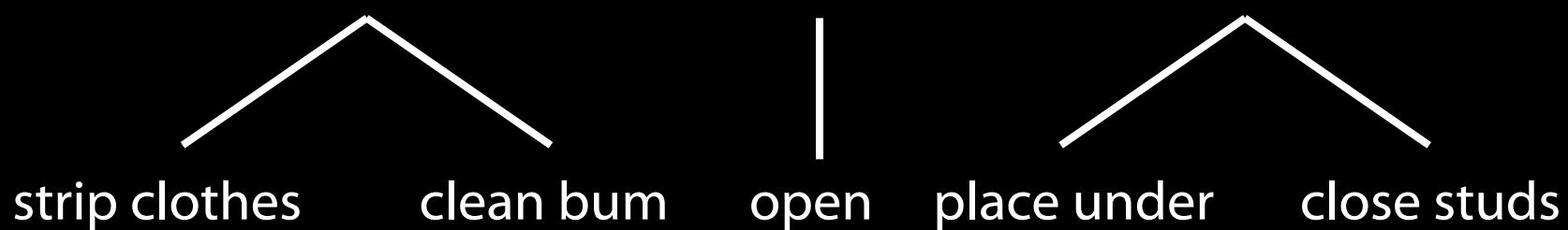


plans



goals



motor action

. /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 ...

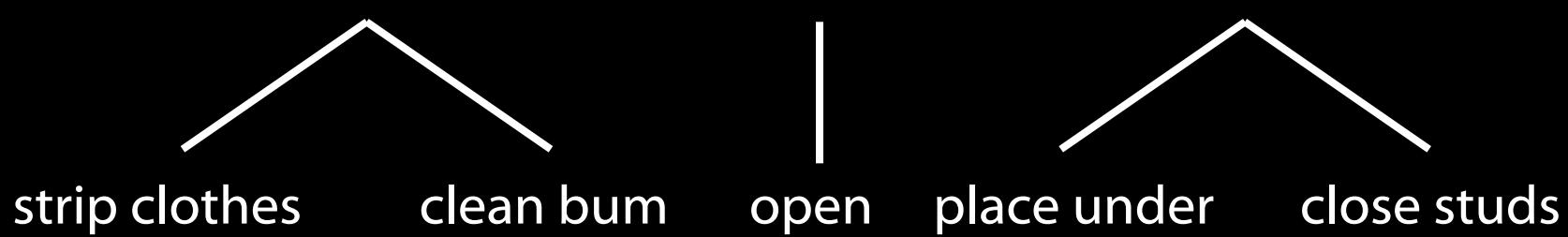
motion



plans



goals



motor action

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

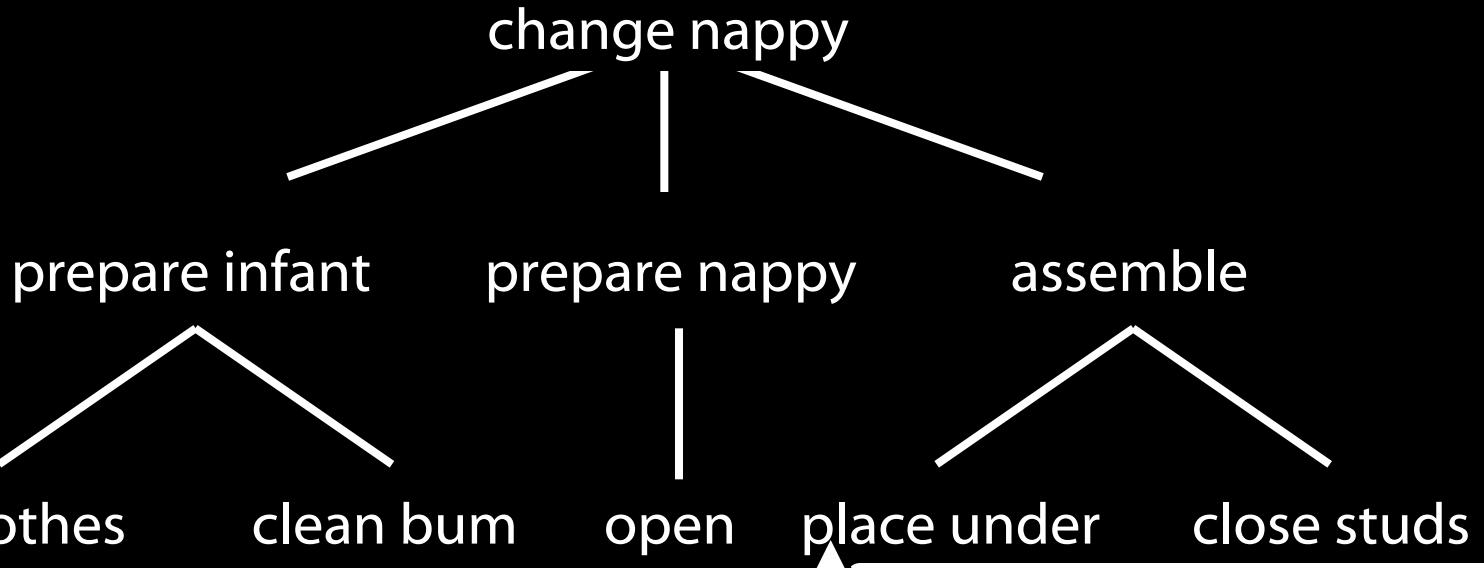
[reach-left-hand X] [left-wholehand-grasp X1] [right-wholehand-grasp ...]

