

Mindreading & Joint Action

6. Goal Ascription



butterfills@ceu.hu

goal ascription

pure goal ascription

How could *pure* goal ascription work?

sophisticated theory of
mind cognition

communication by
language

(mis)understanding
ostensive communication

understanding
distributive goals

understanding
goals

Mindreading is acting in reverse

plans

change nappy

prepare infant

prepare nappy

assemble



plans

goals

change nappy

prepare infant

prepare nappy

assemble

strip clothes

clean bum

open

place under

close studs



plans

change nappy

prepare infant

prepare nappy

assemble

goals

strip clothes

clean bum

open

place under

close studs

motor action

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

plans

change nappy

prepare infant

prepare nappy

assemble

goals

strip clothes

clean bum

open

place under

close studs

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 ...]

plans

change nappy

prepare infant

prepare nappy

assemble

goals

strip clothes

clean bum

open

place under

close studs

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

motion

clauses

words

motor action

sound

change nappy

prepare infant

prepare nappy

S

strip clothes

clean bum

open

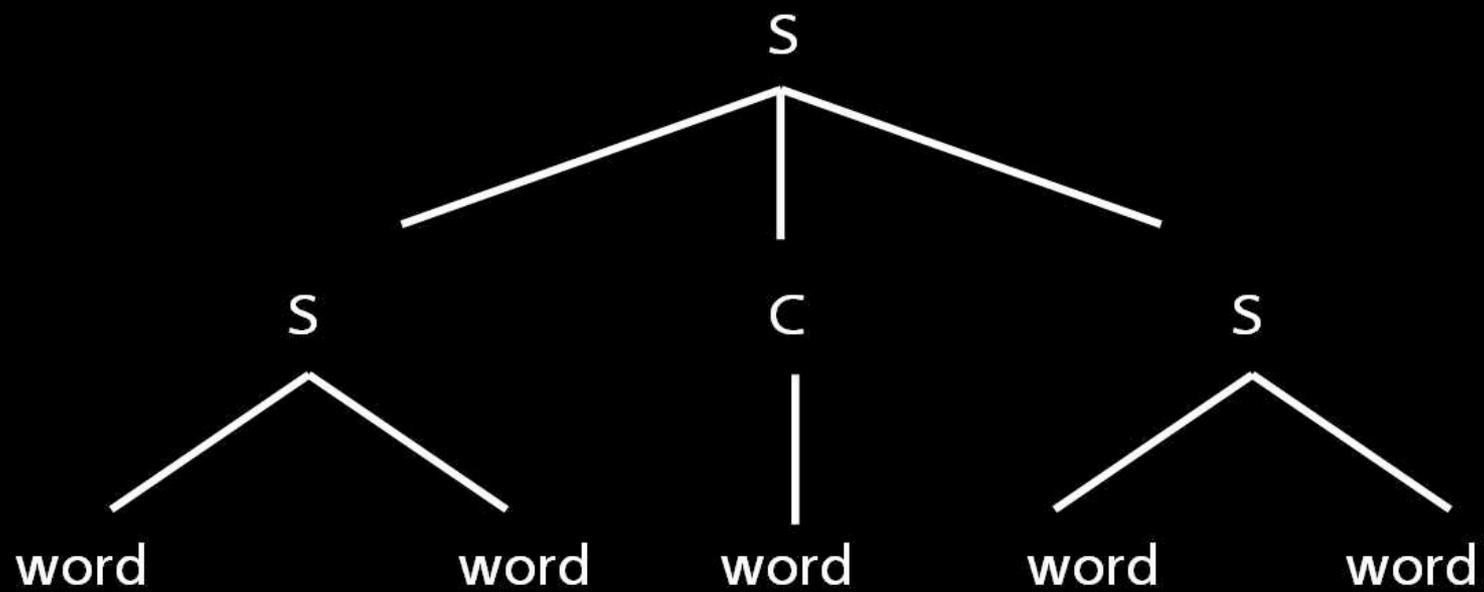
word

word

/reach X/ /grasp X/ /grasp Y/ /e//n//d//l//i//l//i//k//r//a//i//

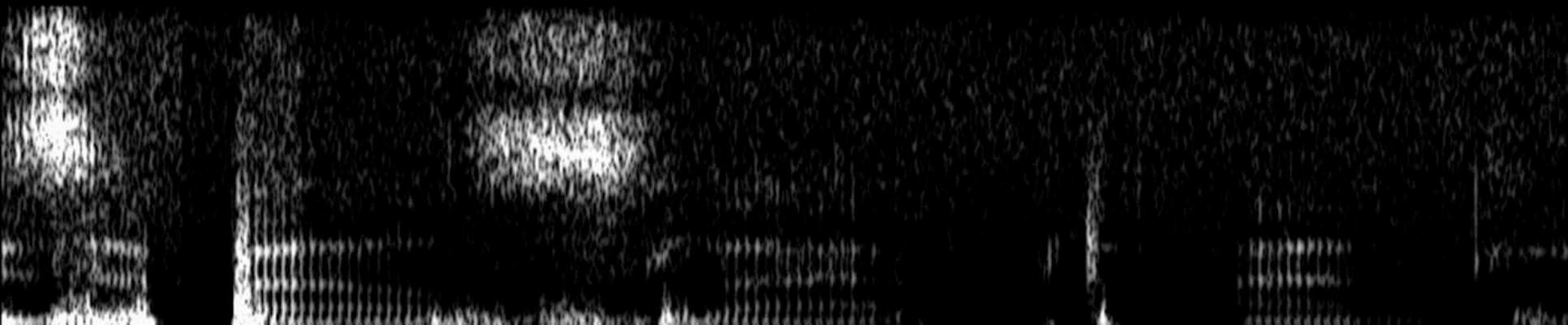
[reach-left-hand X] [left-whole t e n d l i l i k r a i d





/i//z//e//b//e//l//s//l//e//p//t//e//n//d//l//i//l//i//k//r//a//i//d/

l i z ə b ɛ l ʃ l e p t ə n d l i l i k r a i d



plans

goals

motor action

motion

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plans

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motor action

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motion

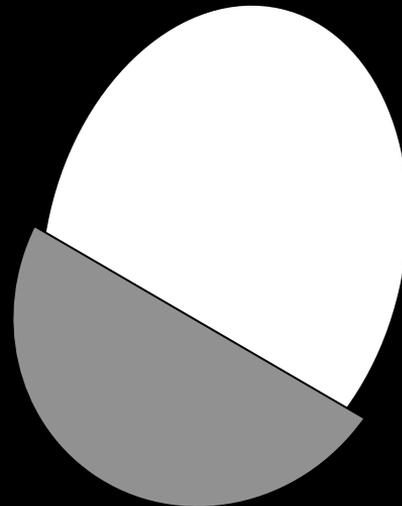


How could *pure* goal ascription work?

How could *pure* goal ascription work?
obstacle

1. action
2. outcome
3. directedness of
action to outcome

1. action
2. outcome
3. directedness of
action to outcome



Ayesha

Beatrice

1. action

move arm

move arm

2. outcome

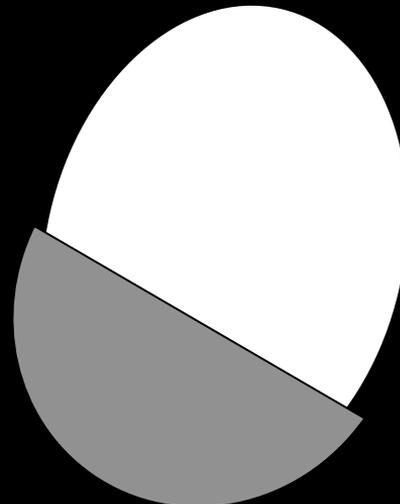
break egg

break egg

3. directedness of
action to outcome

Y

N



Ayesha

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1. action

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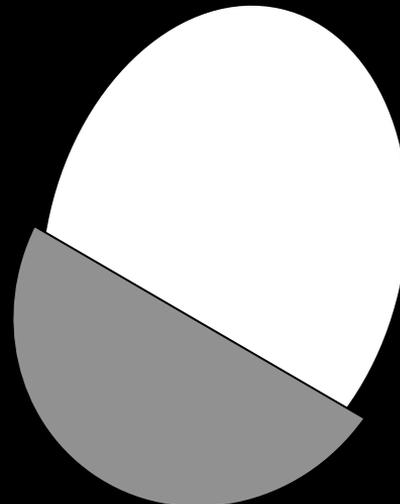
break egg

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action to outcome

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N

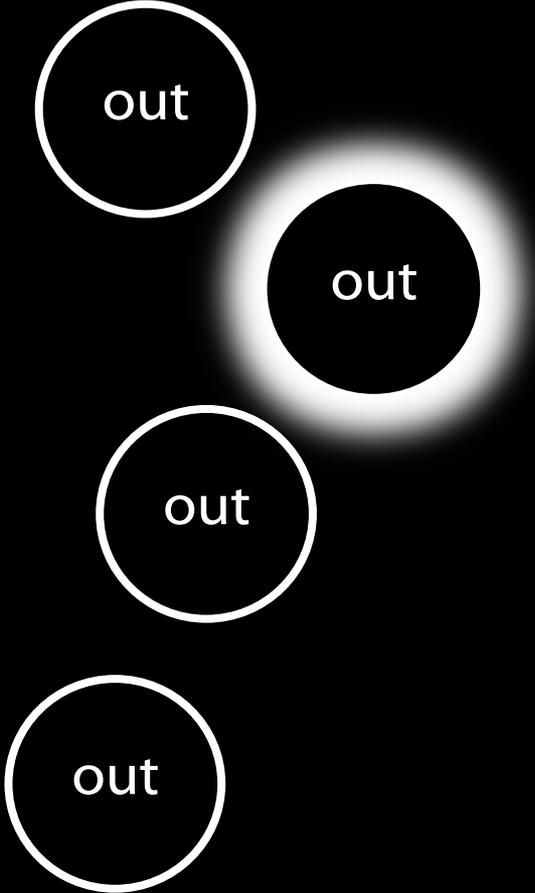
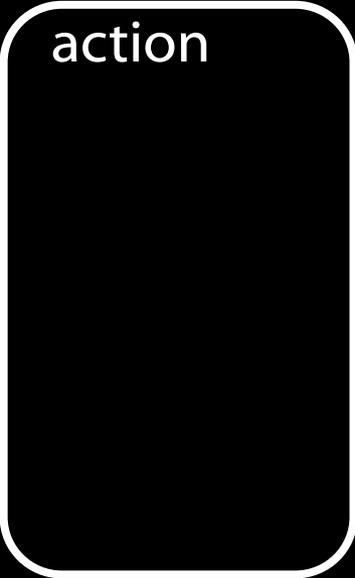


