

# 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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# conjecture

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

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

(Call & Tomasello 2008:191)



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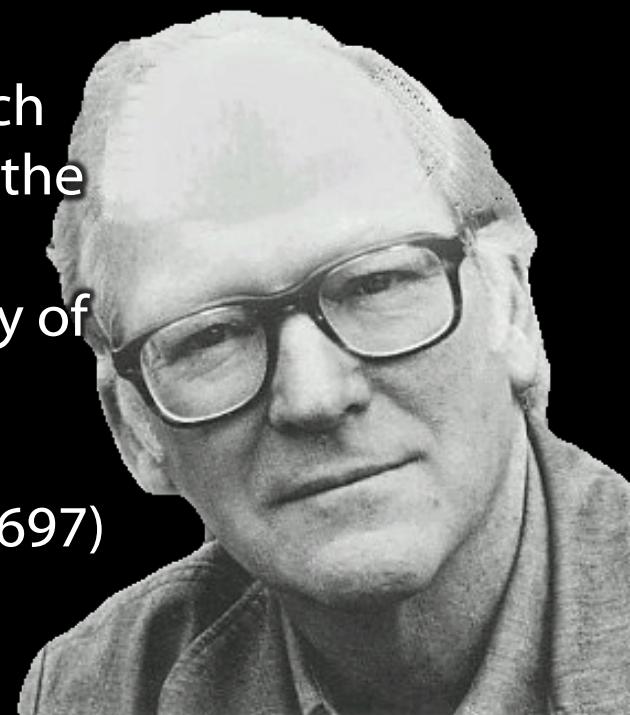
“our [typical adult humans’ ] fundamental conception of what it is to know that P is itself an explanatory conception [...] we think of S’s knowledge that P as something that can properly be explained by reference to what S has perceived or remembered or proved or ...”

(Cassam 2007:356)



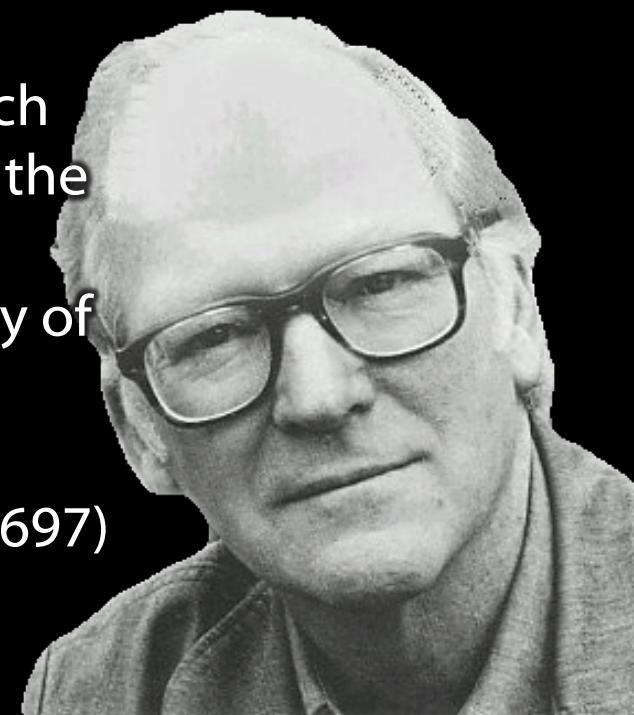
“We are stuck with our two main ways of describing and explaining things, one which treats objects and events as mindless, and the other which treats objects and events as having propositional attitudes. I see no way of bridging the gap by introducing an intermediate vocabulary.”

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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

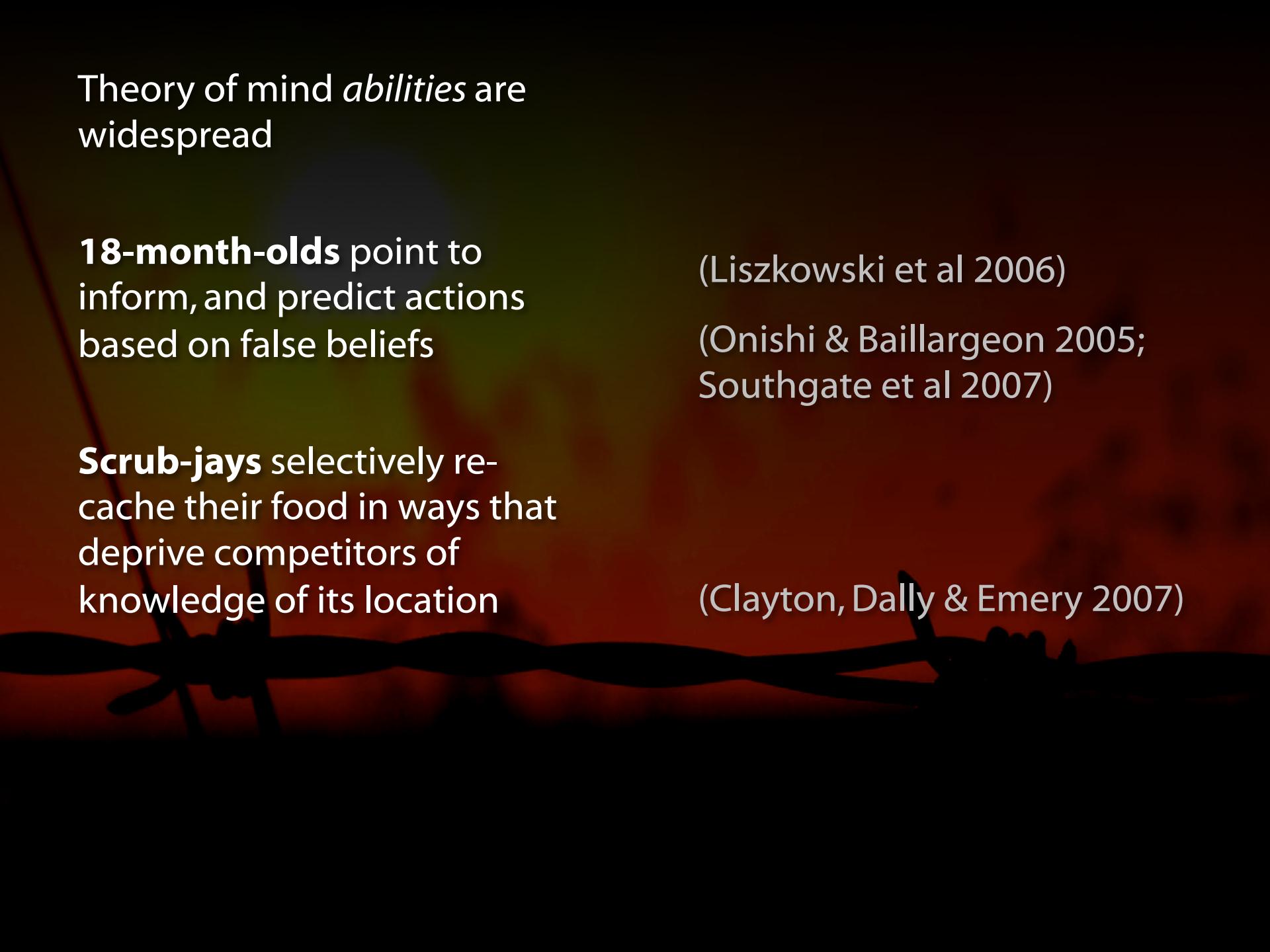


Theory of mind *abilities* are widespread

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

(Liszkowski et al 2006)

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(b) scarce cognitive resources

- attention
- working memory

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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

are associated with normative requirements

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# puzzle

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 about the world?





