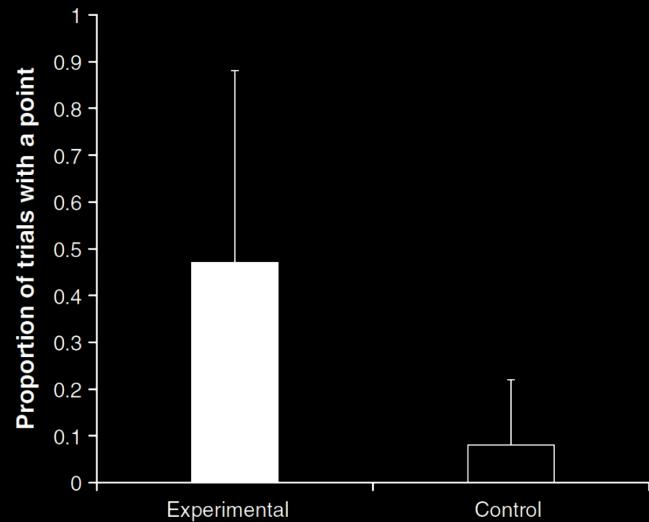
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Principle 5



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proximity



orientation



lighting



barriers



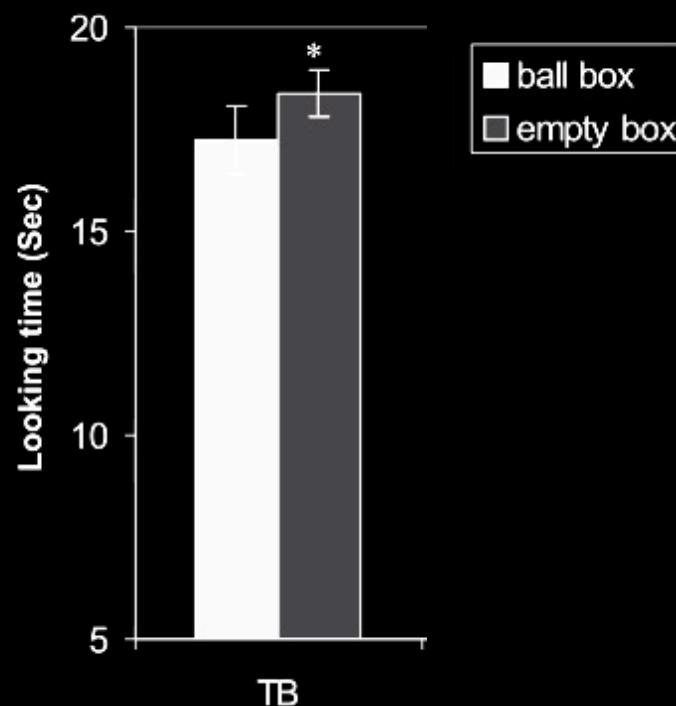
trajectory



source Träuble, Marinovic, & Pauen (2010)