1. action

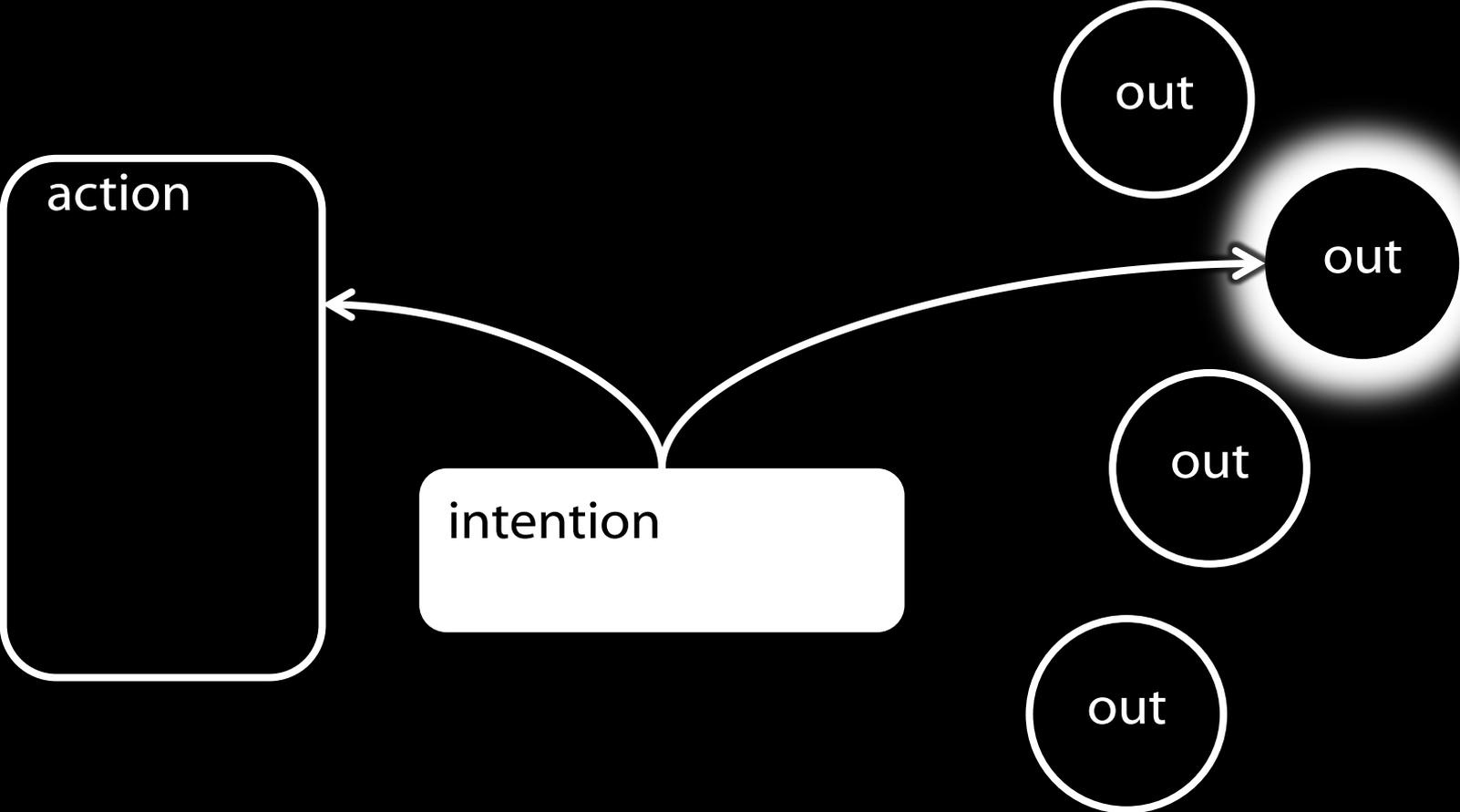
2. outcome

3. directedness of
action to outcome

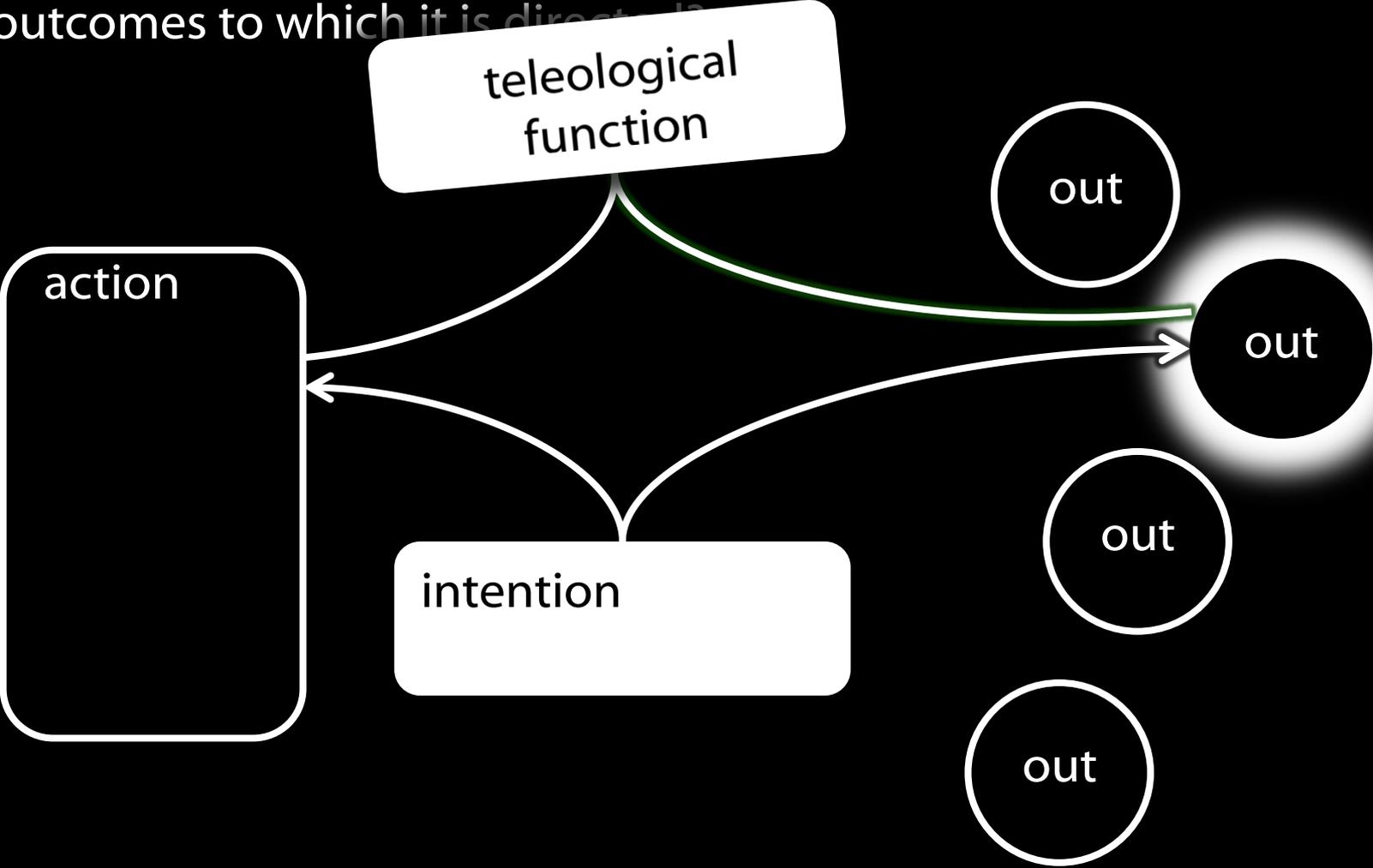
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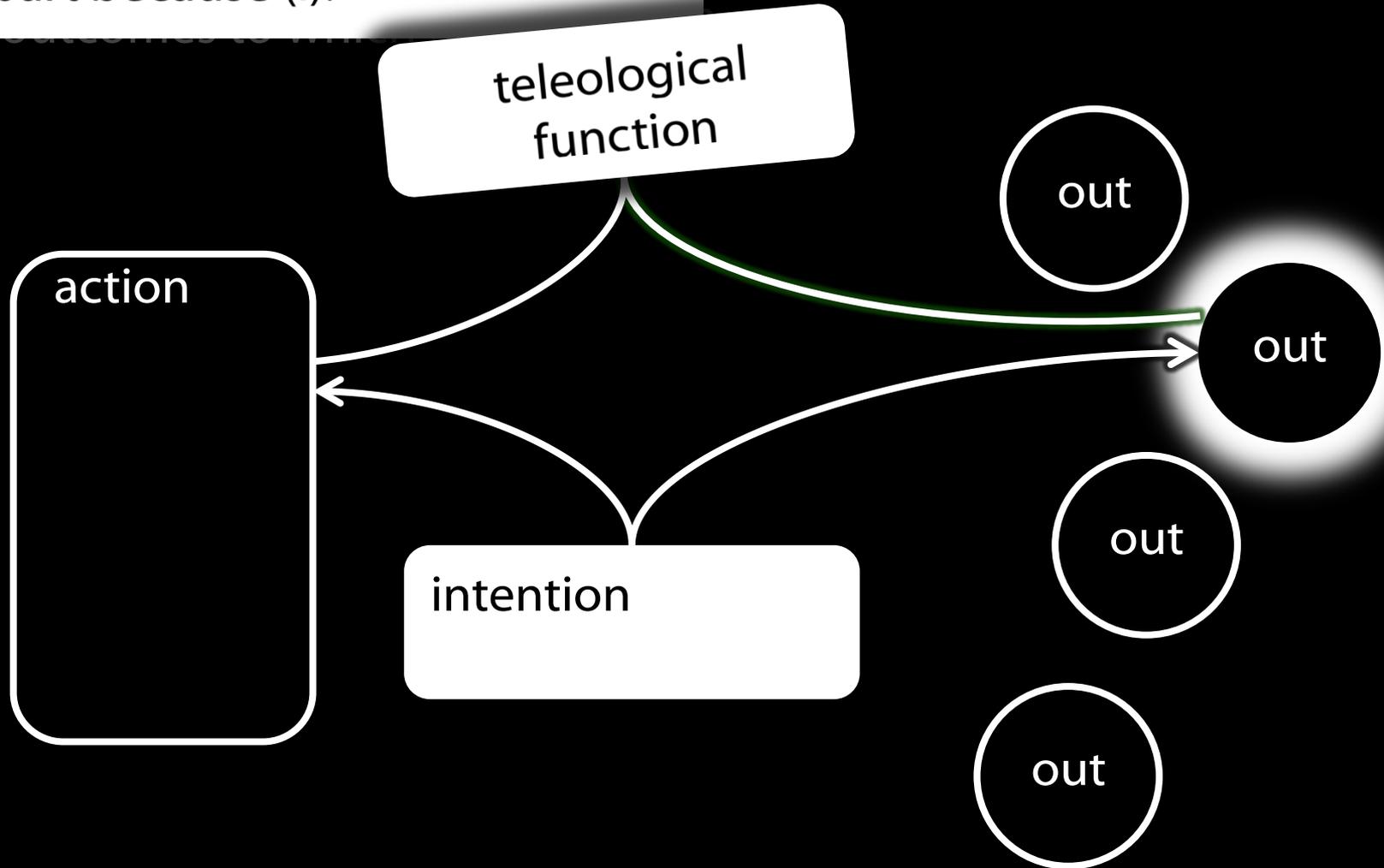