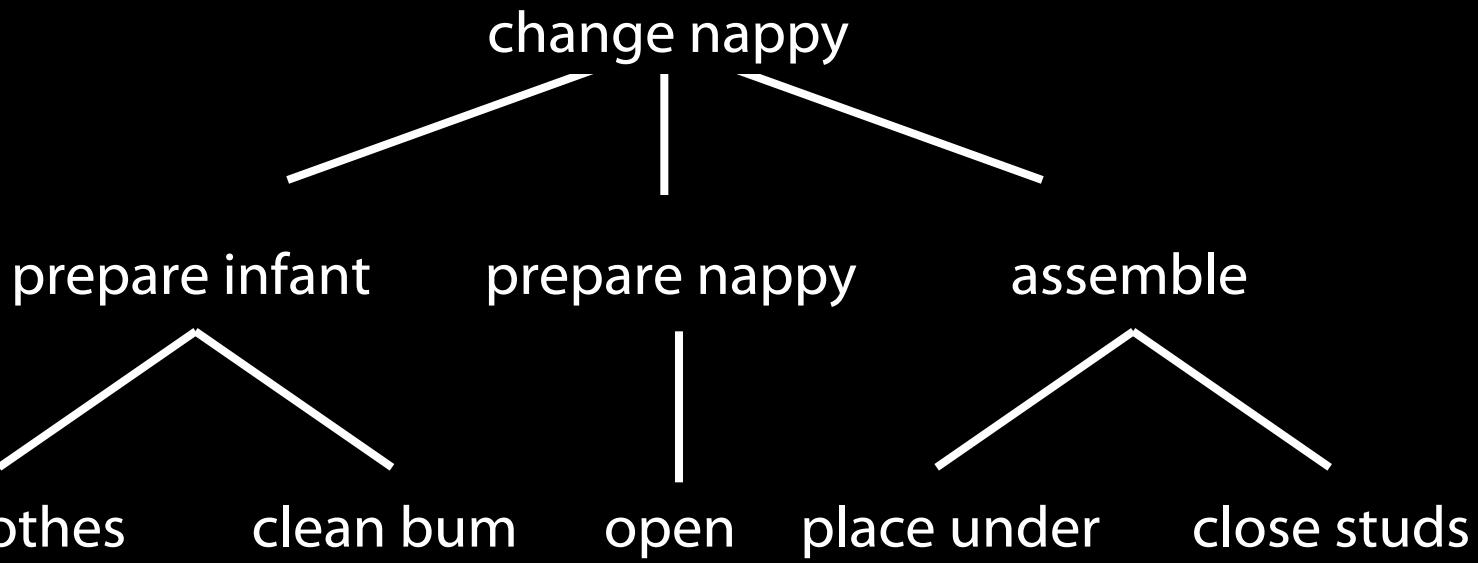


change nappy

plans

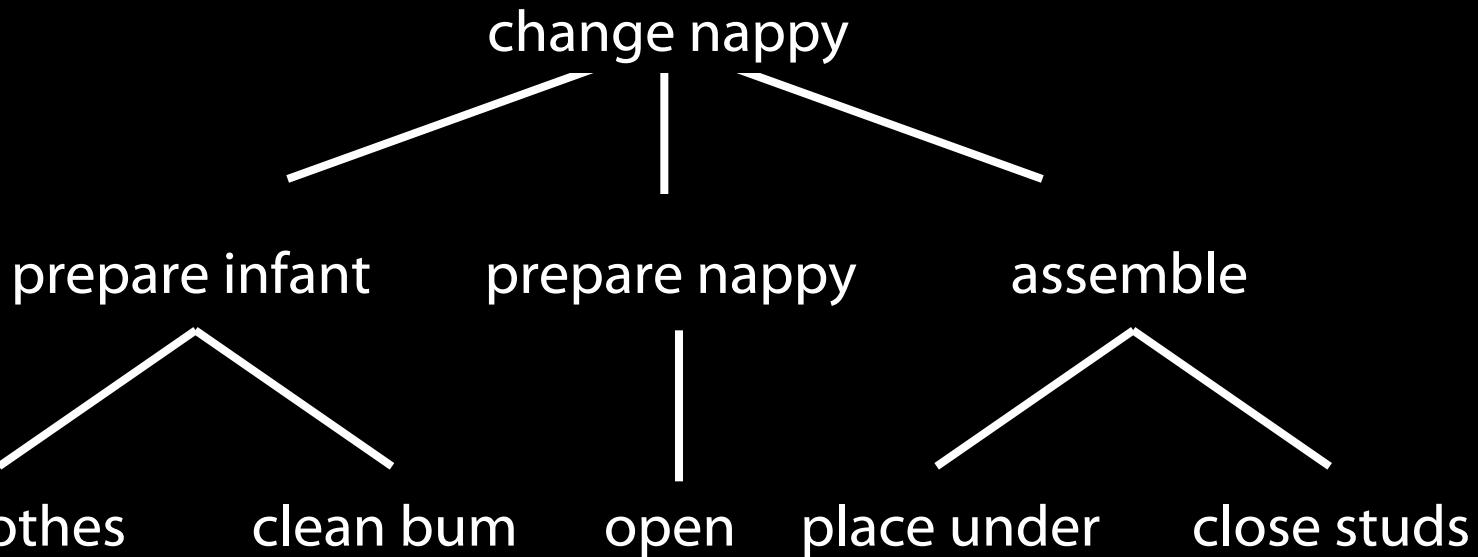


plans



goals

plans

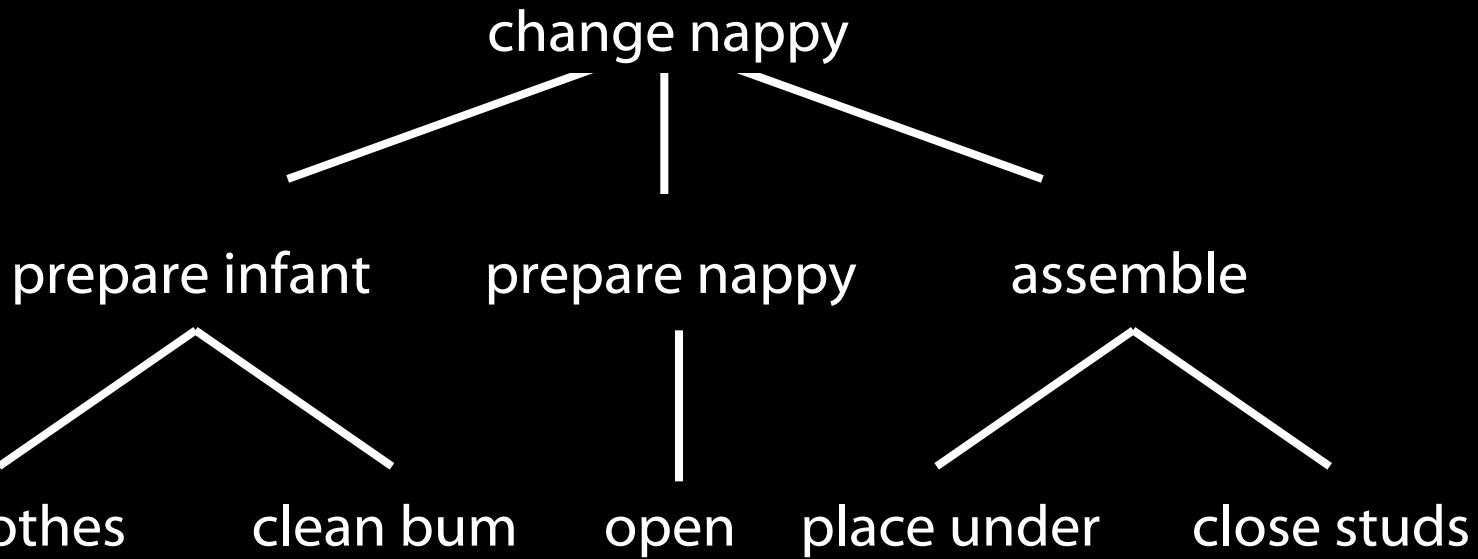


goals

motor action

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

plans



goals

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

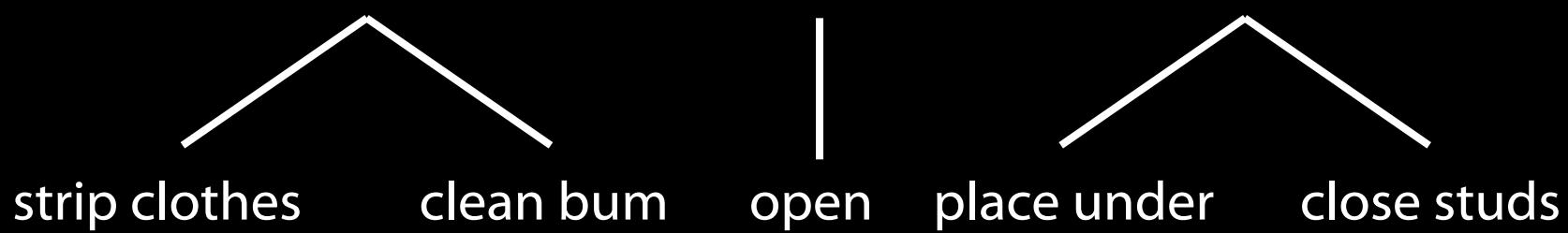
[reach-left-hand X] [left-wholehand-grasp X] [right-wholehand-grasp ...]