motor emulation

motion



plans



goals

sequential probabilities

./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 ...]

motor emulation

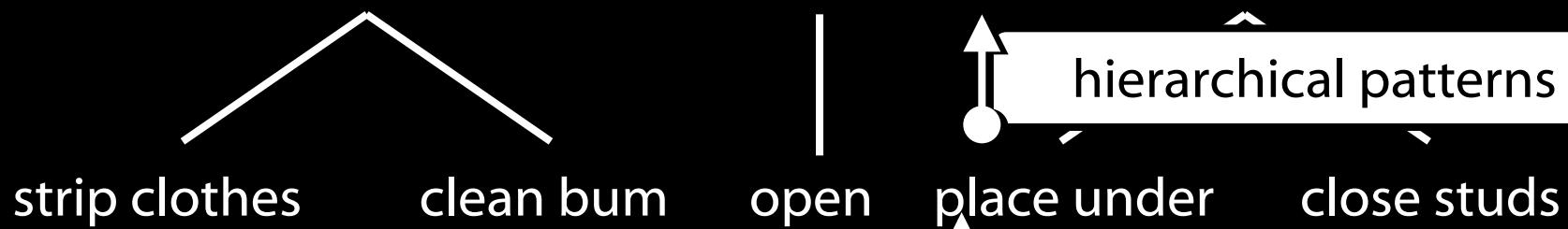
motion



plans



goals



motor action

./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 ...]

motion



plans



goals

strip clothes      clean bum      open      place under      close studs

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 ...]