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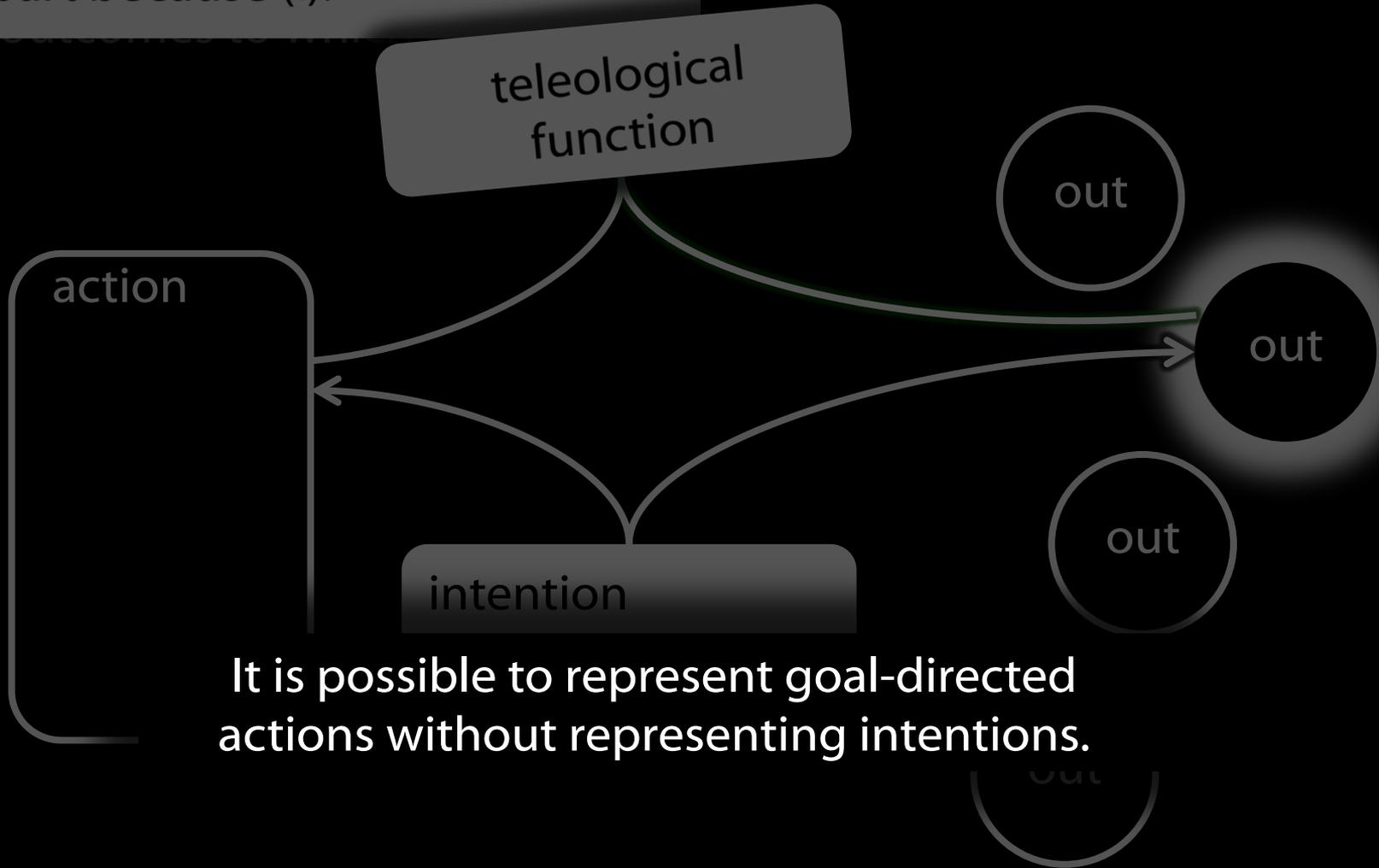
(i) in the past, actions of this type have caused outcomes of this type; (ii) this action happens now in part because (i).

action and the outcome or



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action and the outcome or



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

How could *pure* goal ascription work?

~~obstacle~~

'the perceptual origins of theory of mind ... both causality and intention can be traced to perceptual origins'

(Premack 1990: 15)

'in perceiving one object as having the intention of affecting another, the infant attributes to the object a representation of its intentions'

(Premack 1990: 14)

'For the infant, objects ... have intention when their movements are self-propelled. Whereas for common sense, intention is an inferred state of mind based on evidence for desire, belief, and planning.'

(Premack 1990: 12)

'the perceptual origins of theory of mind ... both causality and intention can be traced to perceptual origins'

(Premack 1990: 15)

'in perceiving one object as having the intention of affecting another, the infant attributes to the object a representation of its intentions'

(Premack 1990: 14)

“chimpanzees understand ... intentions ... perception and knowledge ... Moreover, they understand how these psychological states work together to produce intentional action”
(Call & Tomasello 2008:191)



How could *pure* goal ascription work?

- (1) reliably: $R(a,G)$ when and only when a is directed to G
- (2) $R(a,G)$ is readily detectable
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$R(a,G) =_{df}$ G is the teleological function of a ?

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(Csibra & Gergely 1998: 255)

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Csibra & Gergely (forthcoming ms p. 8)

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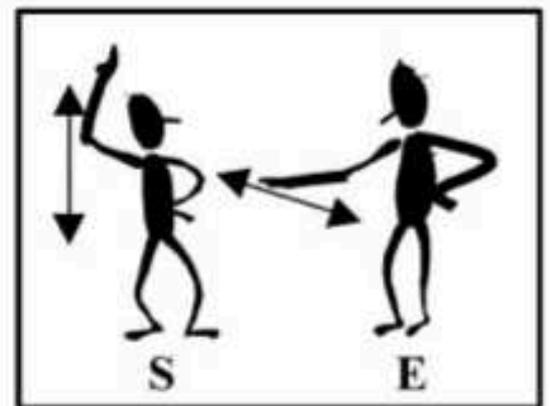
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Motor Planning



Motor planning occurs in action observation

source Kilner et al (2003)

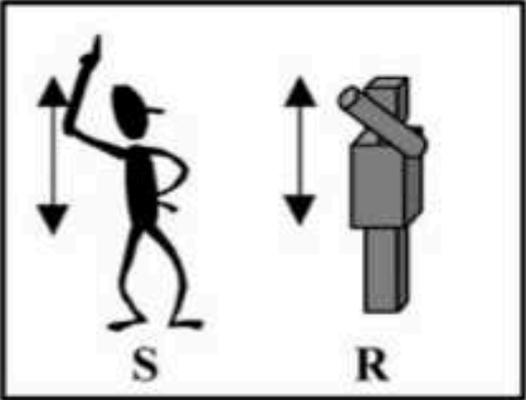
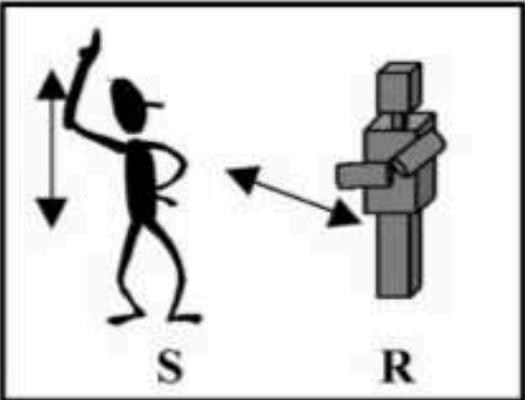
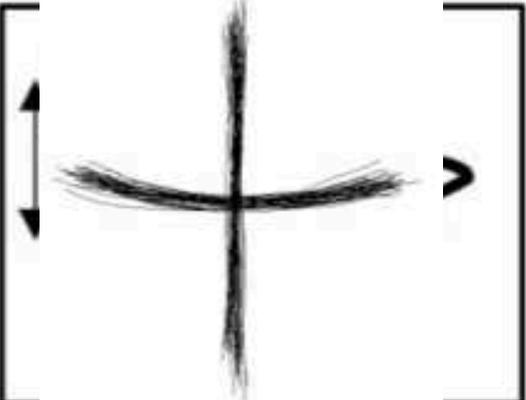
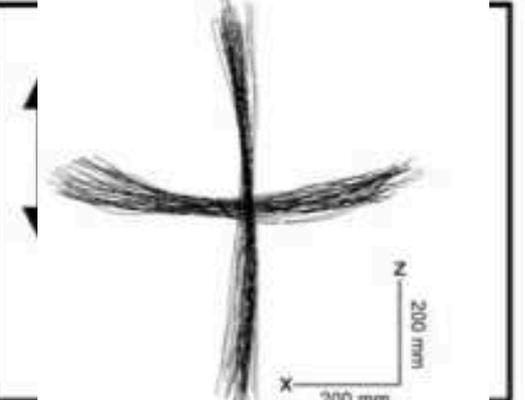