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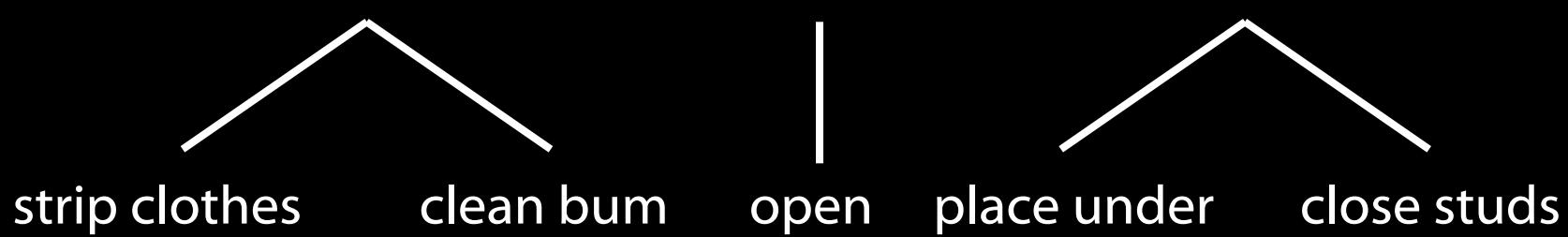
motion



plans



goals



motor action

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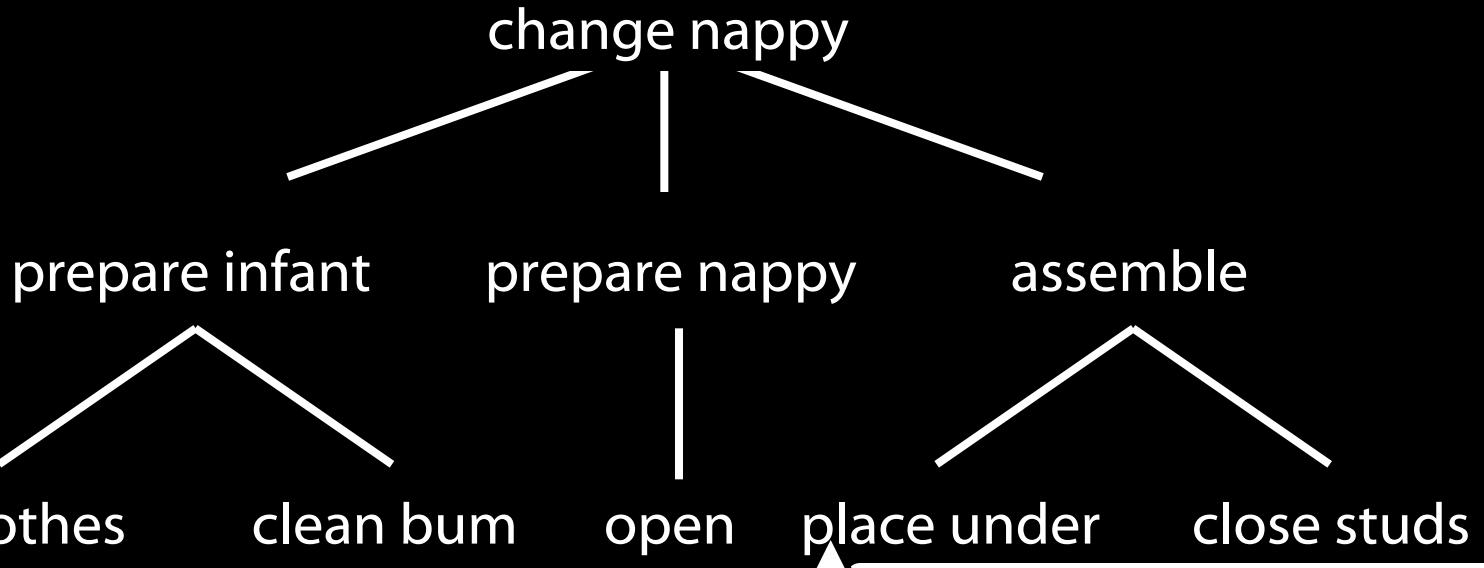
[reach-left-hand X] [left-wholehand-grasp X1] [right-wholehand-grasp ...]

motor emulation

motion



plans



goals

strip clothes      clean bum      open      place under      close studs

motor action

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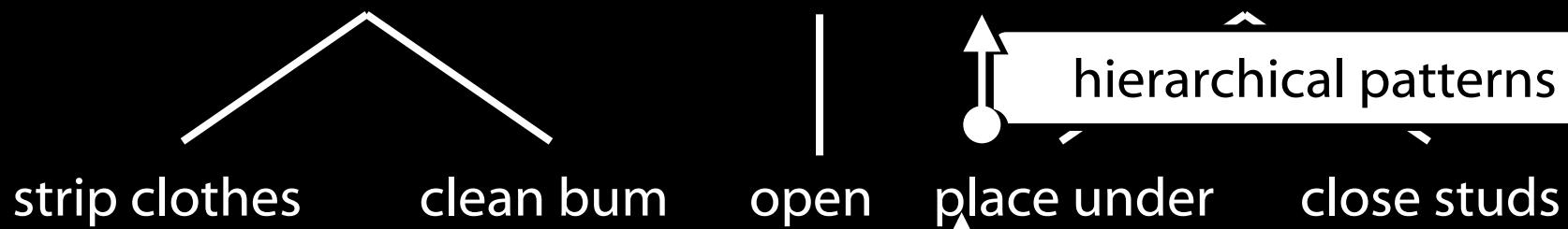
motion



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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

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

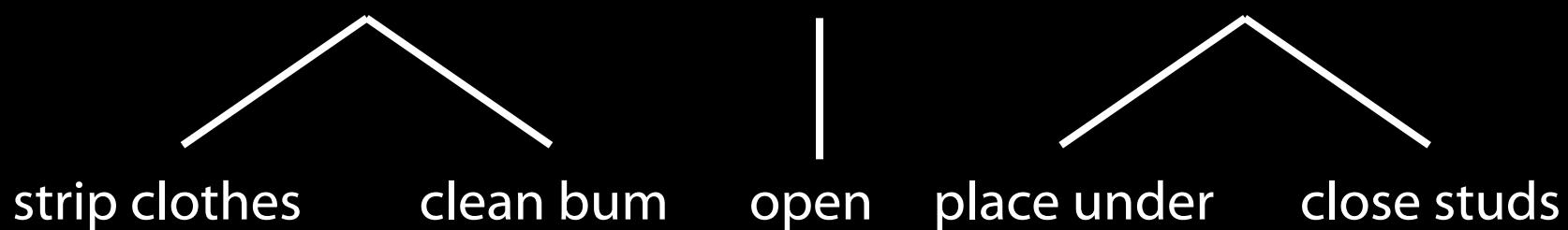
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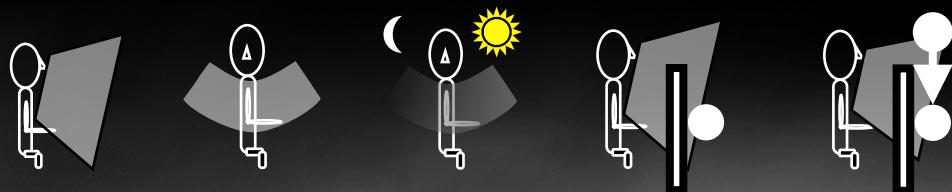




Your *field* = a set of  
objects related to you by  
proximity, orientation,  
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*proximity orientation*

*lighting*

*barriers*

*trajectory*

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



*proximity* *orientation*

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Detour  
Goals are not intentions

