



# **Intention and Motor Representation in Joint Action**

s.butterfill@warwick.ac.uk & corrado.sinigaglia@unimi.it

premise:

Reciprocal agent-neutral motor representation  
enables joint action

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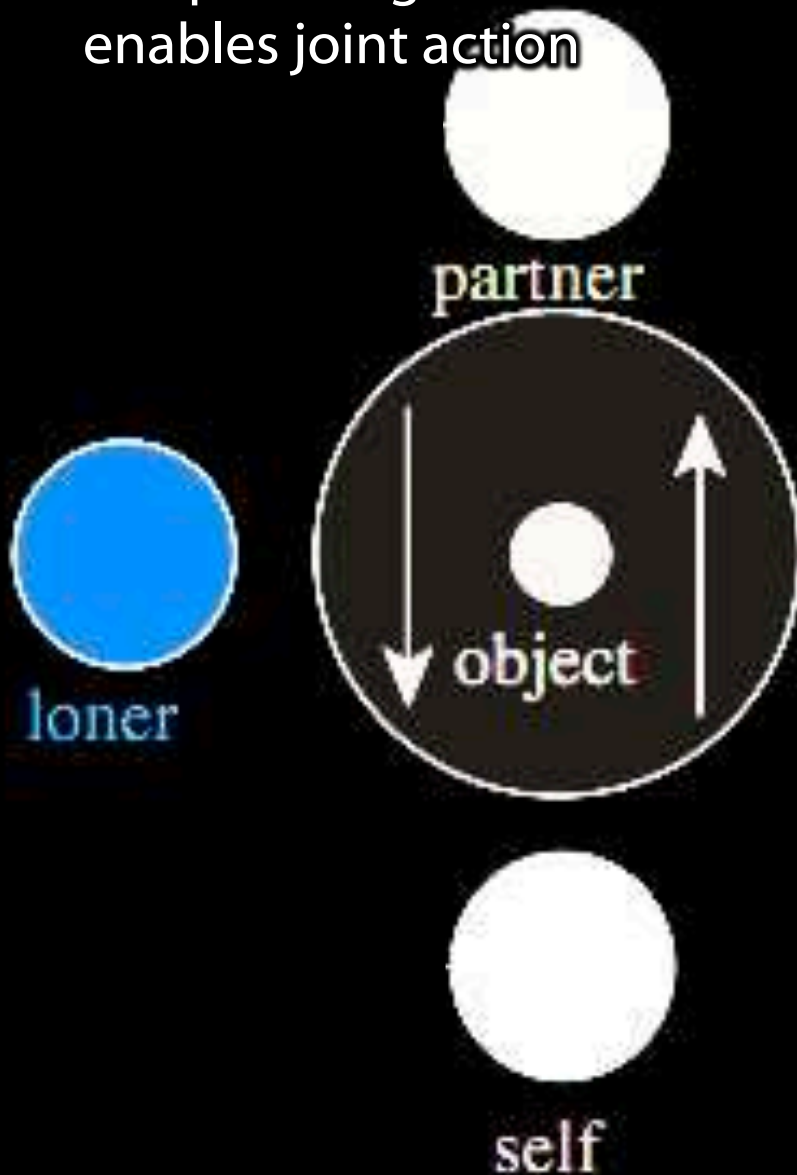
“Simulation of another person’s action, as reflected  
in the activation of motor cortices, gets stronger the  
more the other is perceived as an interaction  
partner.”

--- Kourti, Sebanz & Knoblich (2010, p. 4)



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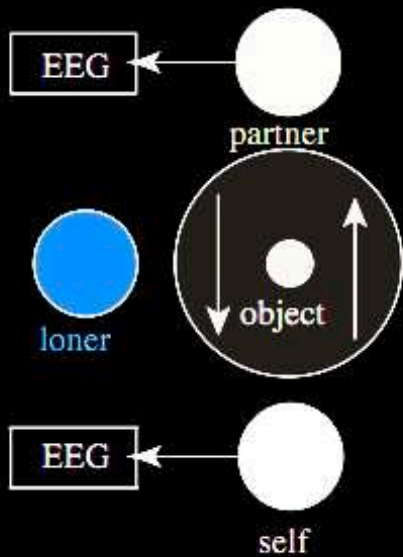
Kourtis, Sebanz & Knoblich (2010)