	Congruent	Incongruent
Robot	<p>Robot Congruent</p>	<p>Robot Incongruent</p>
Human	<p>Human Congruent</p>	<p>Human Incongruent</p>

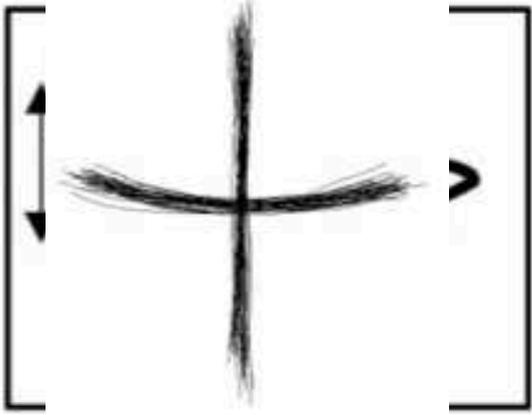
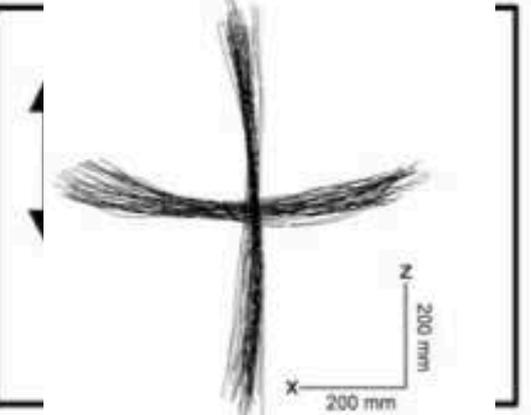
source Kilner et al (2003)

	Congruent	Incongruent
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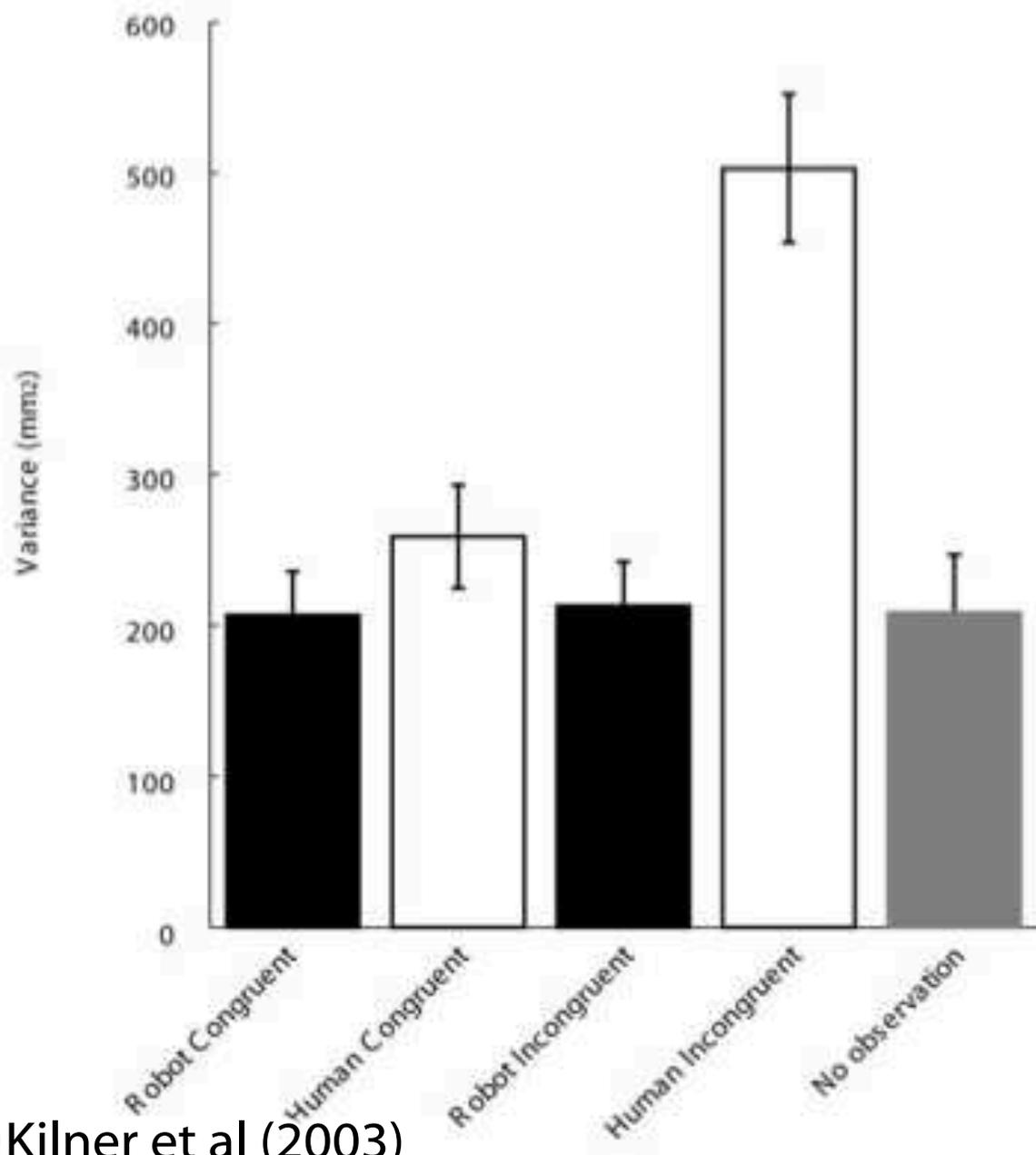
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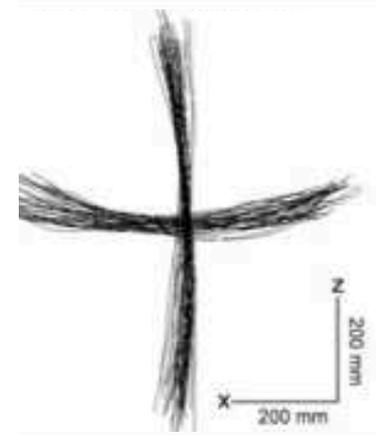


Incongruent

Robot Incongruent



Human Incongruent



source Kilner et al (2003)



source Costantini, Ambrosini, Cardellicchio & Sinigaglia (2012)

Motor planning can facilitate goal judgments

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Training effects (Casile & Giese 2006)

TMS to motor cortex slows goal judgments (Urgesi et al 2007)

Hemiplegia with inaccuracy in corresponding goal judgments
(Serino et al 2009)

Limb vs buccofacial apraxia (Pazzaglia)

Planning as Goal Ascription

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'goal attribution requires that agents expend the least possible amount of energy within their motor constraints to achieve a certain end'

(Southgate et al, 2008: 1061)

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Some motor representations carry information about outcomes.

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...



...

same
effector

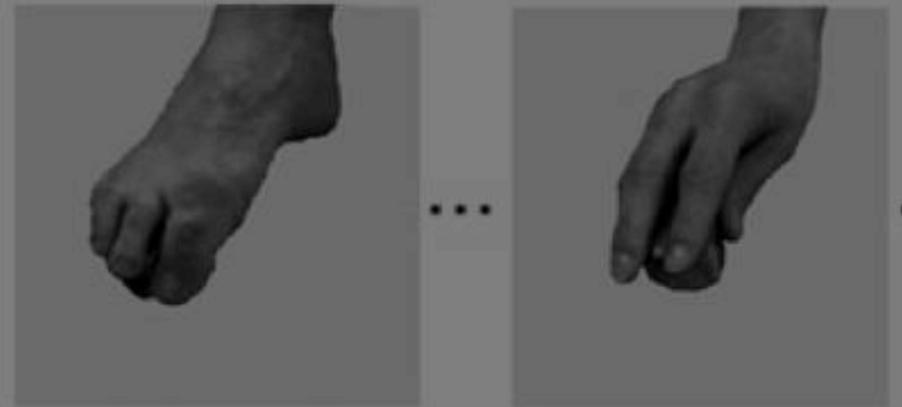
different
effector



same outcome

Cattaneo et al (2010)

Some motor representations carry information about outcomes.



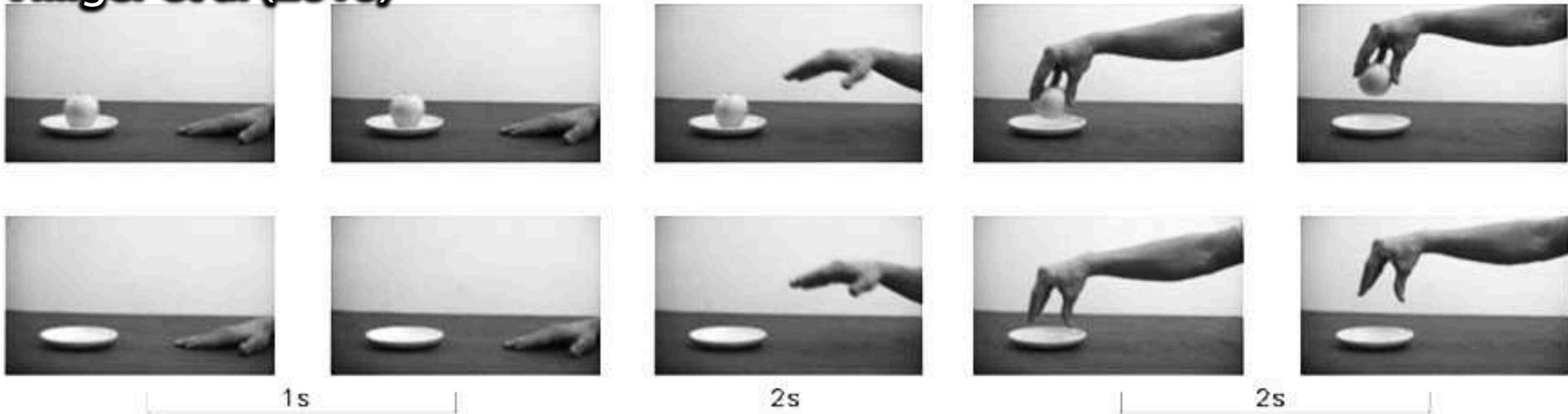
same effector

different effector

same outcome

Cattaneo et al (2010)

Villiger et al (2010)



Some motor representations carry information about outcomes.