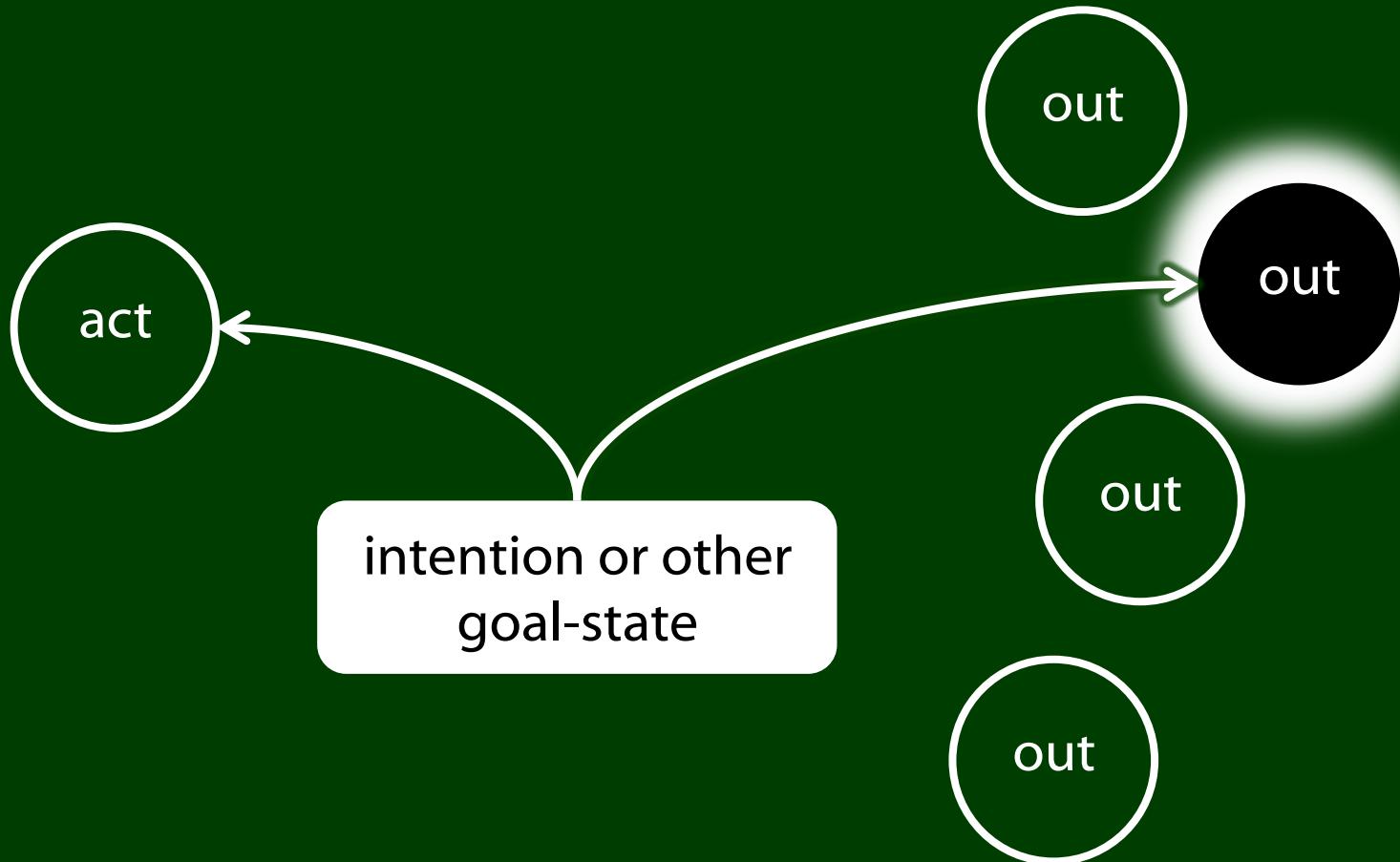
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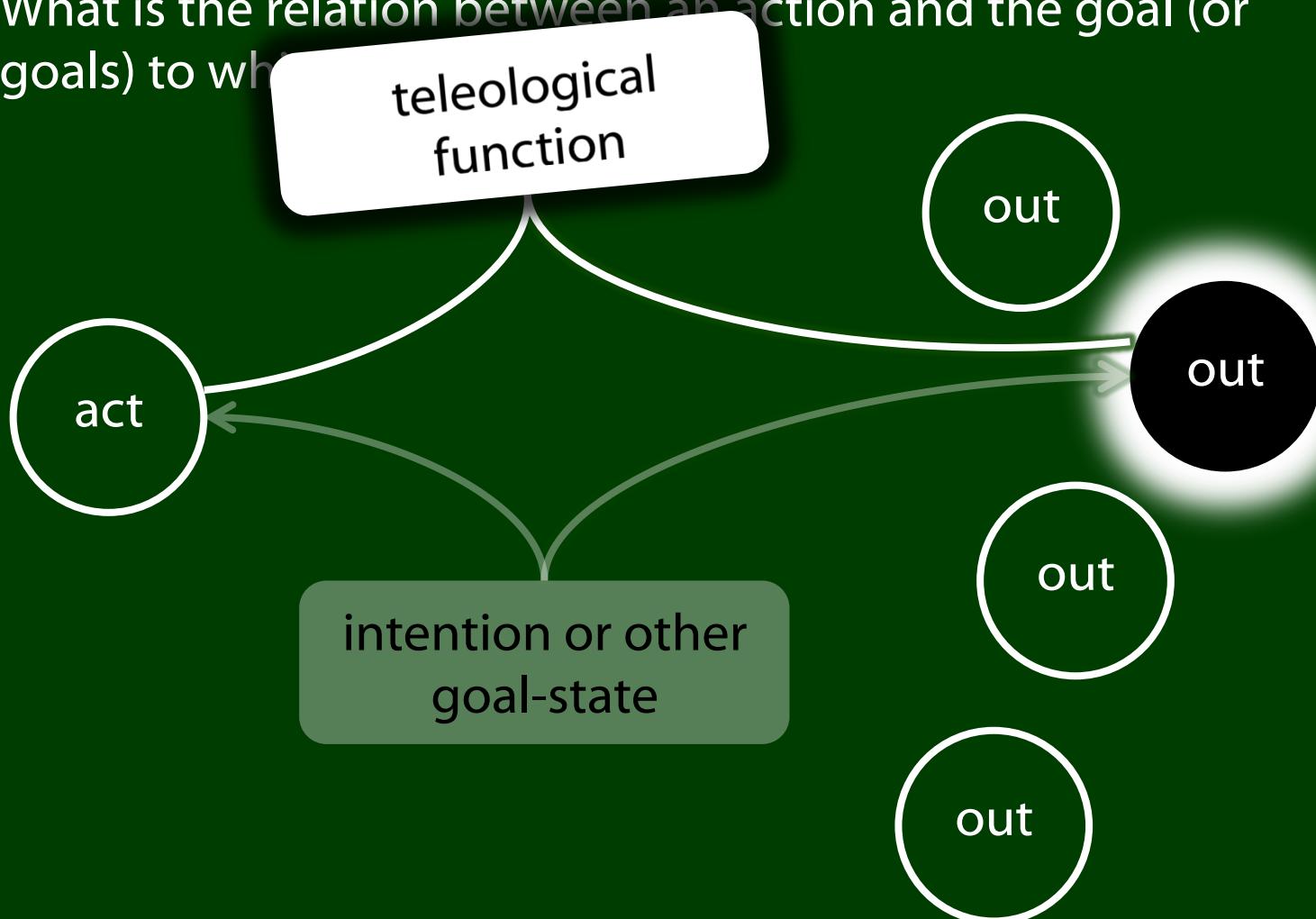
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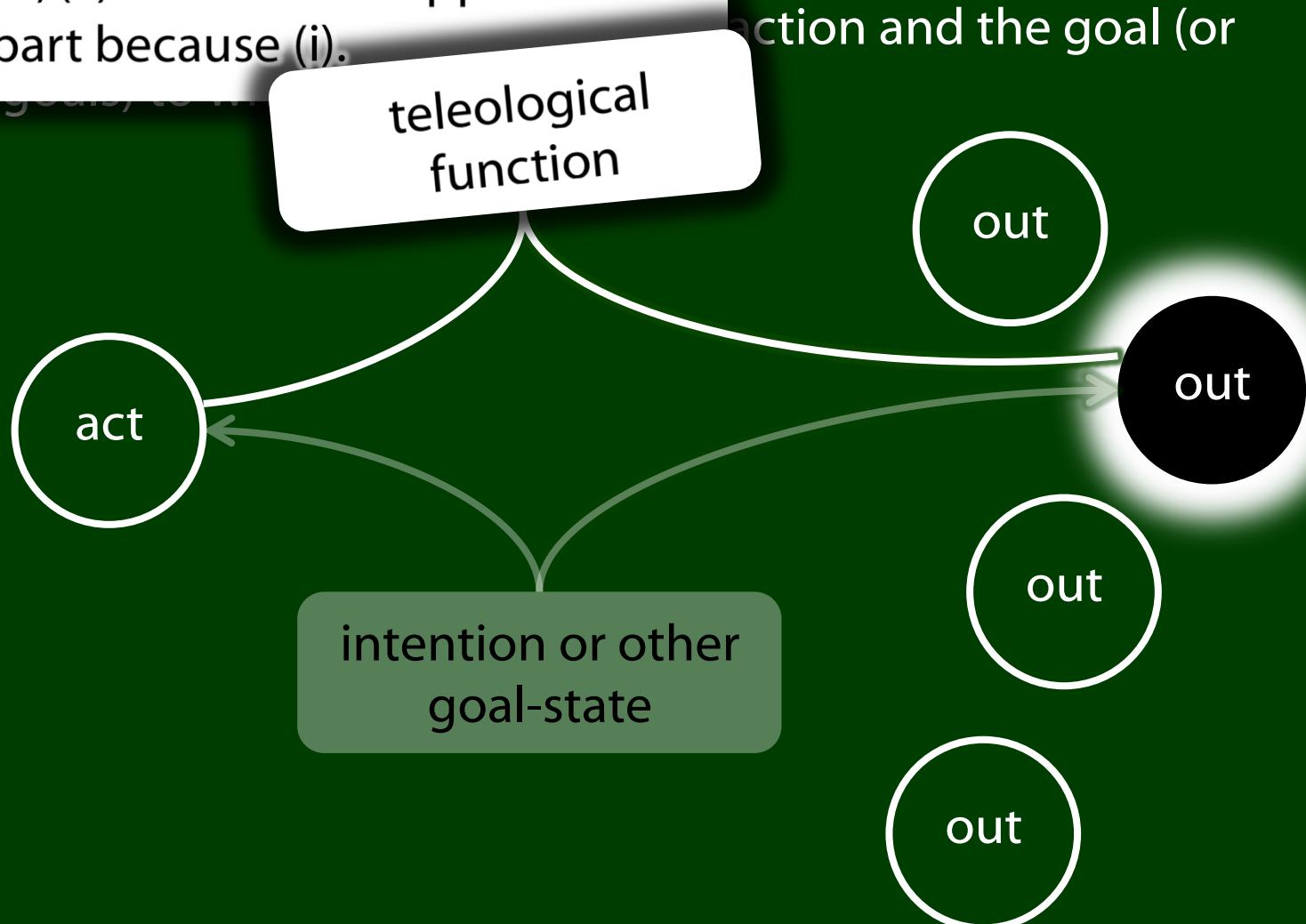
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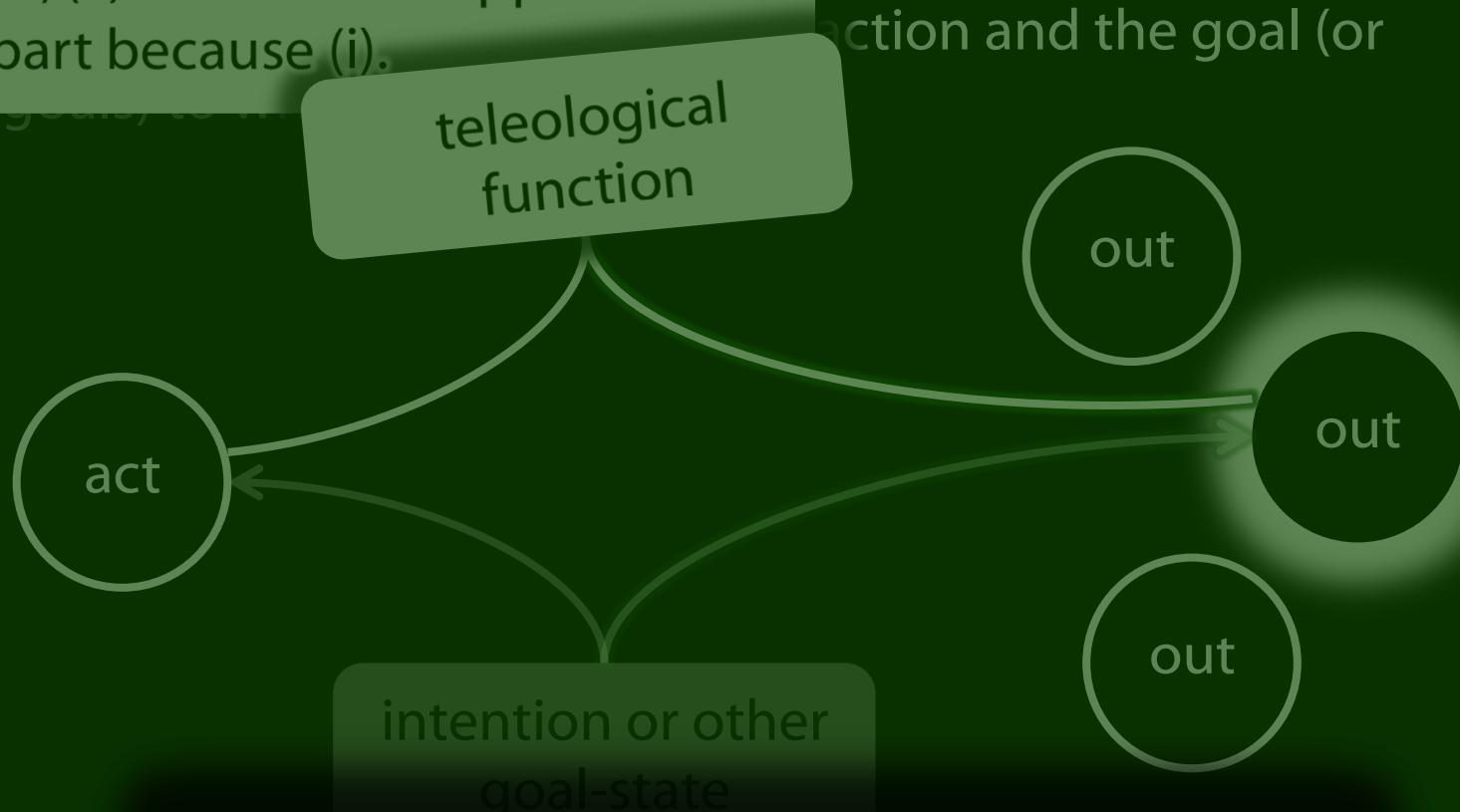
What is the relation between an action and the goal (or goals) to which it is related?