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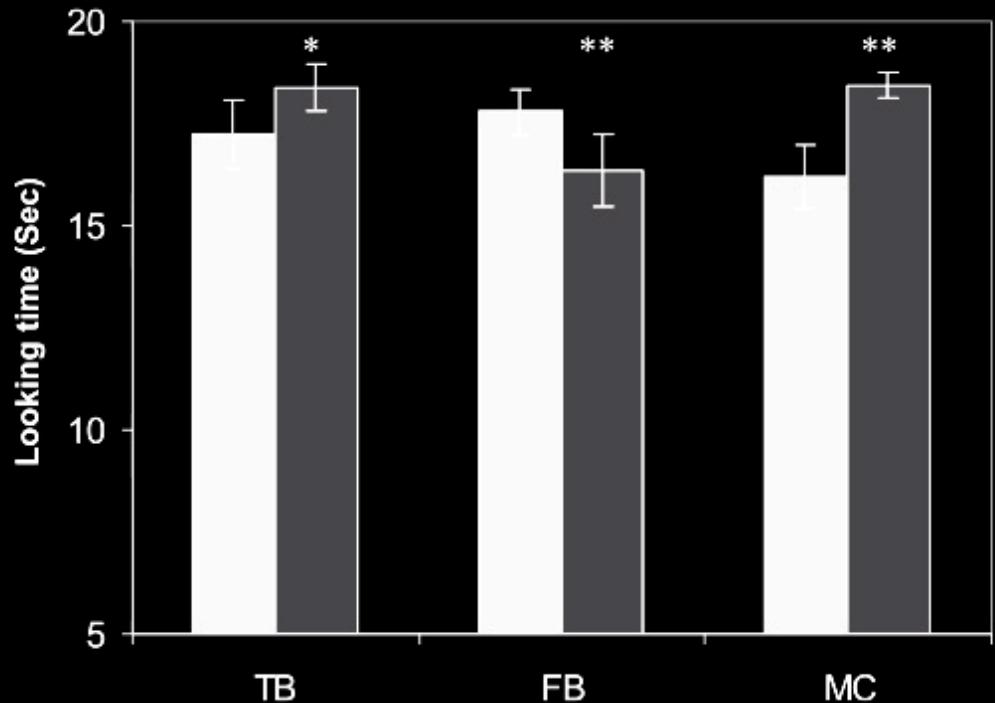
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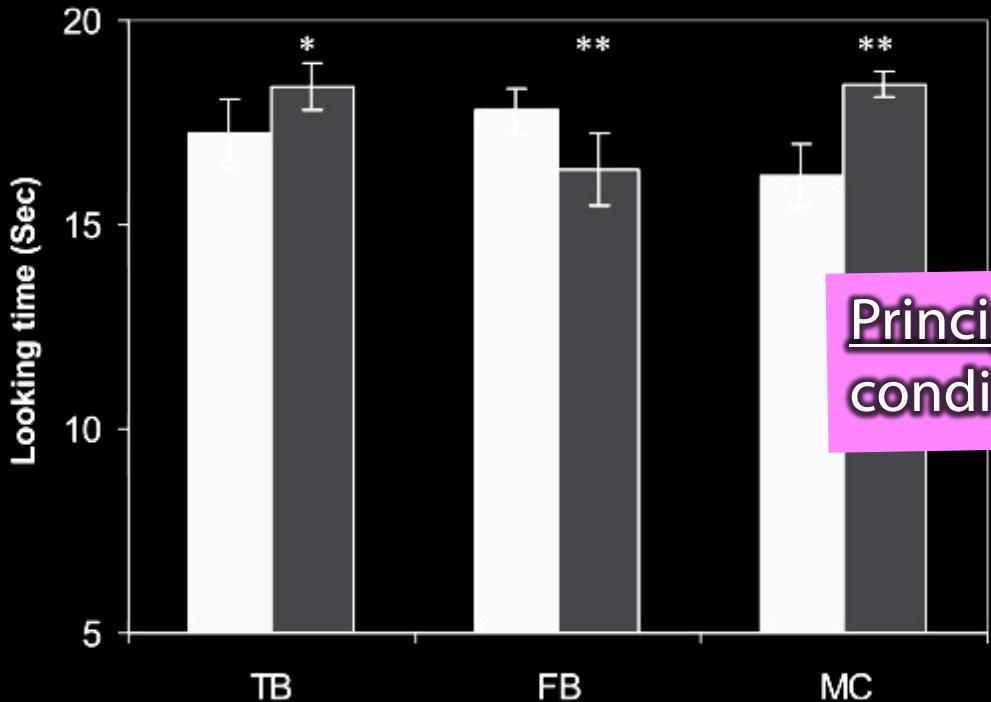
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Propositional attitudes ...