same
effector

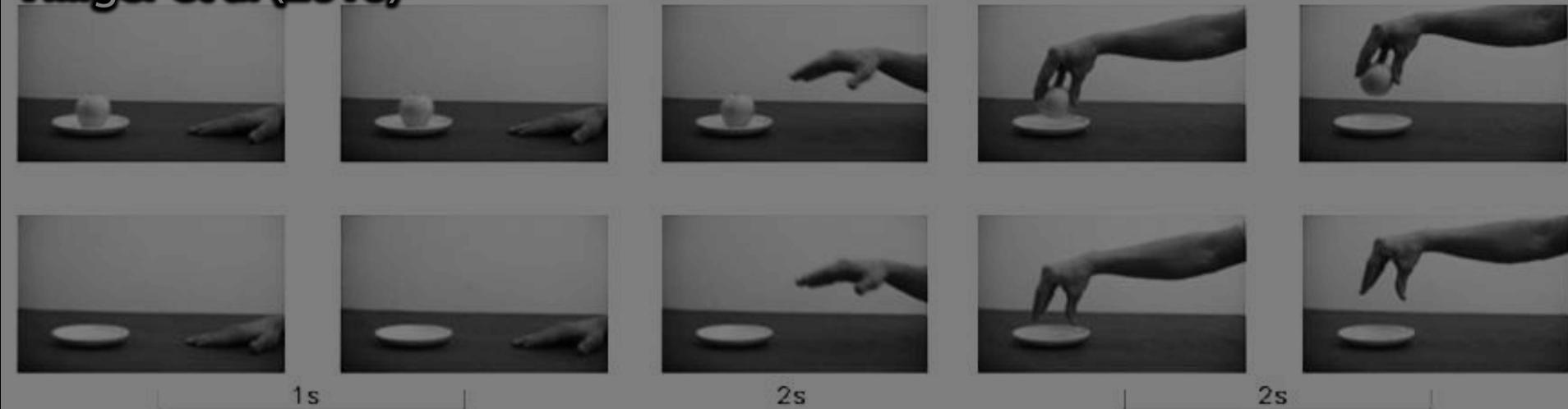
different
effector



same outcome

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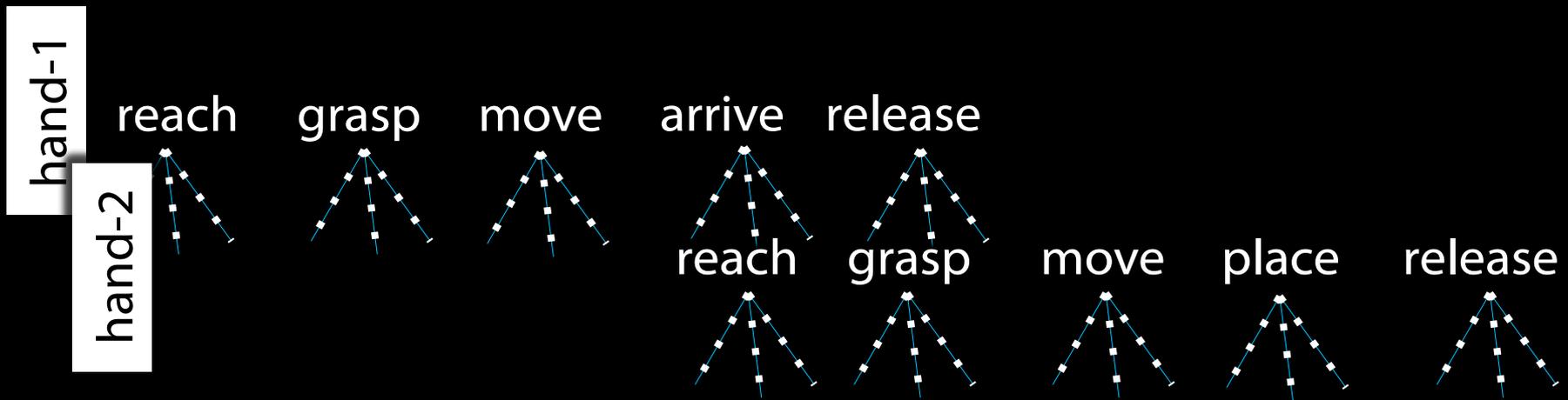


Some motor representations carry information about outcomes.

Information about outcomes guides planning.

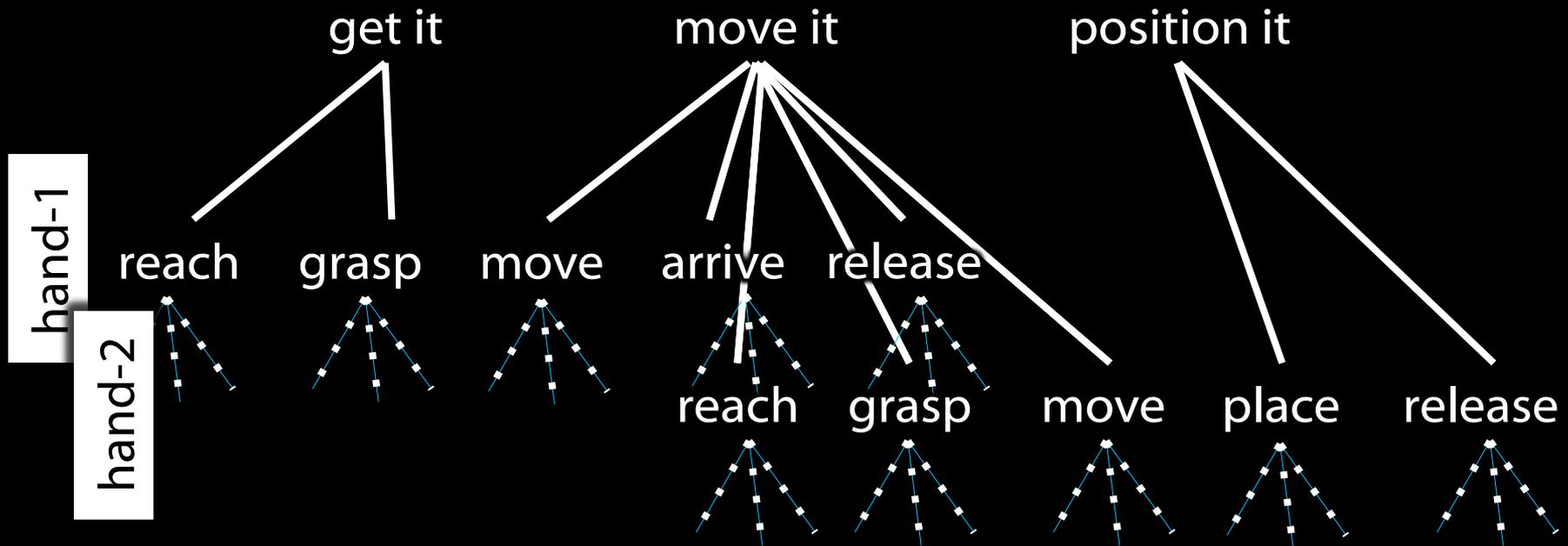
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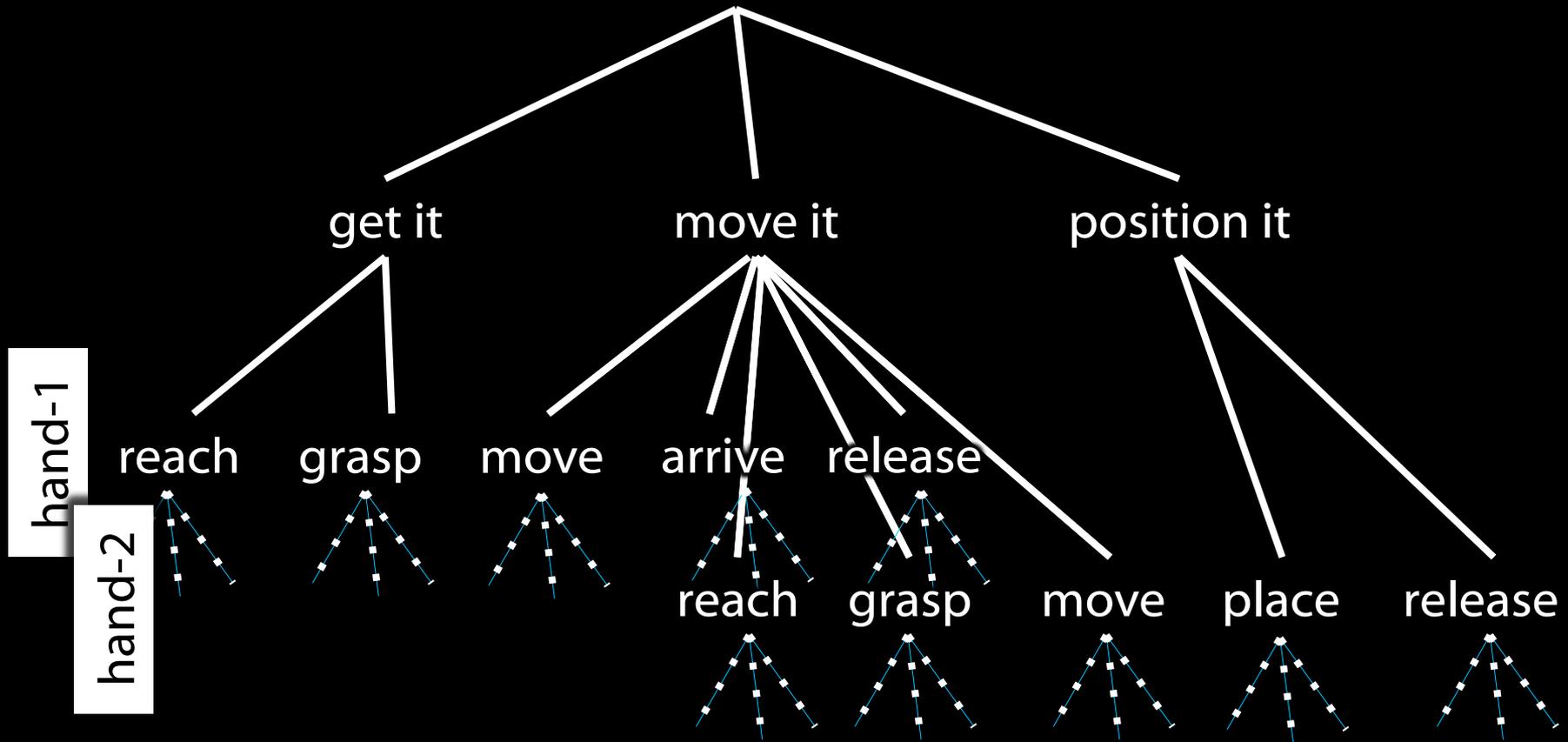
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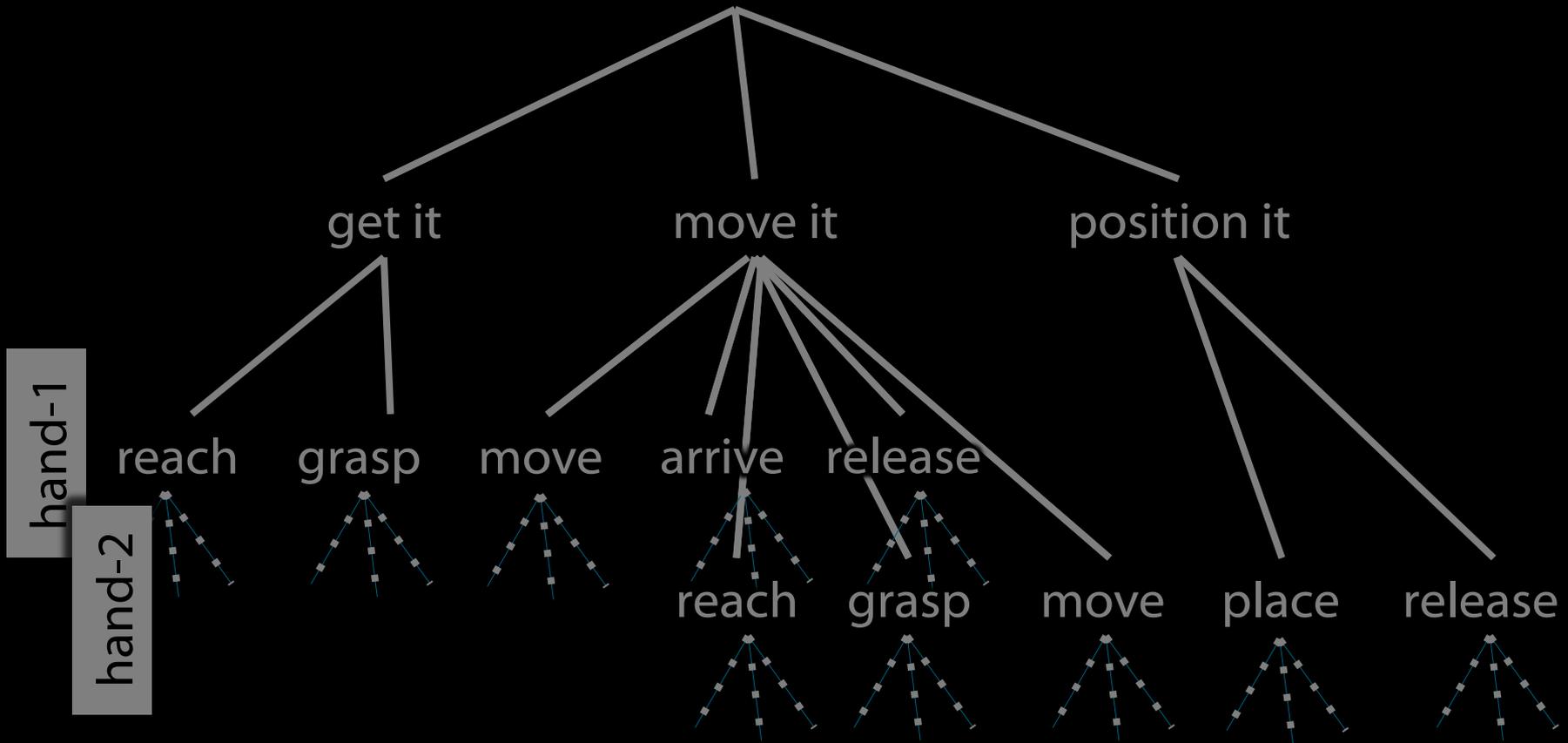
Move it from there to here