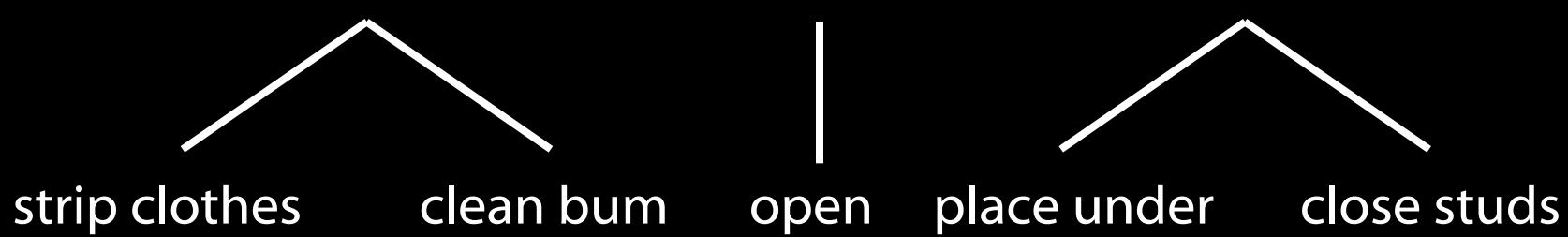
motion



plans



goals



motor action

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

motion





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



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



proximity

orientation

lighting

barriers

trajectory

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

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



*proximity*

*orientation*

*lighting*

*barriers*

*trajectory*

Detour  
Goals are not intentions

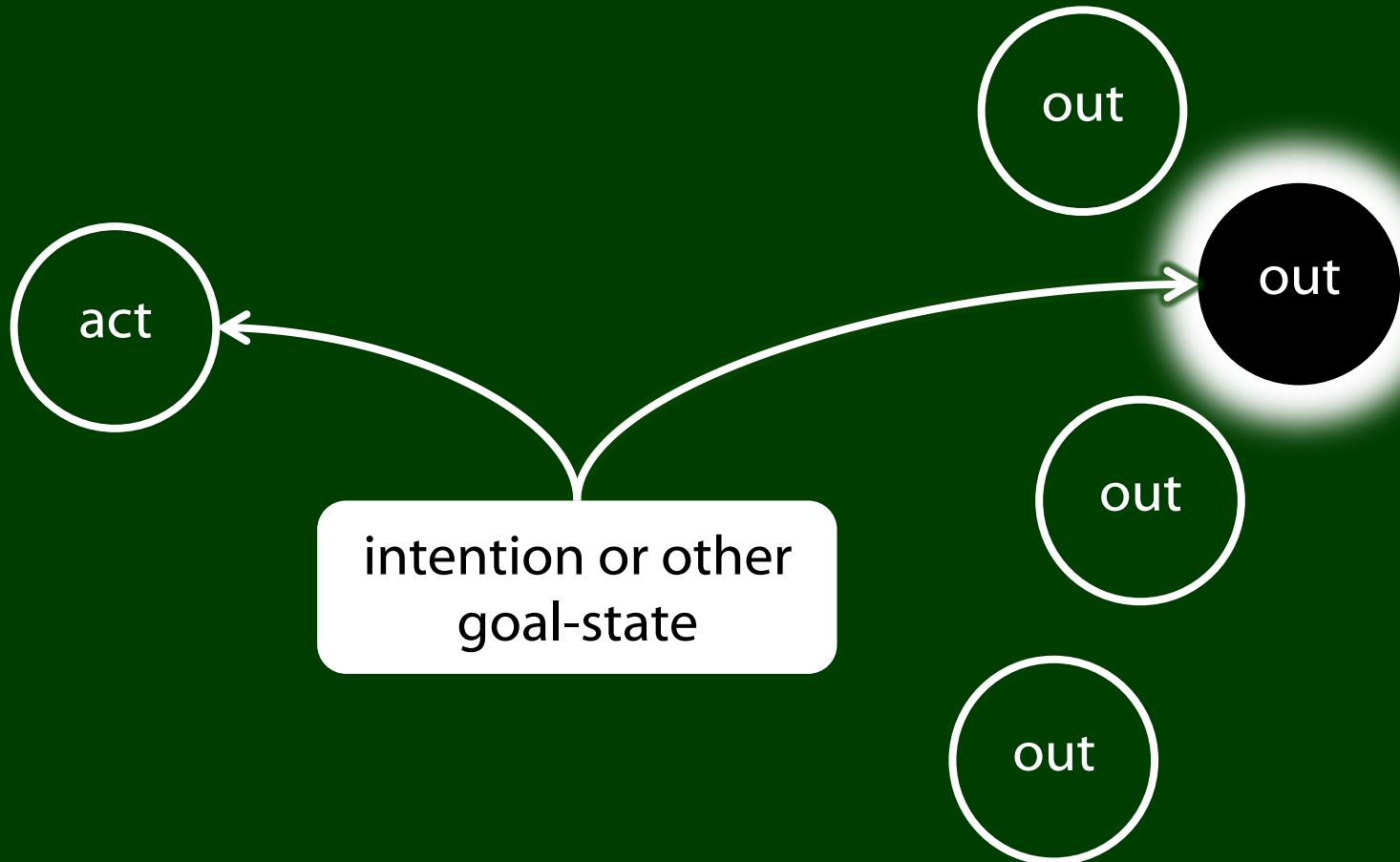
What is the relation between an action and the goal (or goals) to which it is directed?