# Reciprocal agent-neutral motor representation enables joint action



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(a)

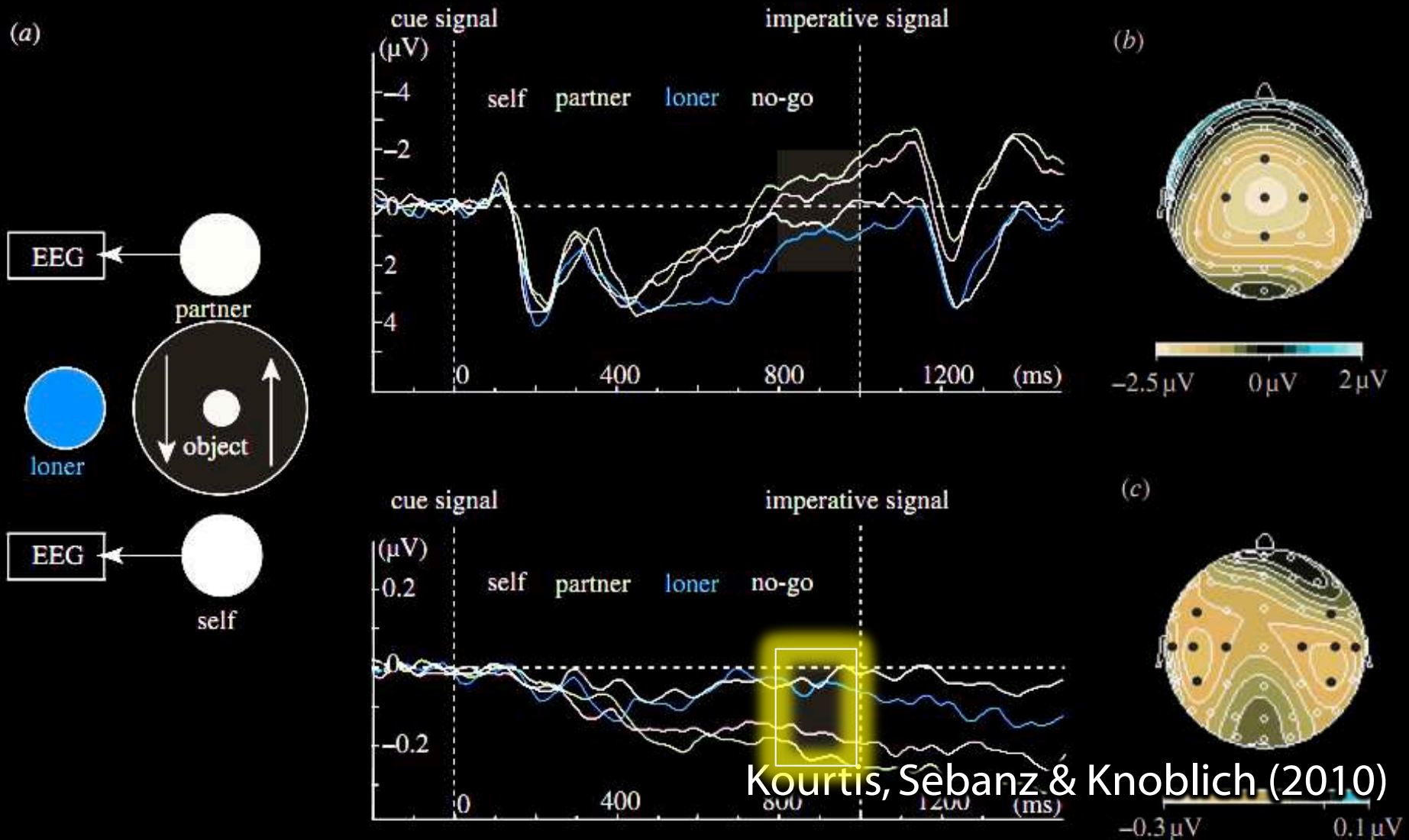


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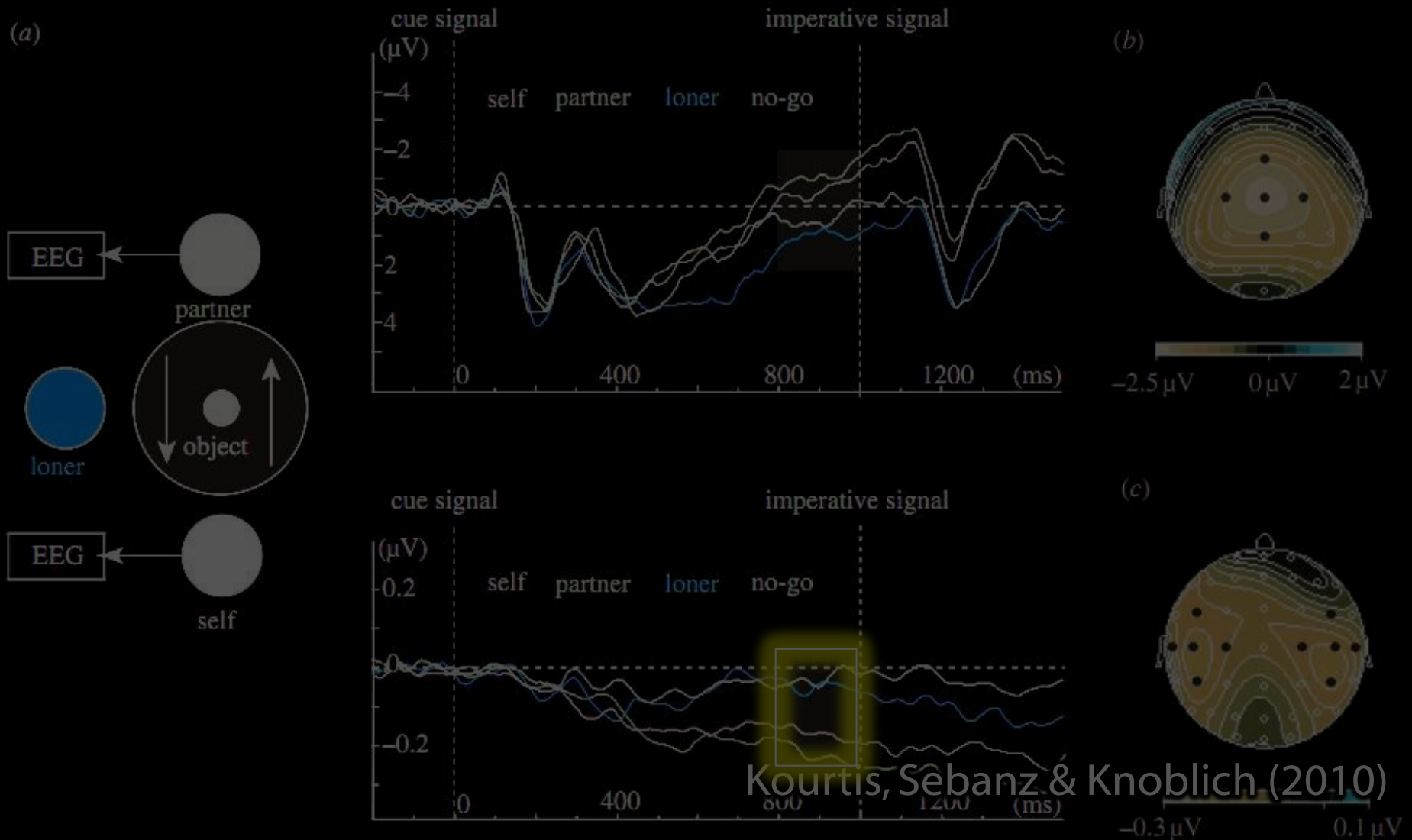