cause actions

resemble “intervening variables” linking environment to behaviour

have contents which may be true or false

have contents which may refer to non-existent entities

are involved in uncodifiably complex causal interactions

have contents which are individuated by senses, not only by referents

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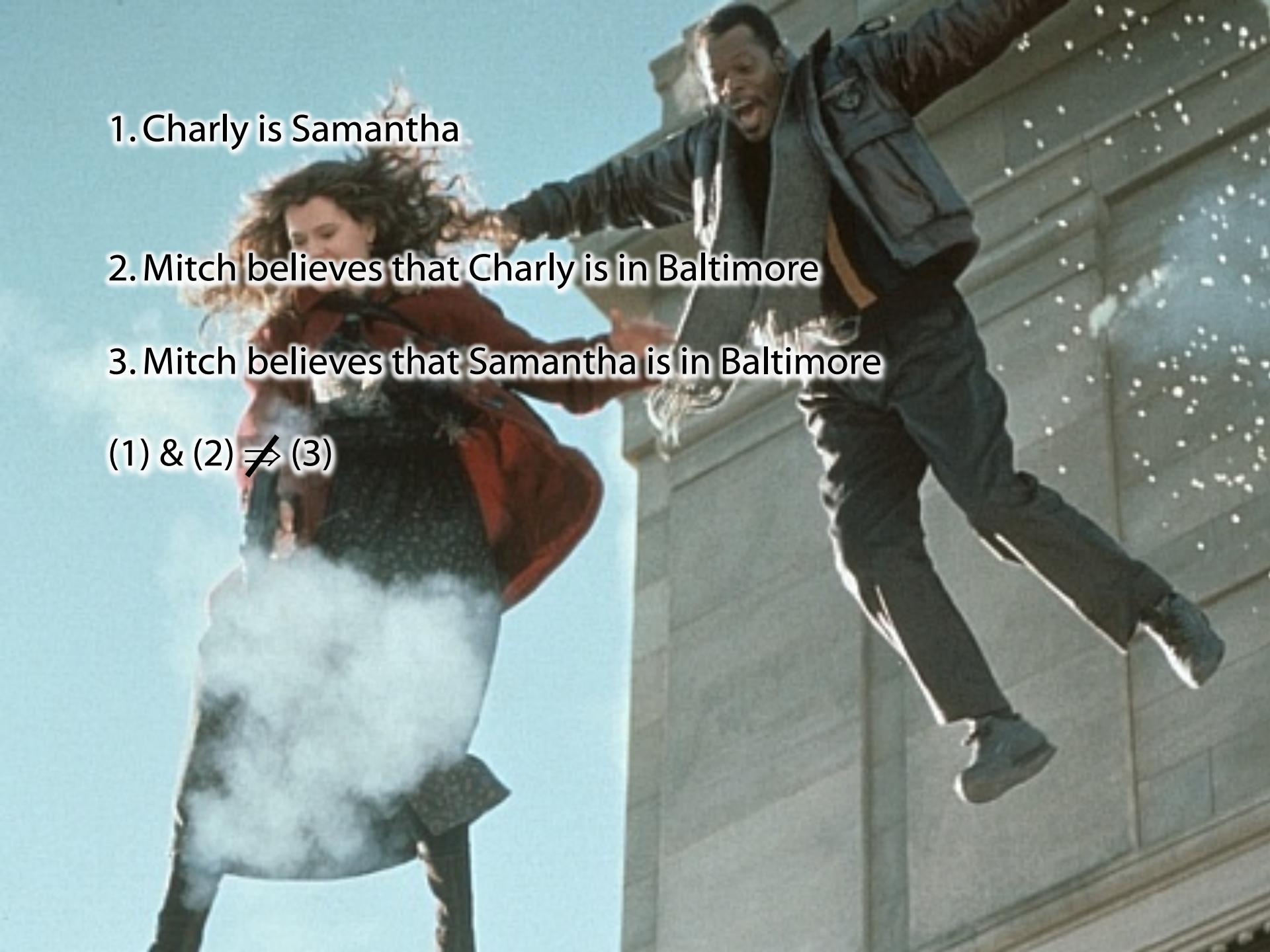
signature limits

1. Charly is Samantha

2. Mitch believes that Charly is in Baltimore

3. Mitch believes that Samantha is in Baltimore

(1) & (2) $\not\Rightarrow$ (3)



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 2. Mitch believes that Charly is in Baltimore
 3. Mitch believes that Samantha is in Baltimore
- (1) & (2) $\not\Rightarrow$ (3)
4. Mitch registers <Charly, Baltimore>
 5. Mitch registers <Samantha, Baltimore>
- (1) & (4) \Rightarrow (5)