(i) in the past, actions of this type have caused outcomes of this type; (ii) this action happens now in part because (i).



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It is possible to represent goal-directed actions without representing intentions.

End Detour

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*proximity orientation lighting*

*barriers trajectory*

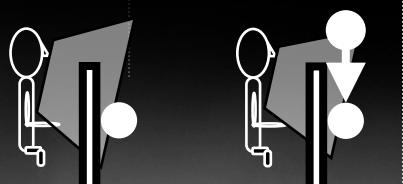
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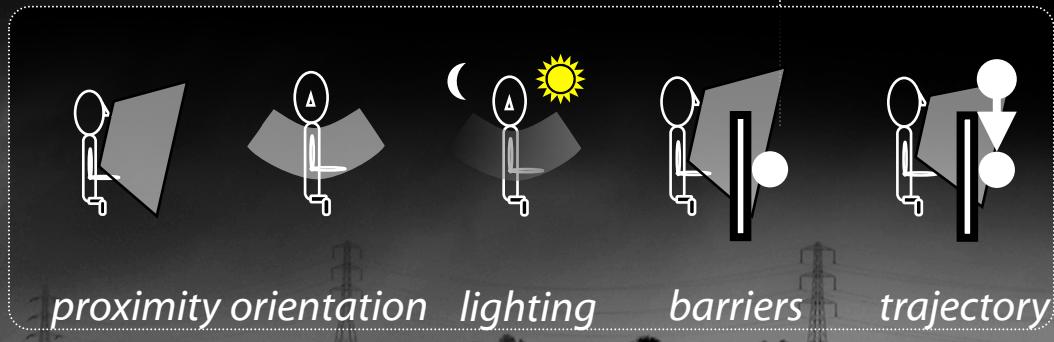
barriers trajectory

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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

barriers

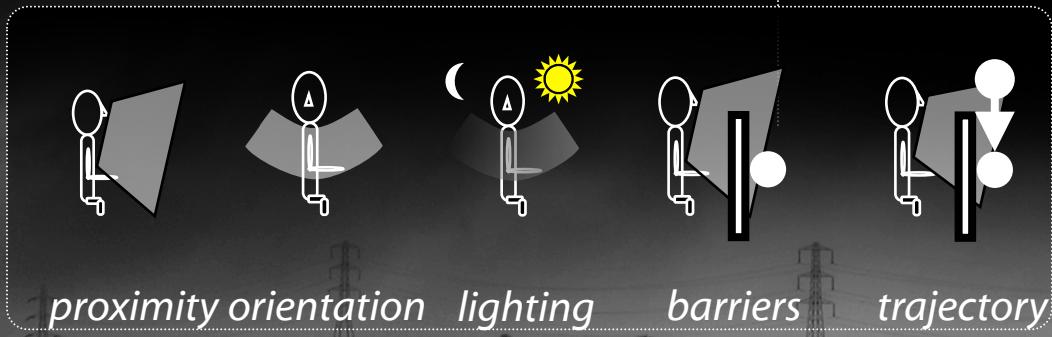
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*orientation*

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Principle 4: correct registration is a condition of *successful* action.



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source: Liszkowski et al (2008)



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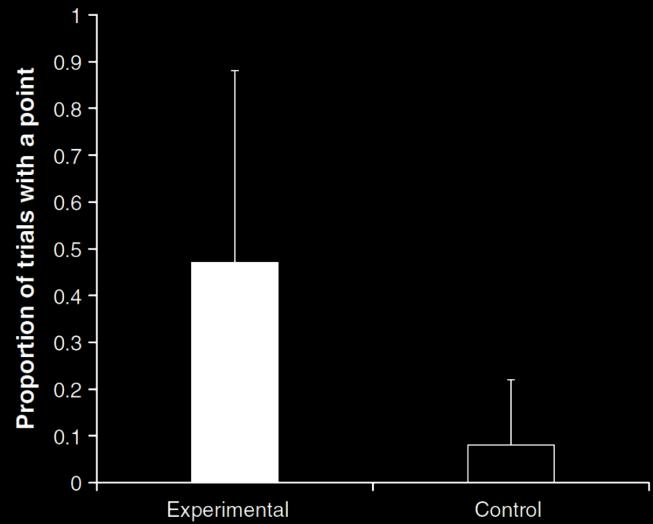
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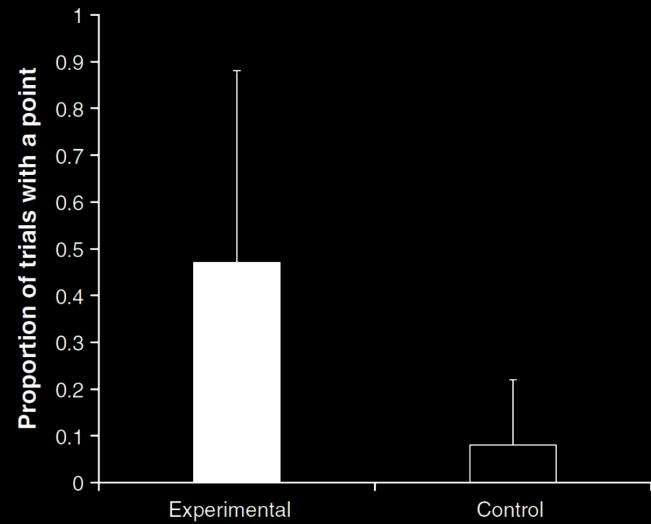
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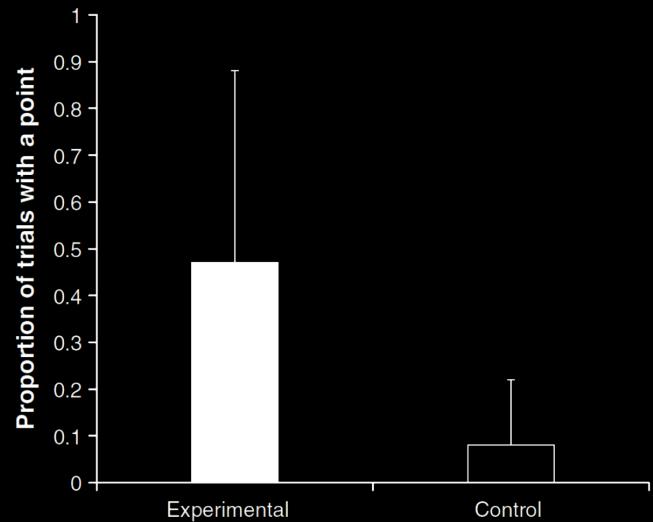
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proximity