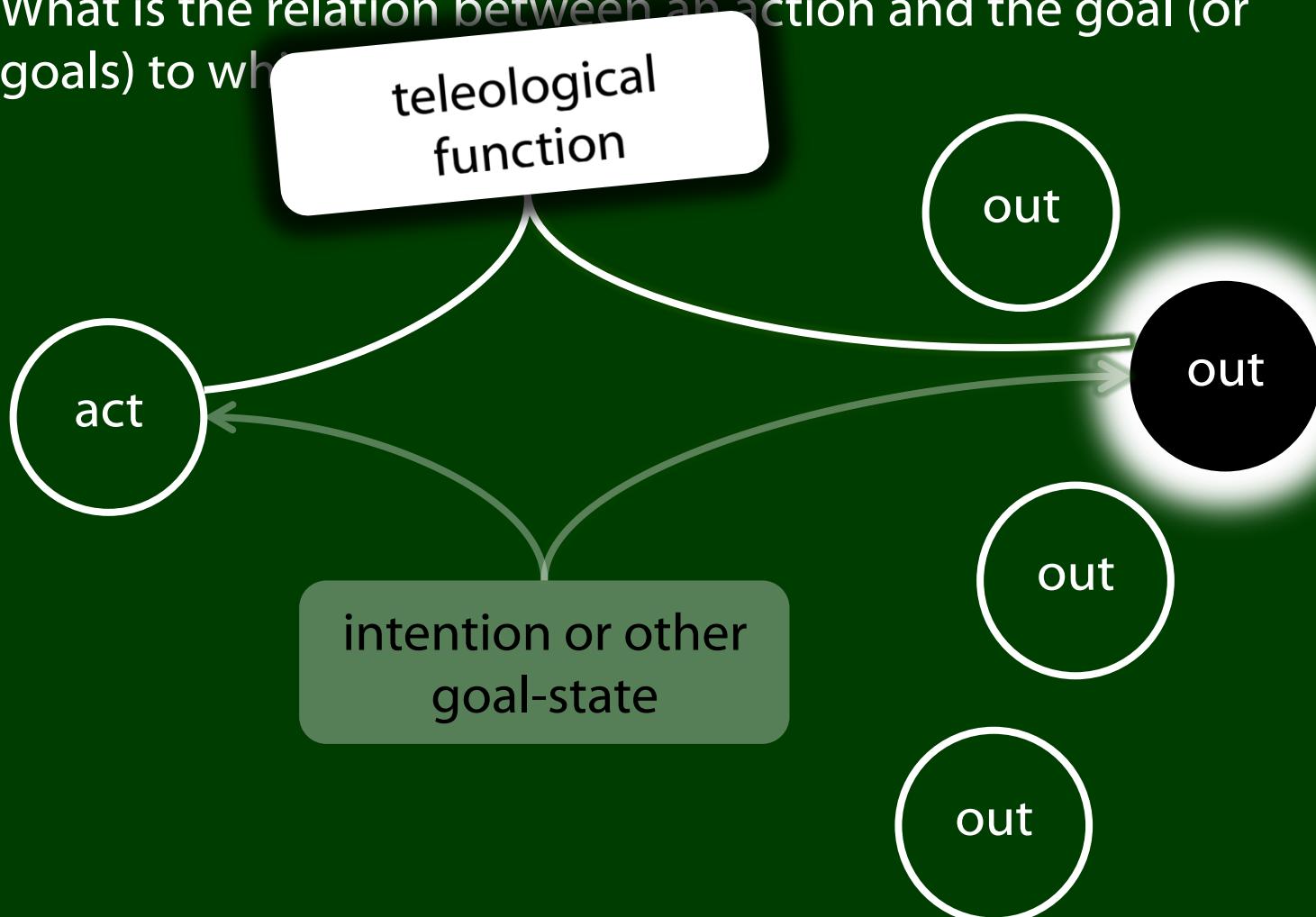
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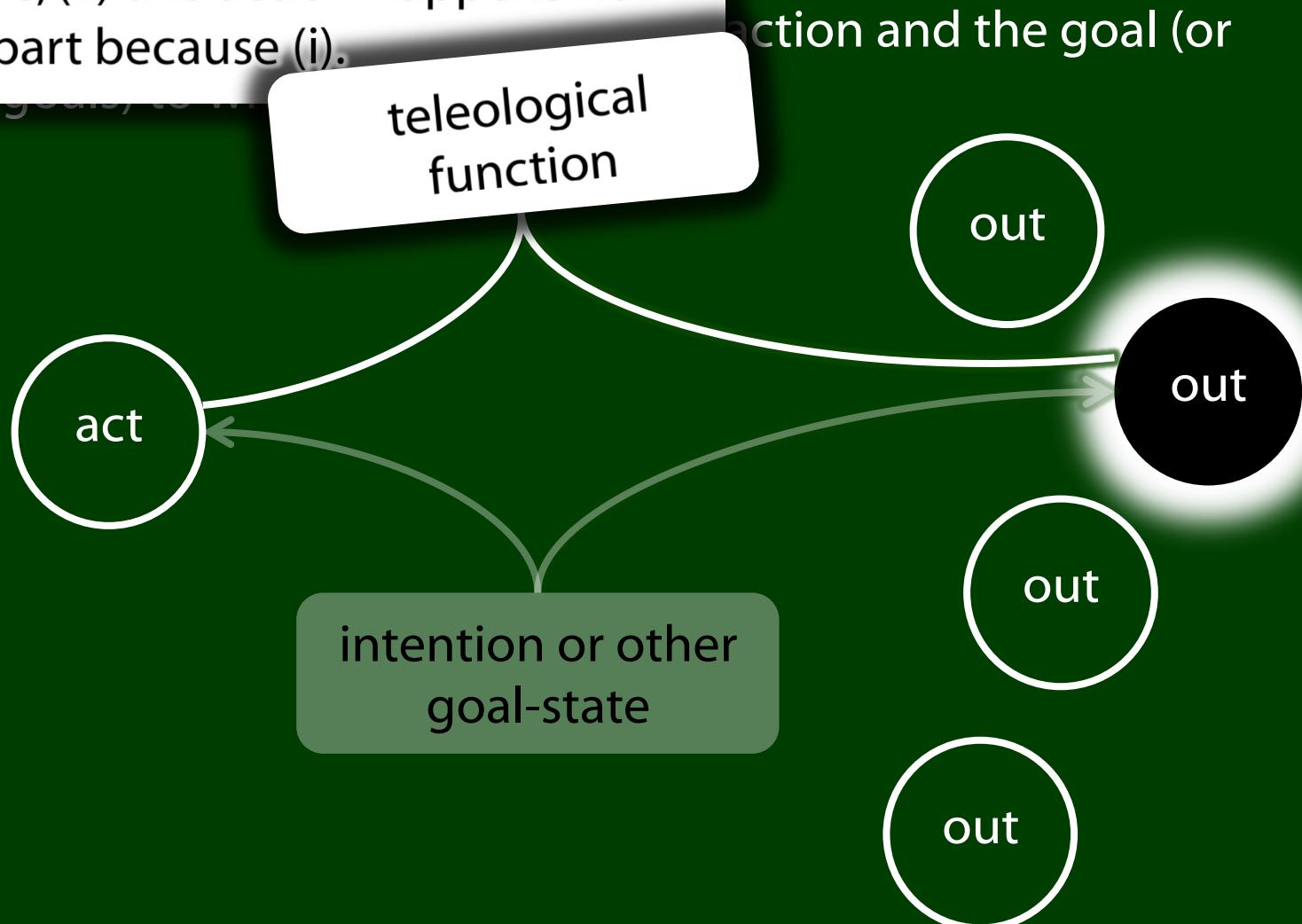