Subjects represent
registration

pass

fail

Subjects represent
beliefs

pass

pass

False belief
about location

False belief
about identity











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registration

pass

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joint action (ability
to share goals)

minimal theory of
mind cognition

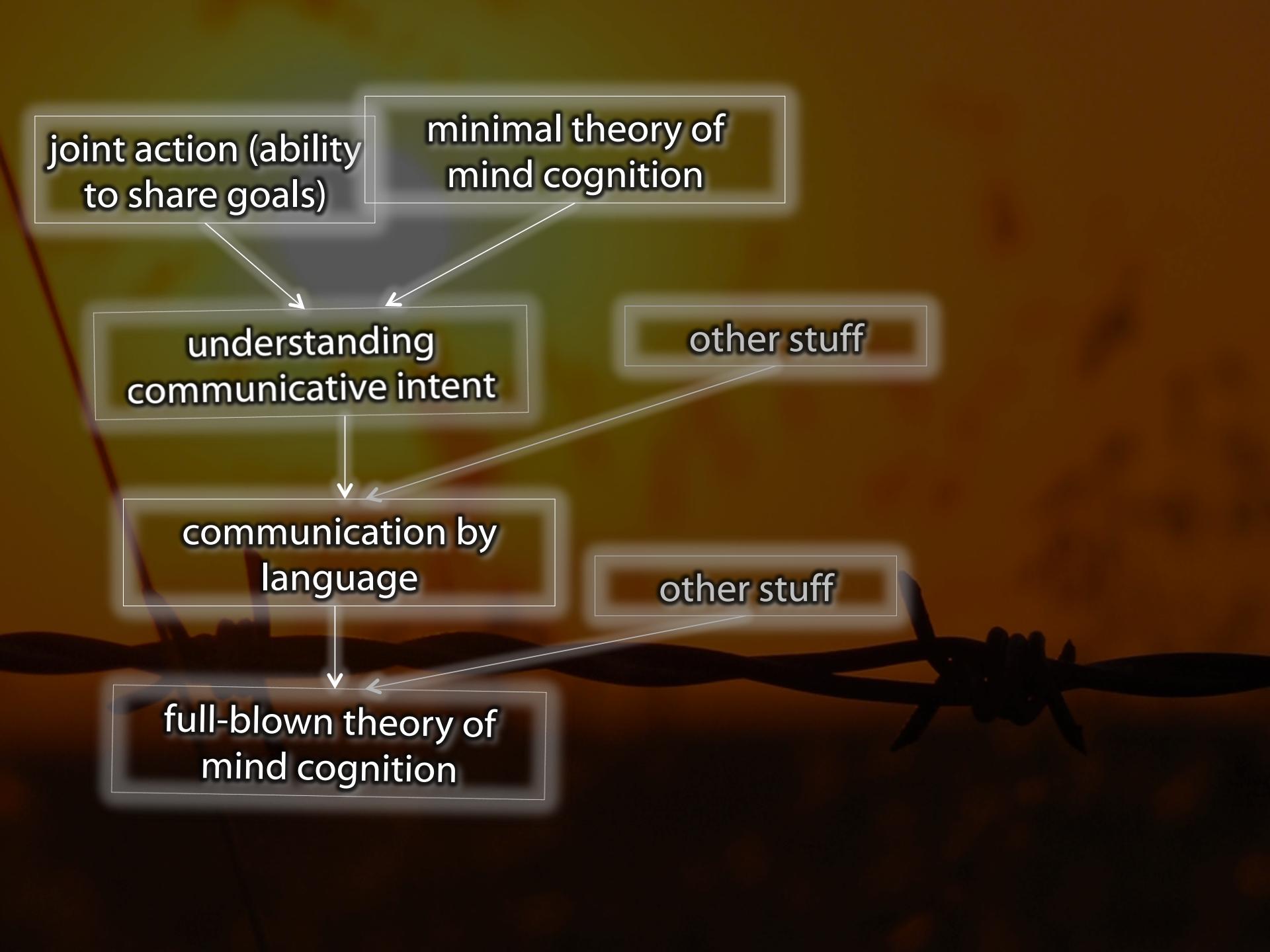
understanding
communicative intent

other stuff

communication by
language

other stuff

full-blown theory of
mind cognition





"We ... use the acronym ToM, to refer to any cognitive system, whether theory-like or not, that predicts or explains the behaviour of another agent by postulating that unobservable inner states particular to the cognitive perspective of that agent causally modulate that agent's behaviour."