orientation



lighting



barriers



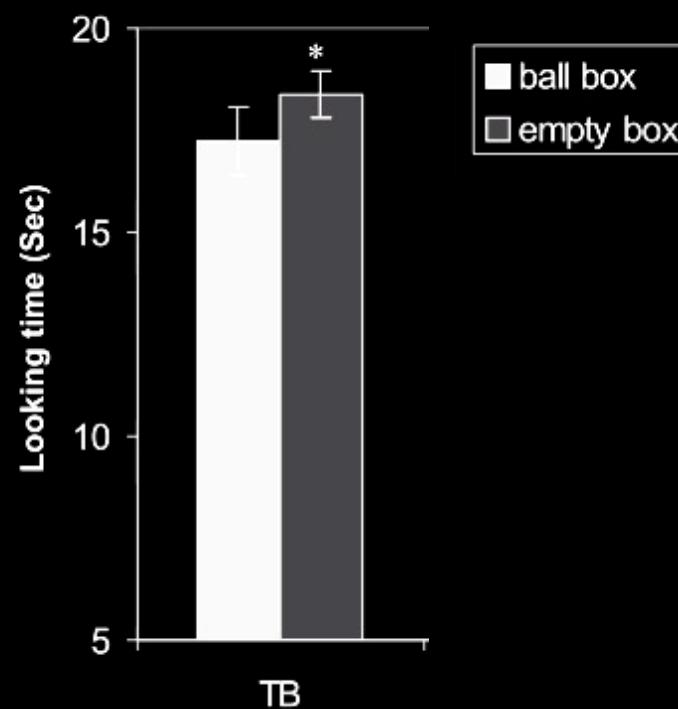
trajectory



*source* Träuble, Marinovic, & Pauen (2010)



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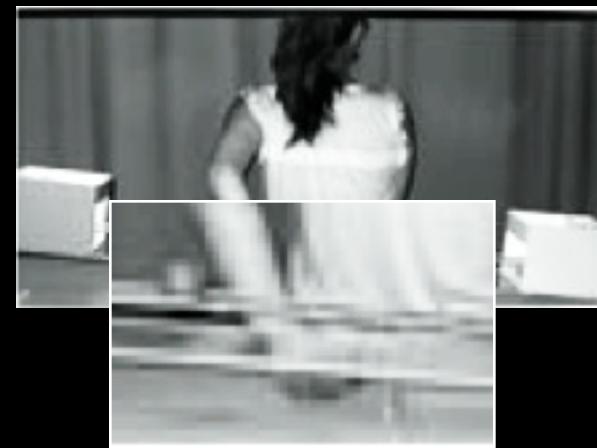
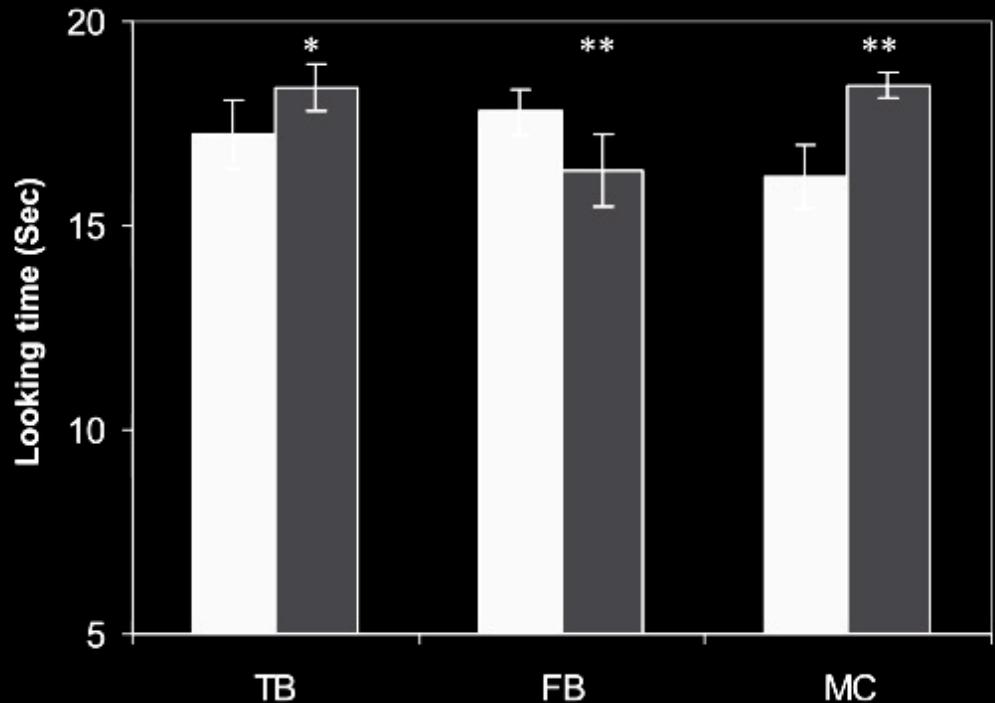
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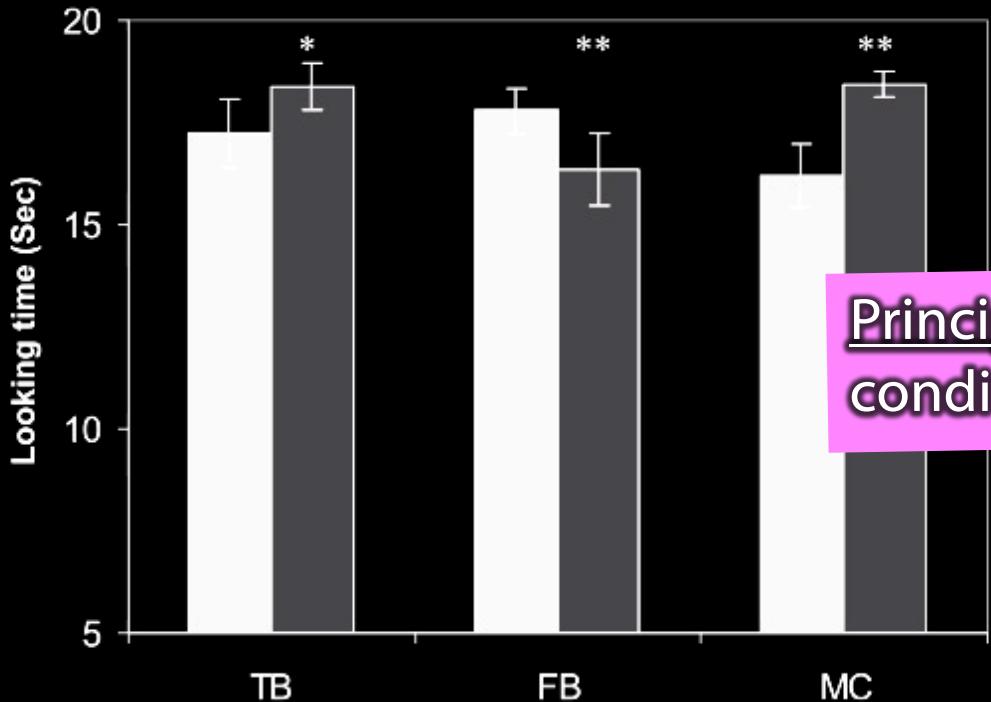
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barriers