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Move it from there to here

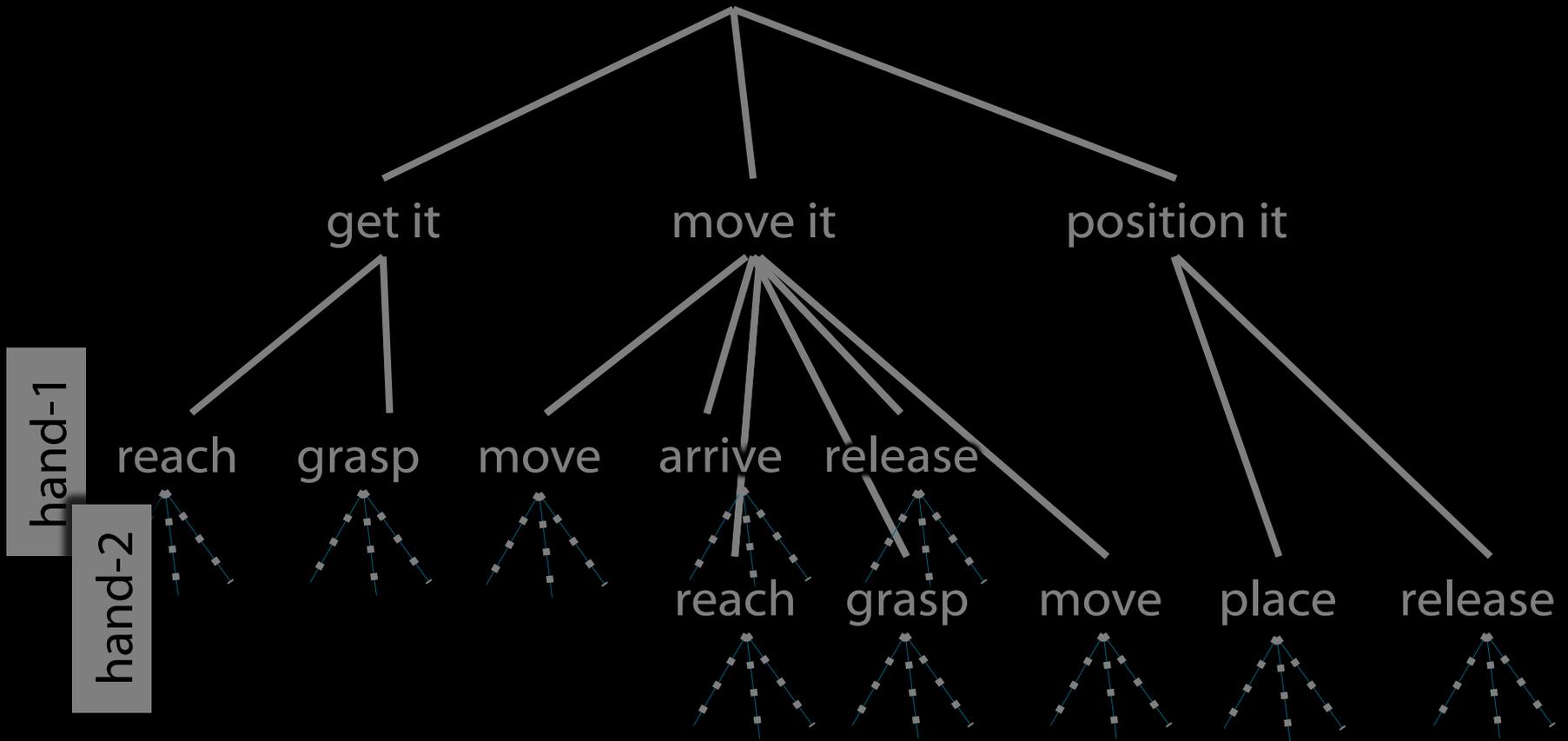


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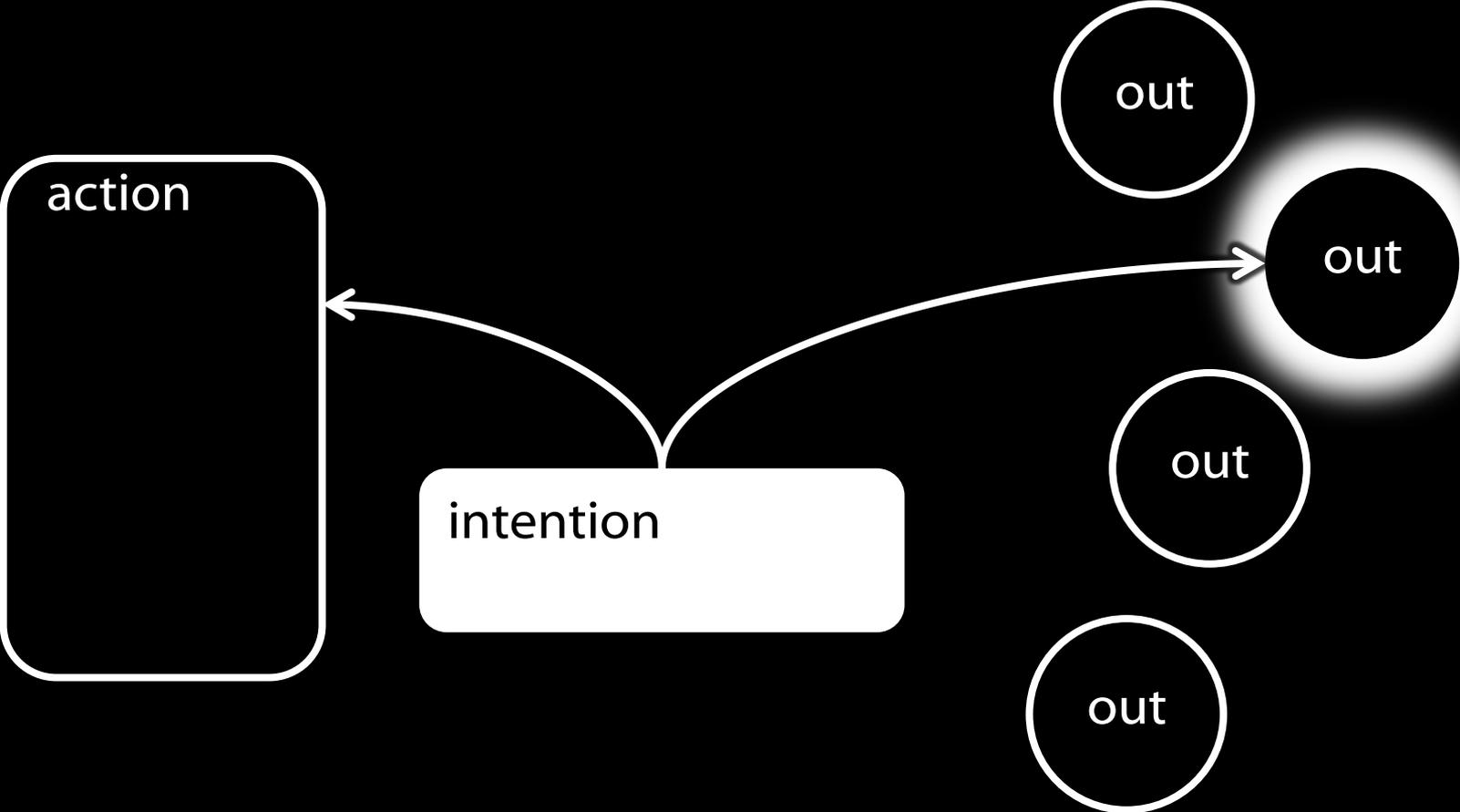
Information about outcomes guides planning.