(Penn & Povinelli 2007:732)

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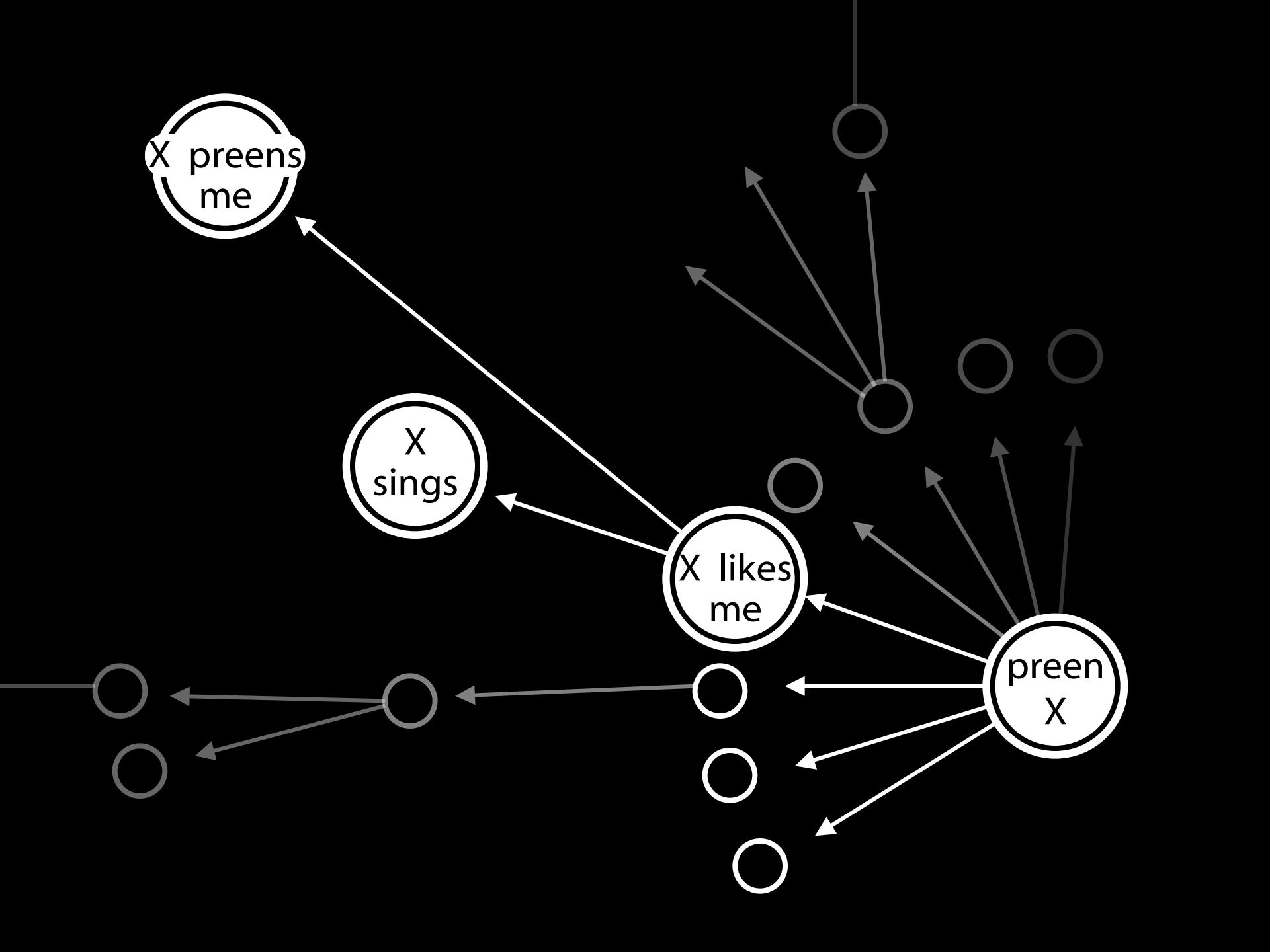
(Penn & Povinelli 2007:732)