trajectory



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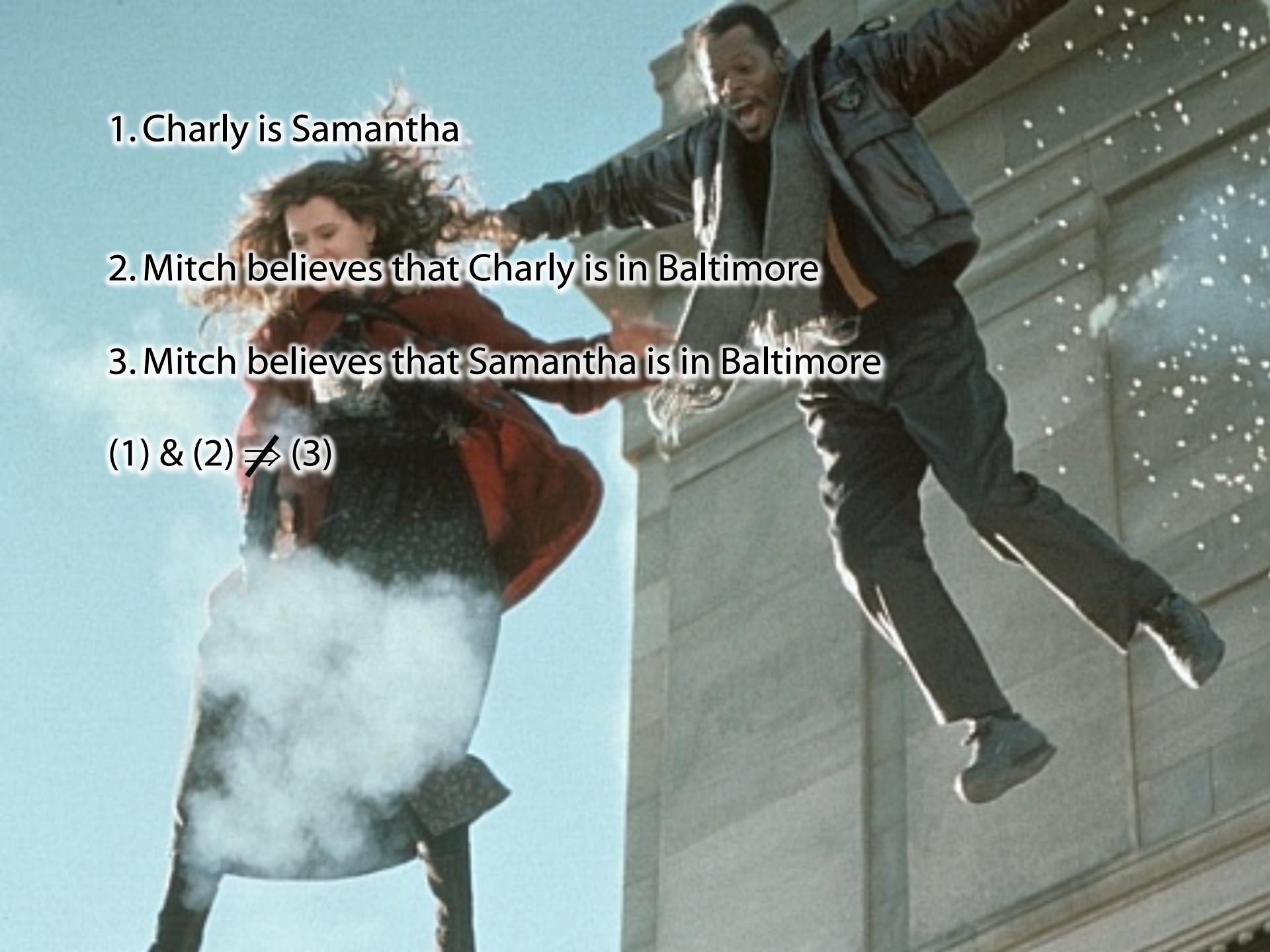
signature limits

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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- (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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# challenge

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

# puzzle

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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joint action (ability  
to share goals)