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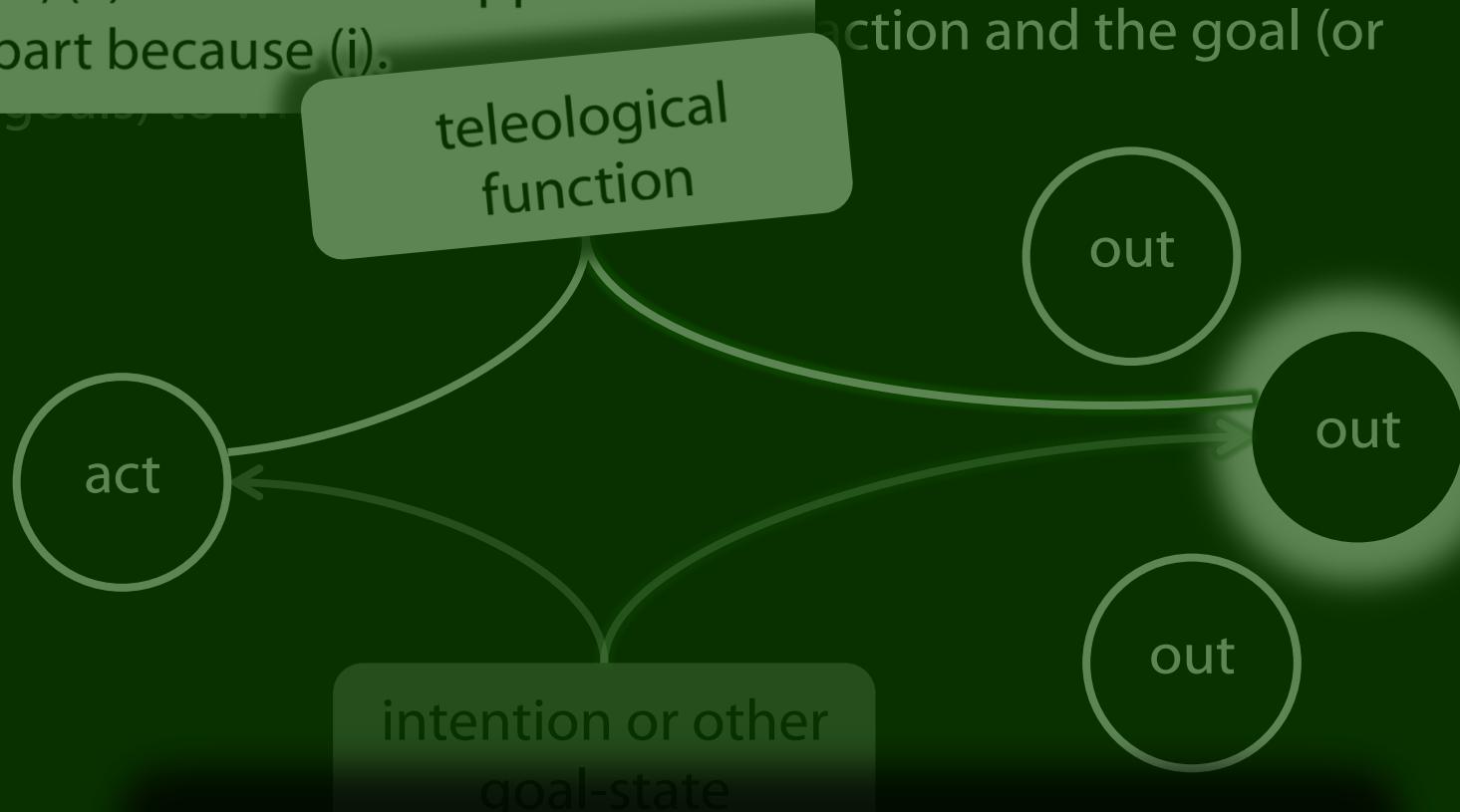
What is the relation between an action and the goal (or goals) to which it is related?