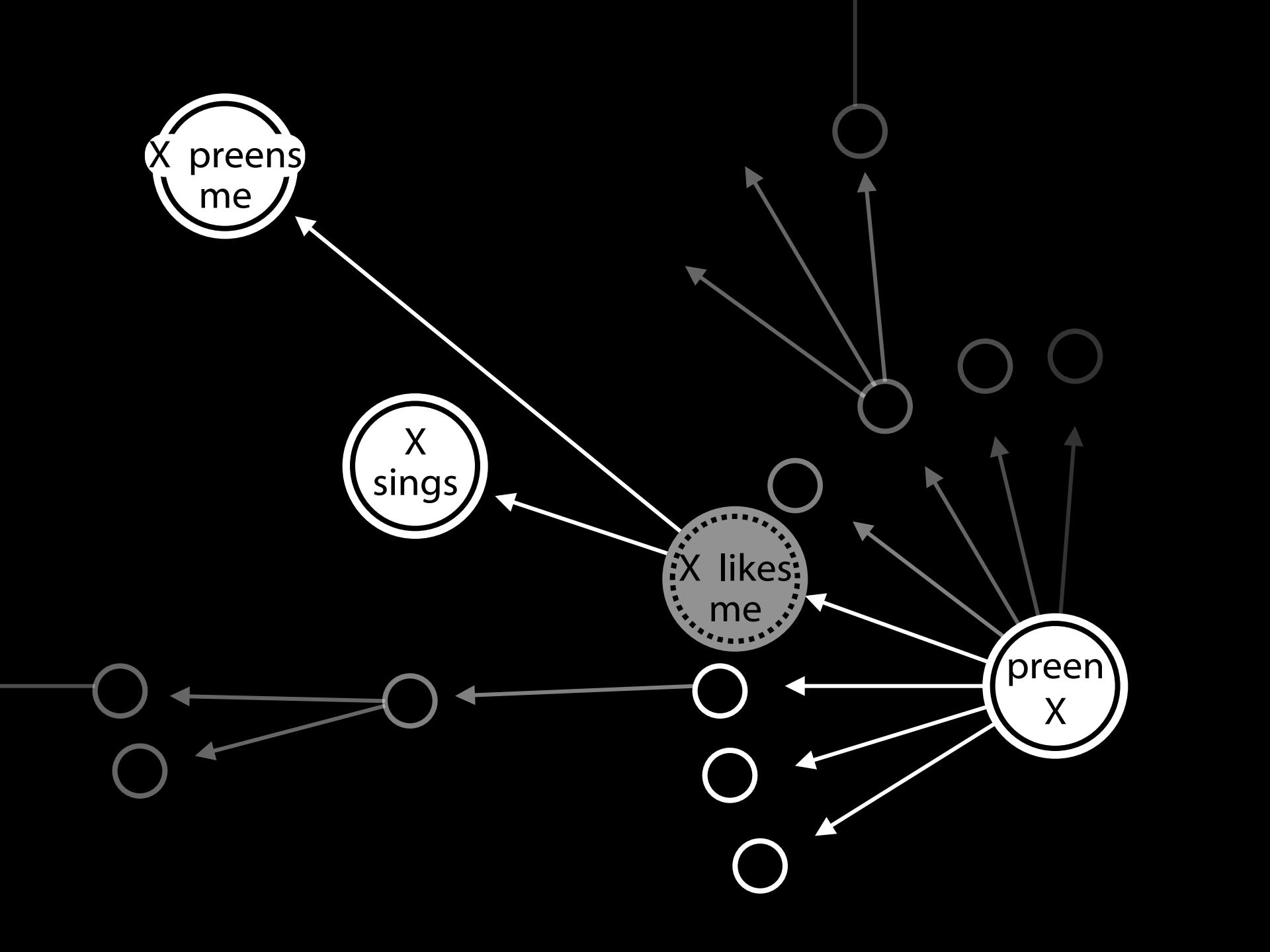
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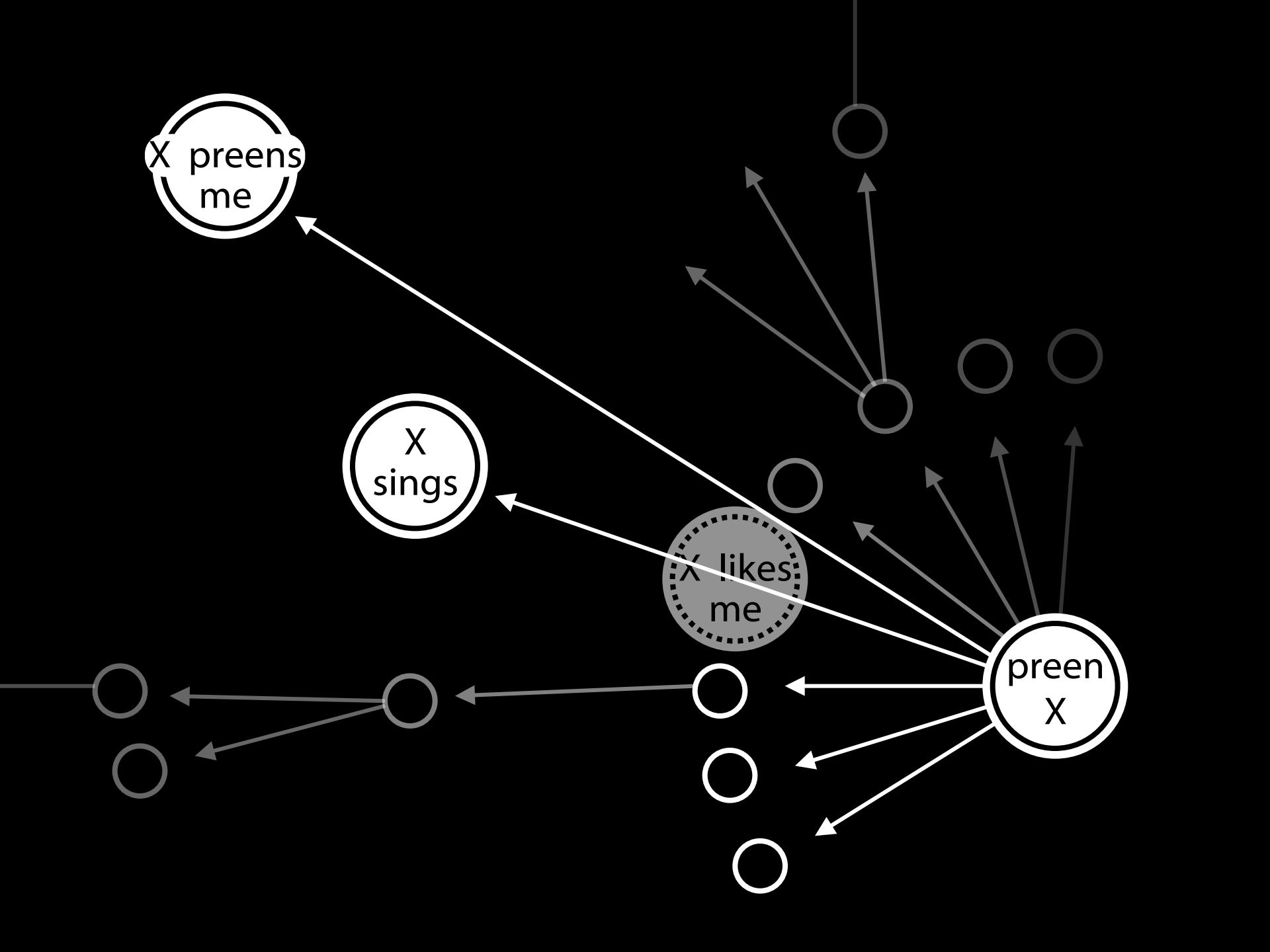
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“chimpanzees understand ... intentions ... perception and knowledge ... Moreover, they understand how these psychological states work together to produce intentional action”

(Call & Tomasello 2008:191)



“our fundamental understanding of [...] knowledge is that it is something whose possession by an individual can properly be explained by reference to [...] ways of coming to know.”

(Cassam “What is Knowledge?”, forthcoming)