minimal theory of  
mind cognition

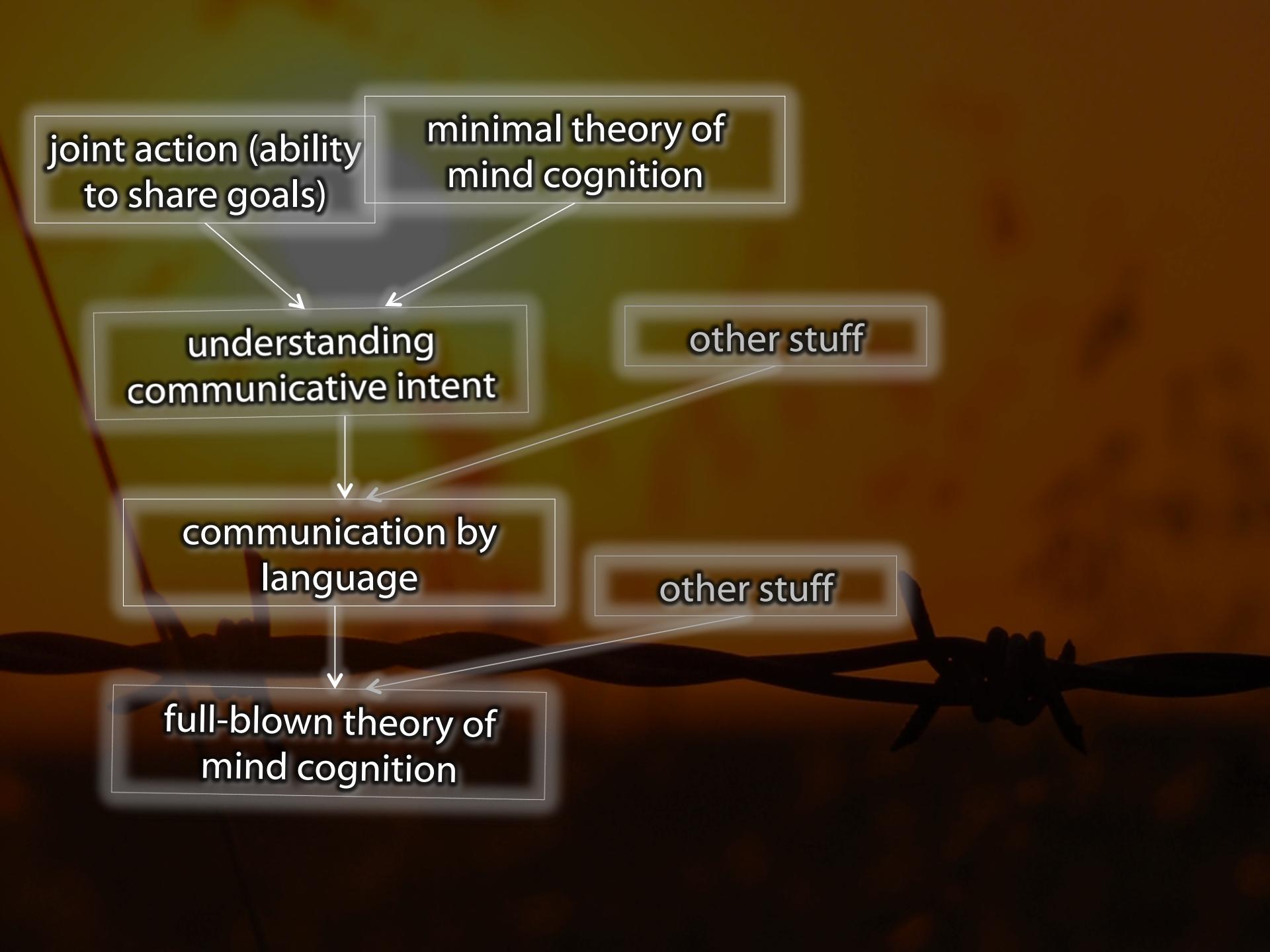
understanding  
communicative intent

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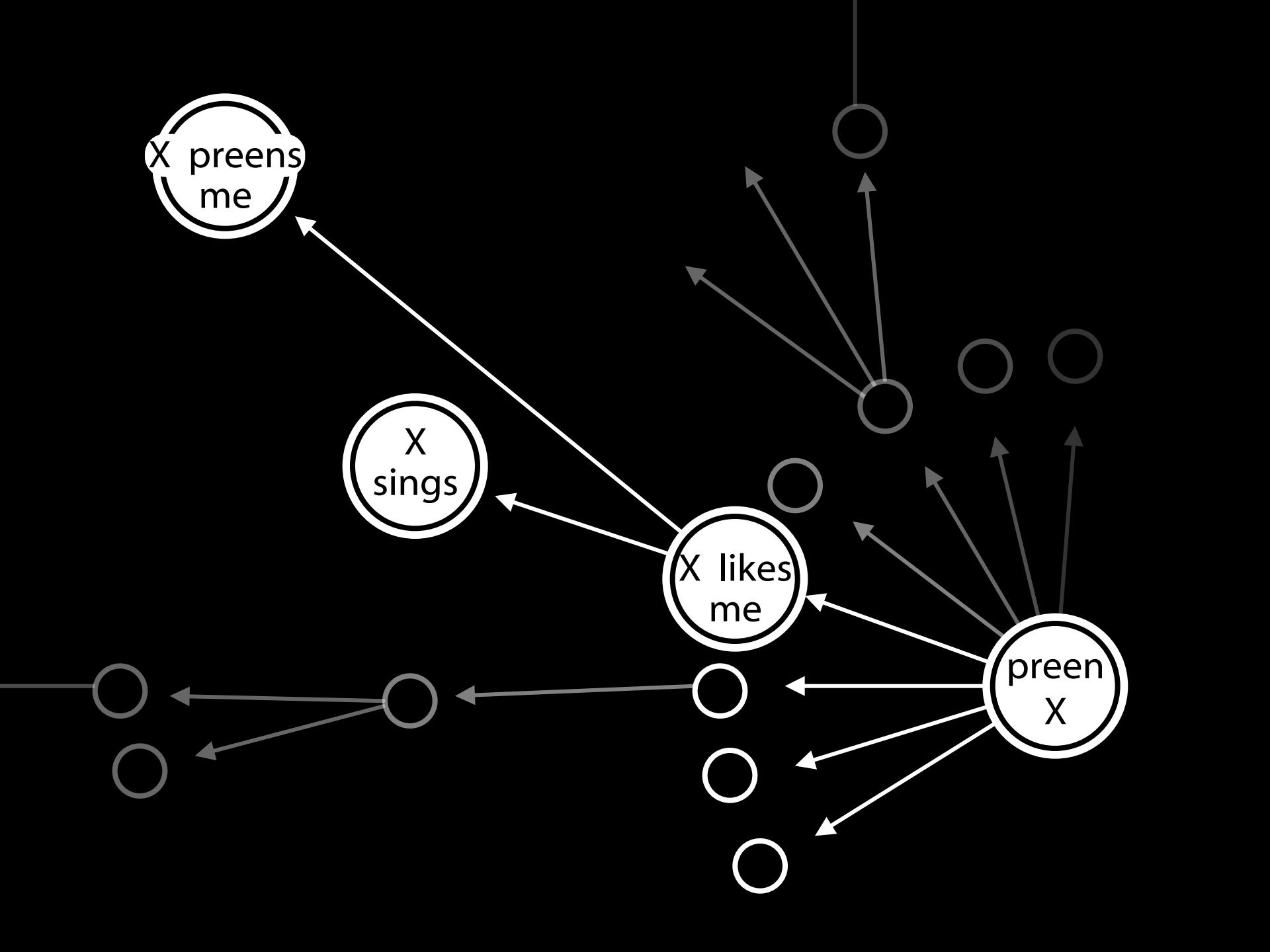
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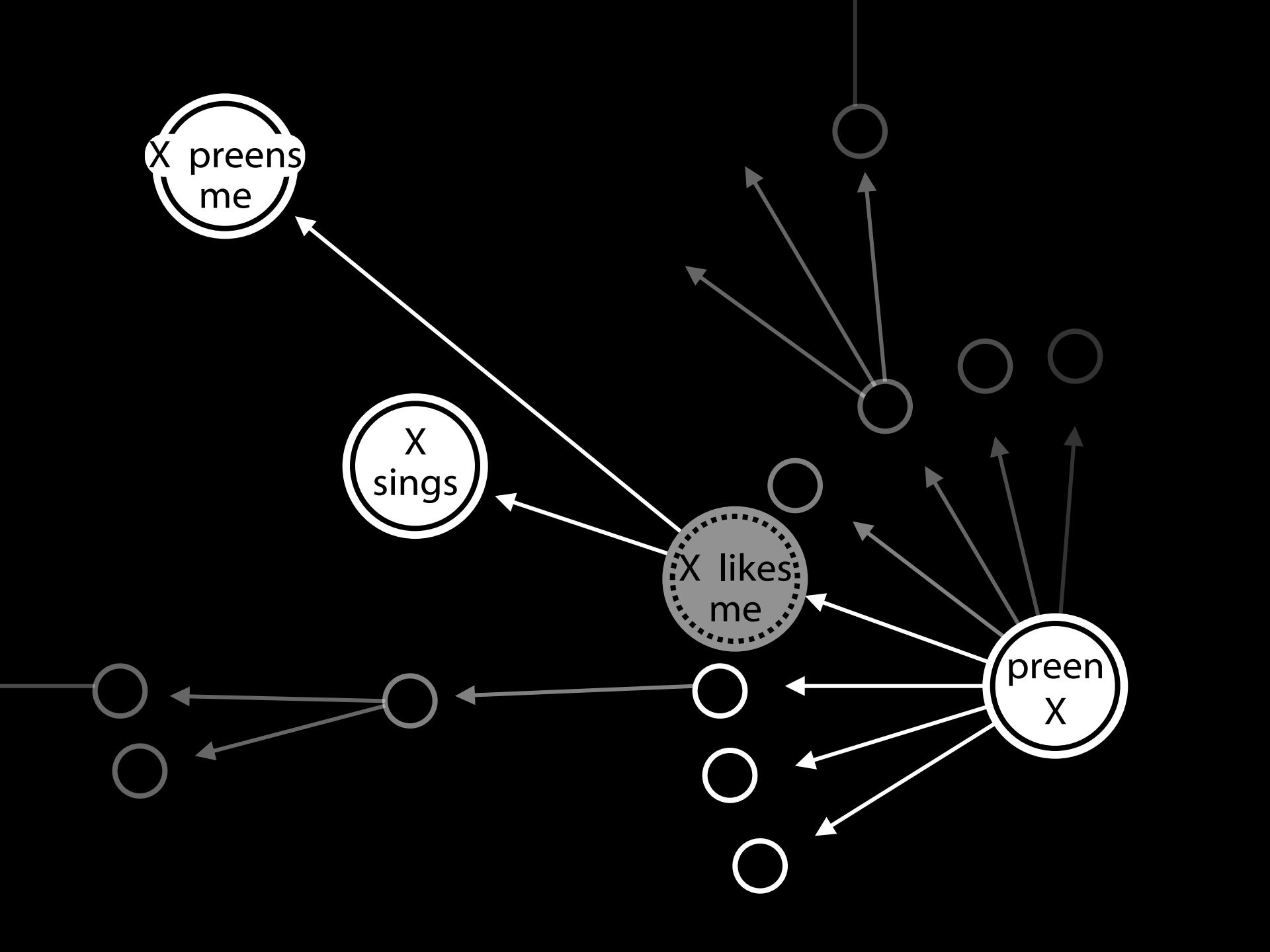
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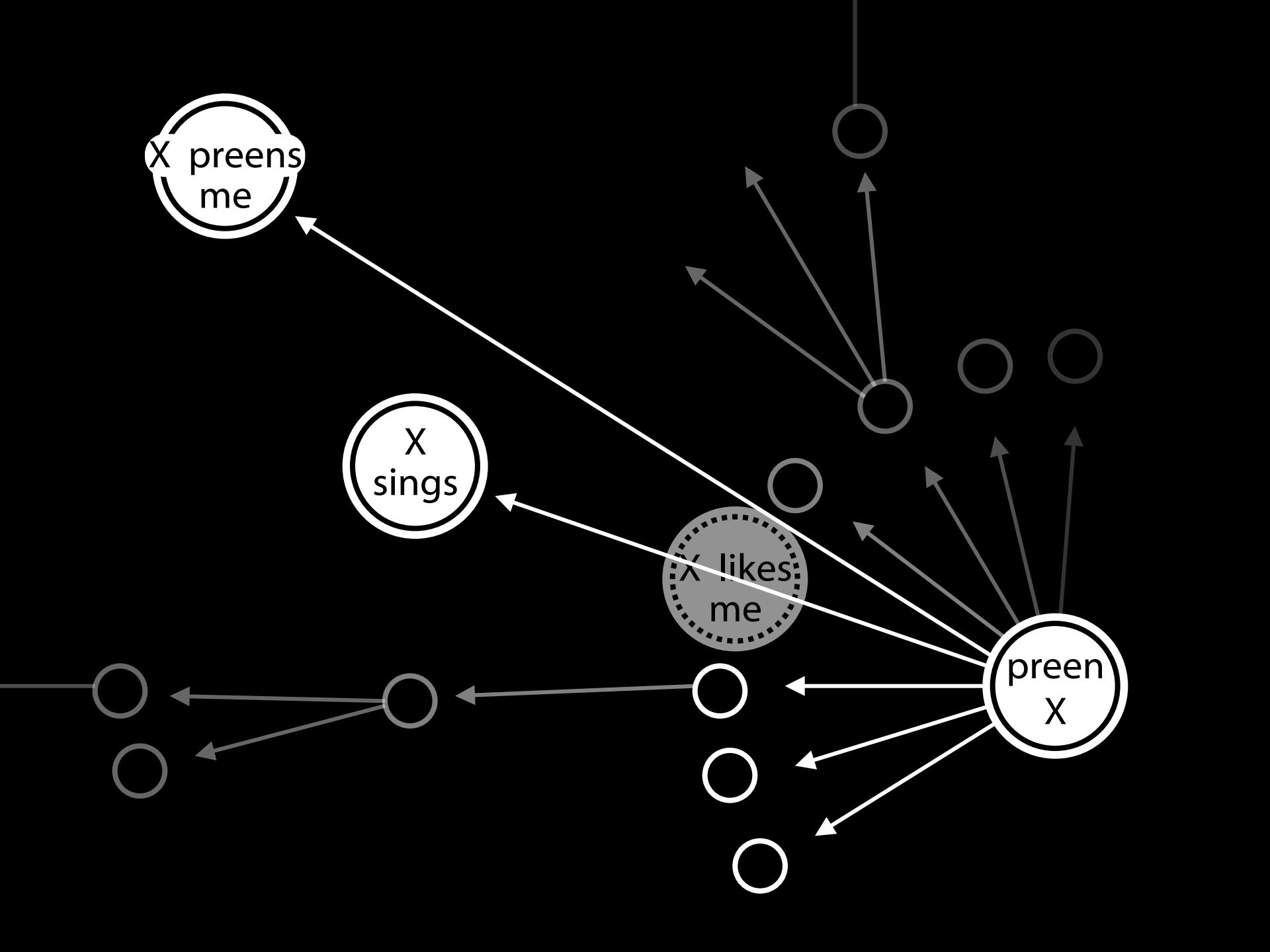
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“chimpanzees understand ... intentions ... perception and knowledge ... Moreover, they understand how these psychological states work together to produce intentional action”

(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)