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



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



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

End Detour

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*proximity*

*orientation*

*lighting*

*barriers*

*trajectory*

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

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

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



proximity

orientation

lighting

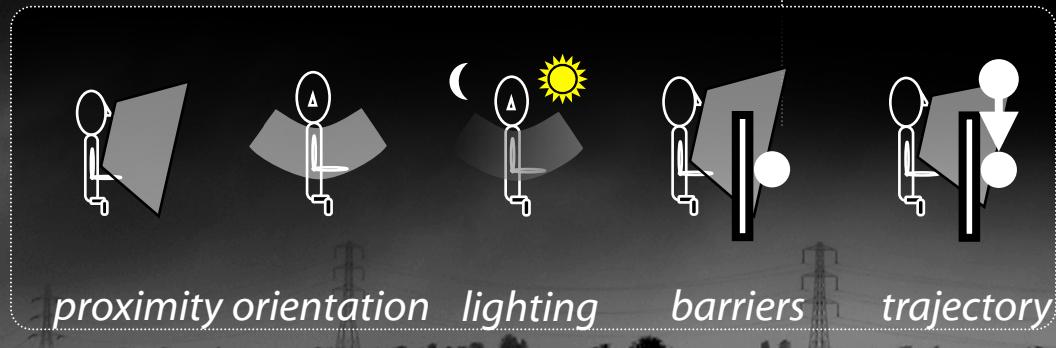
barriers

trajectory

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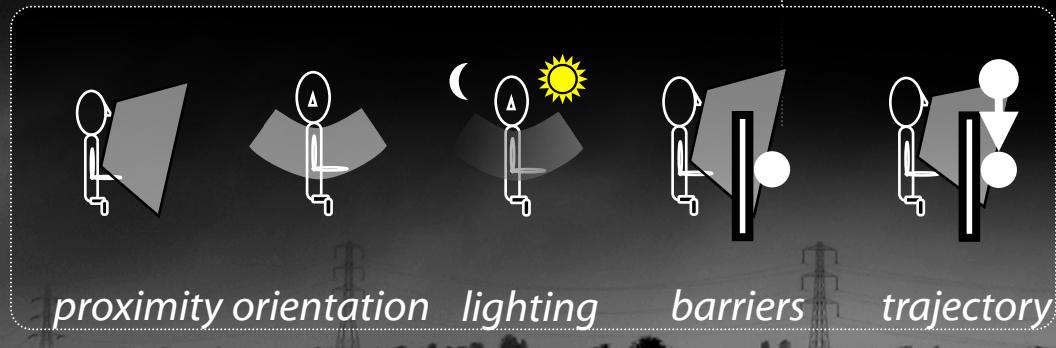