Some motor representations represent outcomes

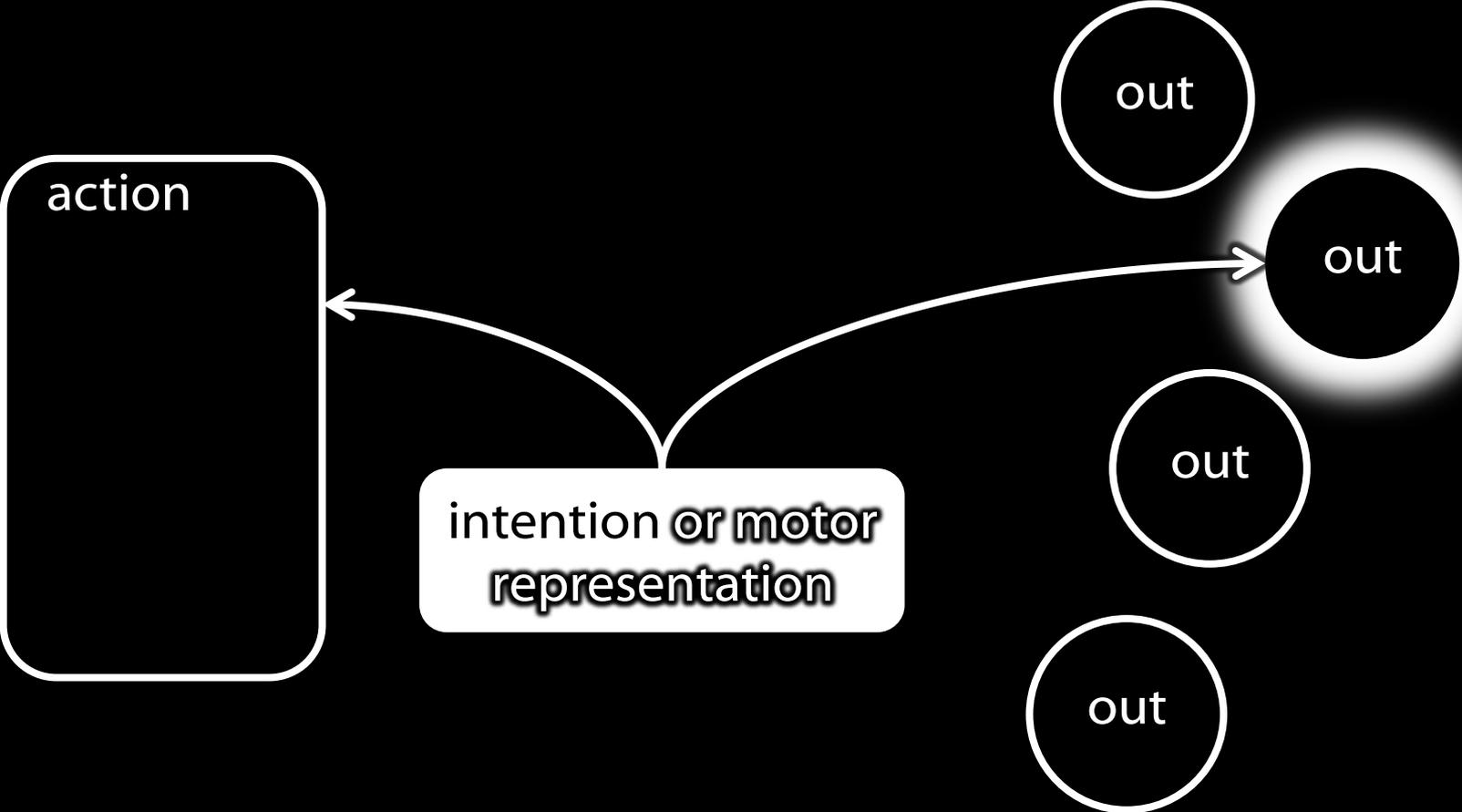
Move it from there to here



What is the relation between a purposive action and the outcome or outcomes to which it is directed?



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motor representation = intention ?

motor representation = intention ? No !

< different content >



< different content >

< different format >

Head down Rue Cujas
toward Rue Victor
Cousin. Turn right onto
Rue Saint-Jacques...



Take RER B and get out
at the Luxembourg
station, from there it's
less than 5 minutes
walk.



Head down Rue Cujas
toward Rue Victor
Cousin. Turn right onto
Rue Saint-Jacques... =



?

< different format >

Head down Rue Cujas toward Rue Victor Cousin. Turn right onto Rue Saint-Jacques. ...



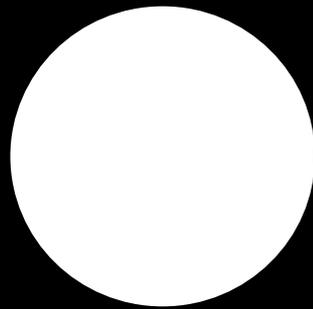
e.g. rapid identification of key landmarks; slow translation into compass directions

Rapid identification of direction of start from end (projection-dependent)

> different performance <

imagine

seeing

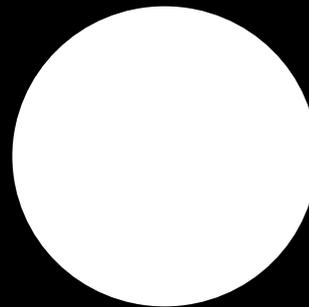


imagine

actually

seeing

seeing



imagine

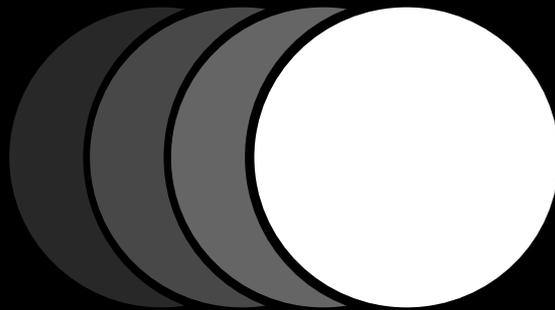
actually

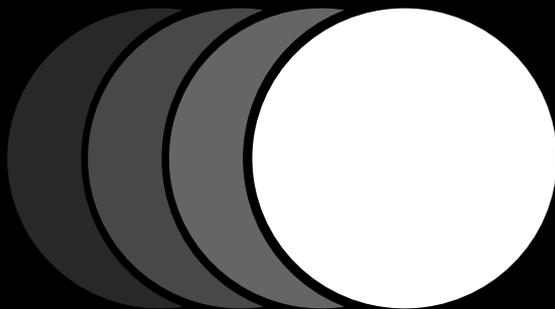
seeing

acting

seeing

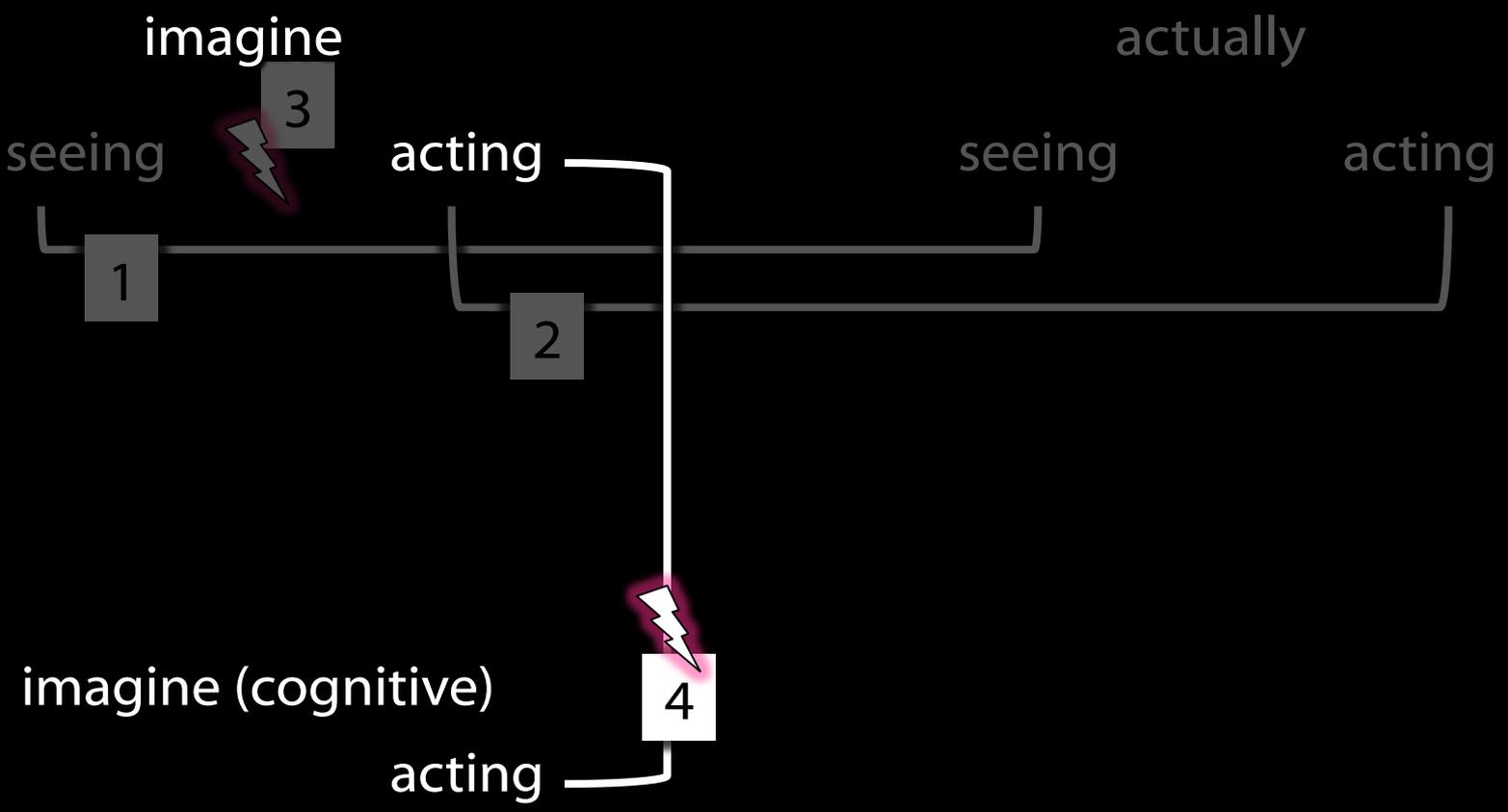
acting







Fiori et al (submitted)



No motor representations are propositional attitudes.