Your *field* = a set of objects related to you by proximity, orientation, lighting and other factors

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

(Flavell, Shipstead & Croft 1978: 1210)

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

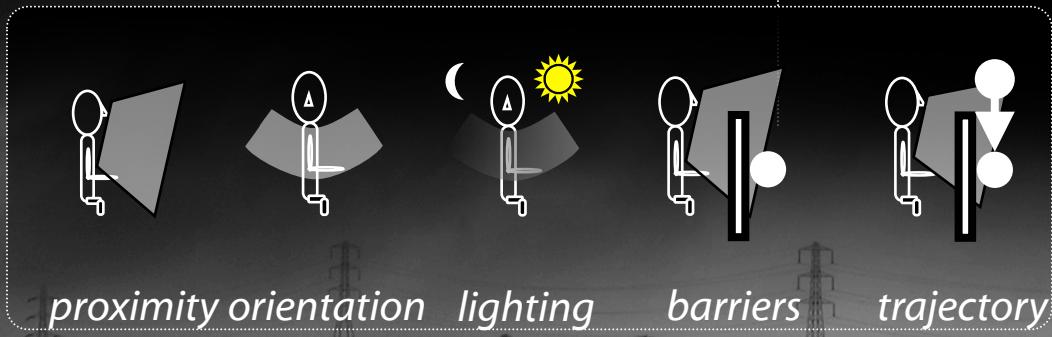


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proximity

orientation

lighting

barriers

trajectory

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

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

You *register* an object at a location  $\leq$  you most recently encountered the object at that location

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



*proximity*

*orientation*

*lighting*

*barriers*

*trajectory*

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

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

You *register* an object at a location <= you most recently encountered the object at that location

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

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



proximity orientation



lighting



barriers



trajectory



source: Liszkowski et al (2008)





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proximity



orientation



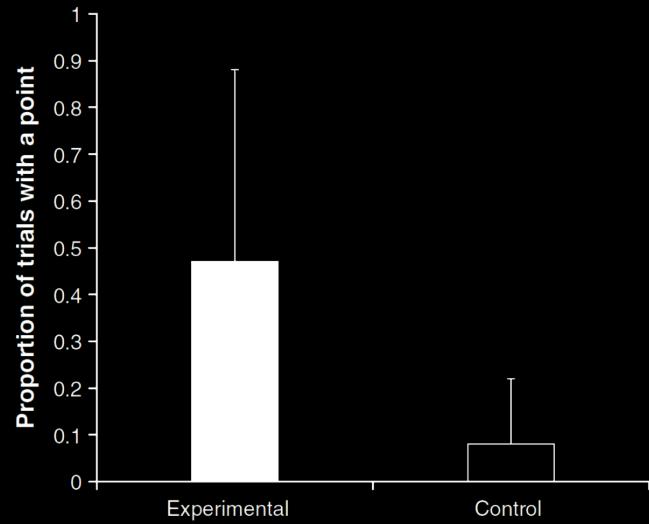
lighting



barriers

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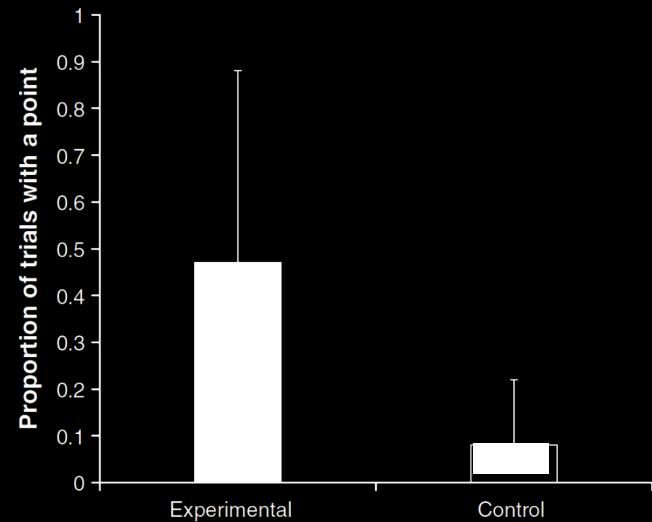
*proximity orientation lighting*

*barriers*

*trajectory*

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

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

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

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



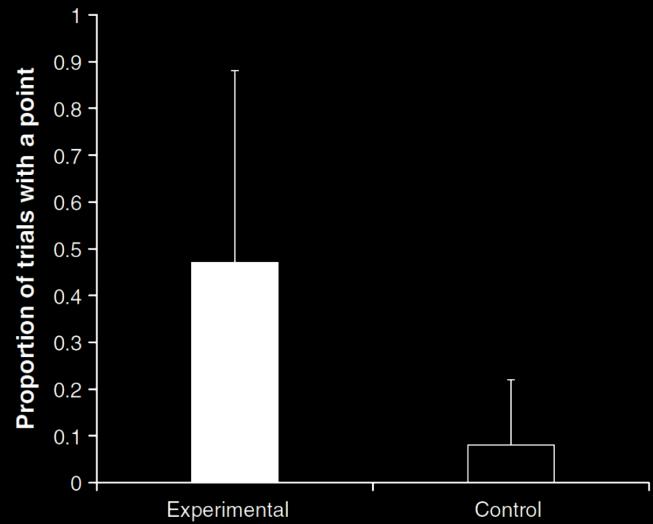
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*barriers*

*trajectory*

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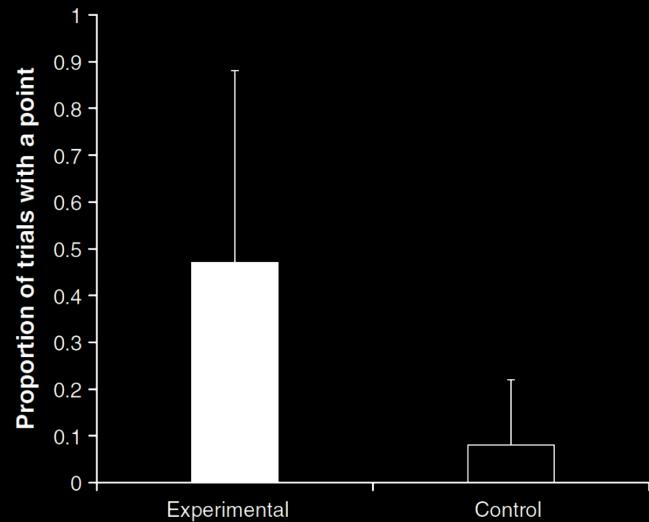
*proximity orientation lighting*

*barriers*

*trajectory*

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

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

You *register* an object at a location <= you most recently encountered the object at that location

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

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proximity orientation



lighting



barriers



trajectory

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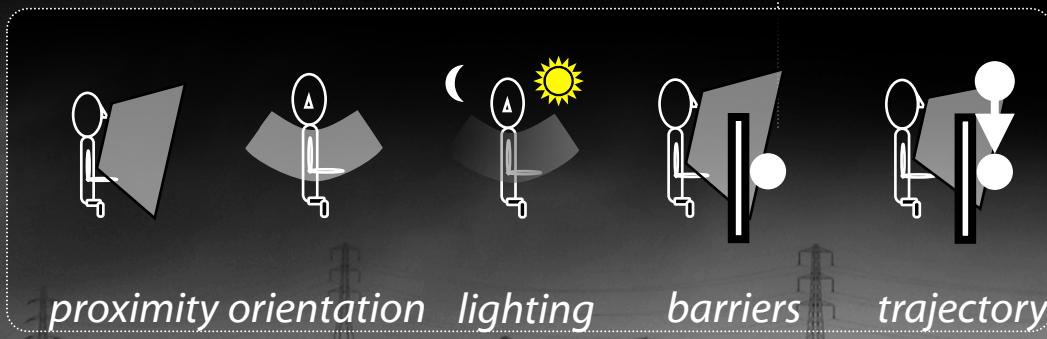
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Principle 5



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You *register* an object at a location <= you most recently encountered the object at that location

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

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

Principle 5: when an agent performs a goal-directed action and the goal specifies an object, the agent will act as if the object were actually in the location she registers it at.



proximity



orientation



lighting



barriers



trajectory

# 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?