Only representations with a common format can be inferentially integrated.

Any two intentions can be inferentially integrated in practical reasoning.

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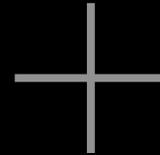
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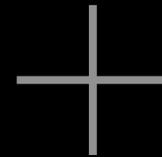
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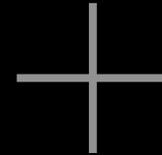
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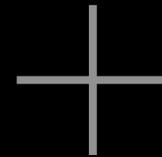
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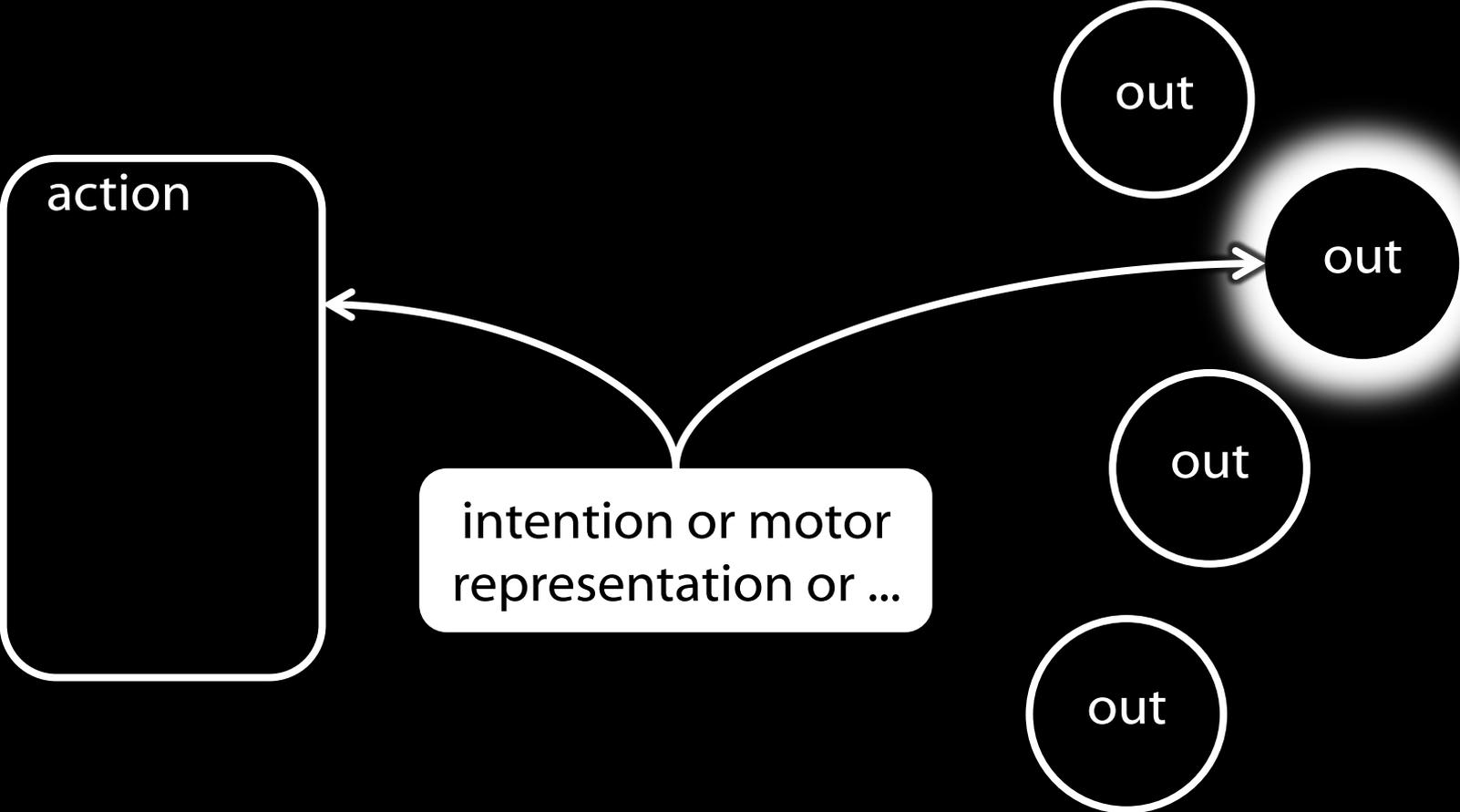
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No motor representations are intentions

What is the relation between a purposive action and the outcome or outcomes to which it is directed?





The Interface Problem

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Some actions involve both
intention and motor
representation

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motor representations:

i. represent outcomes;

ii. ground the
purposiveness of some
actions

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Two outcomes, A and B,
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just if, in that context, either
the occurrence of A would
normally constitute or cause,
at least partially, the
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The Interface Problem:

How are non-accidental matches possible?

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Head southeast on Rue Cujas toward Rue Victor Cousin. Turn right onto Rue Saint-Jacques...



Follow *that* route

=



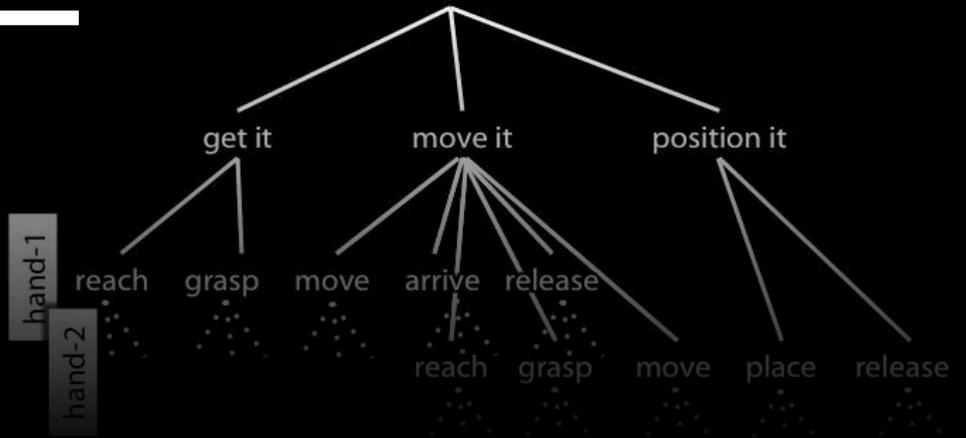
?

Do that

==

Move it from there to here

?





first round

A (10)

B (5)

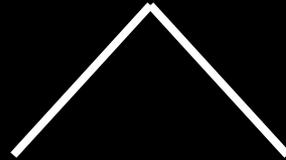
second round

C (10)

D (5)

E (55)

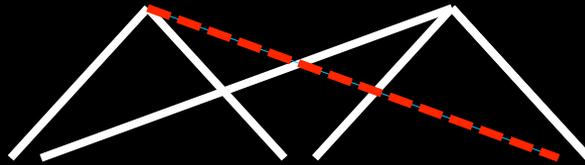
first round



A (10)

B (5)

second round



C (10)

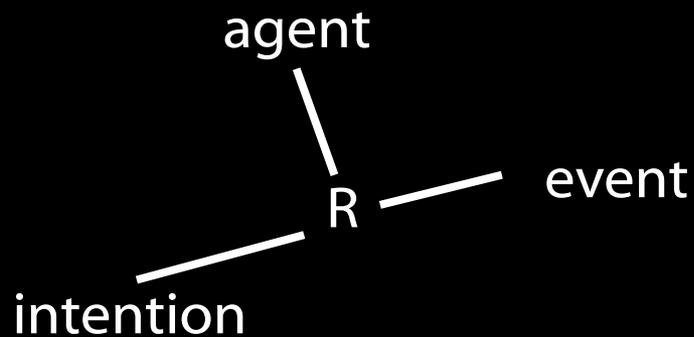
D (5)

E (55)

“What events in the life of a person reveal agency;
what are his deeds and his doings in contrast to
mere happenings in his history;
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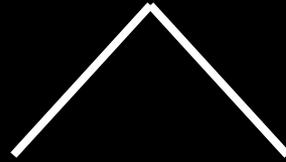
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“a person is the agent of an event if and only if
there is a description of what he did that makes
true a sentence that says he did it intentionally”

(Davidson 1971:46)



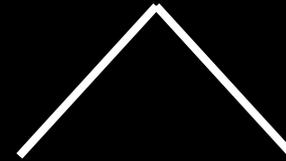
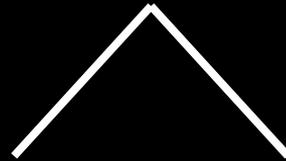
first round



A (10)

B (5)

second round



C (10)

D (5)

E (55)

F (5)

One night in Budapest

[A] My having dinner at ____ would be desirable.

[B] My visiting the theatre would be desirable.

[C] My shopping at ____ would be desirable.

One night in Budapest

[A] My having dinner at ___ would be desirable.

[B] My visiting the theatre would be desirable.

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Alternative frame

[A] & [B]

[A] & [C]

[B] & [C]