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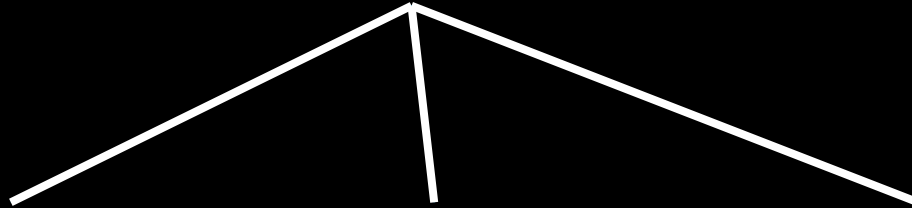


premise:  
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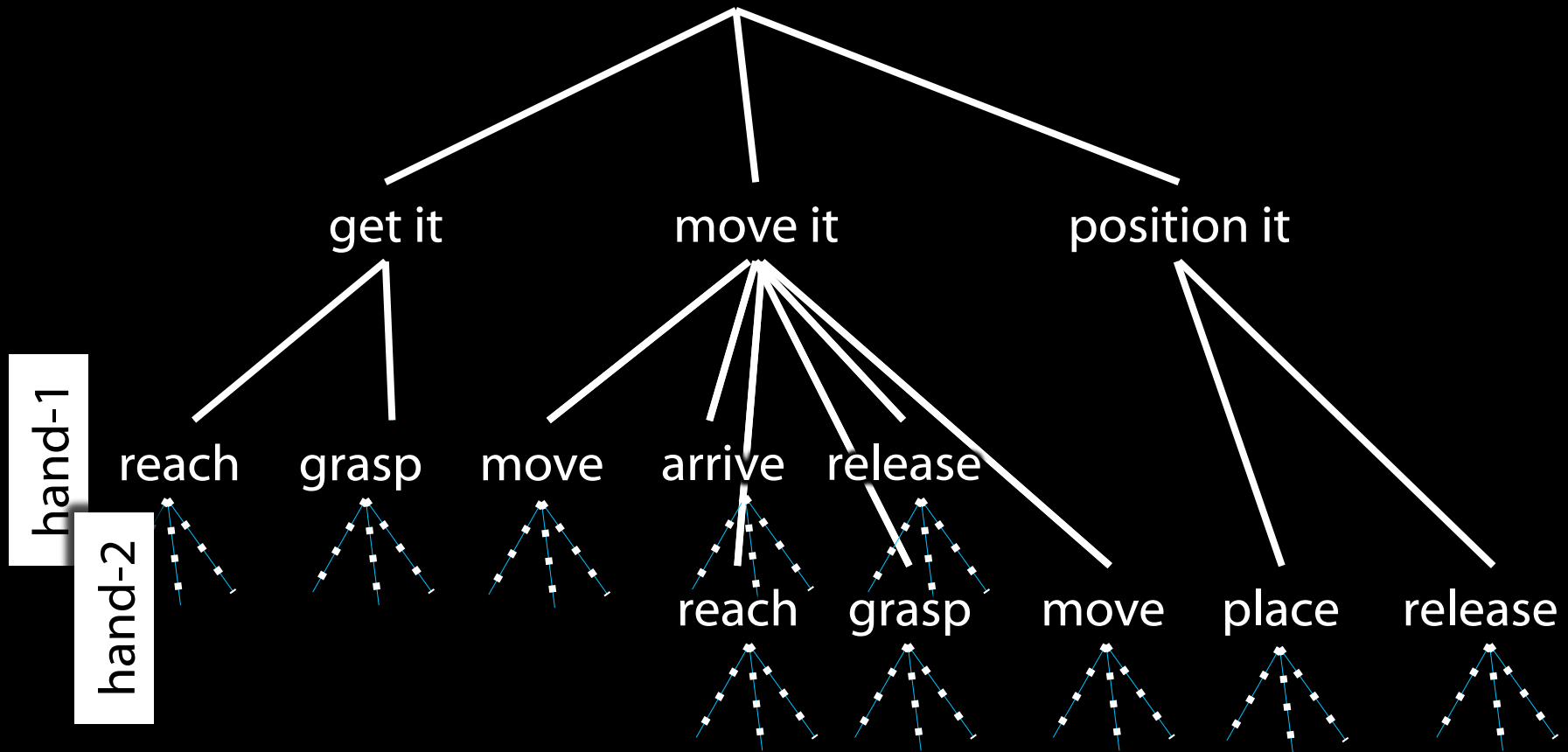


How could reciprocal agent-neutral motor  
representation enable joint action?

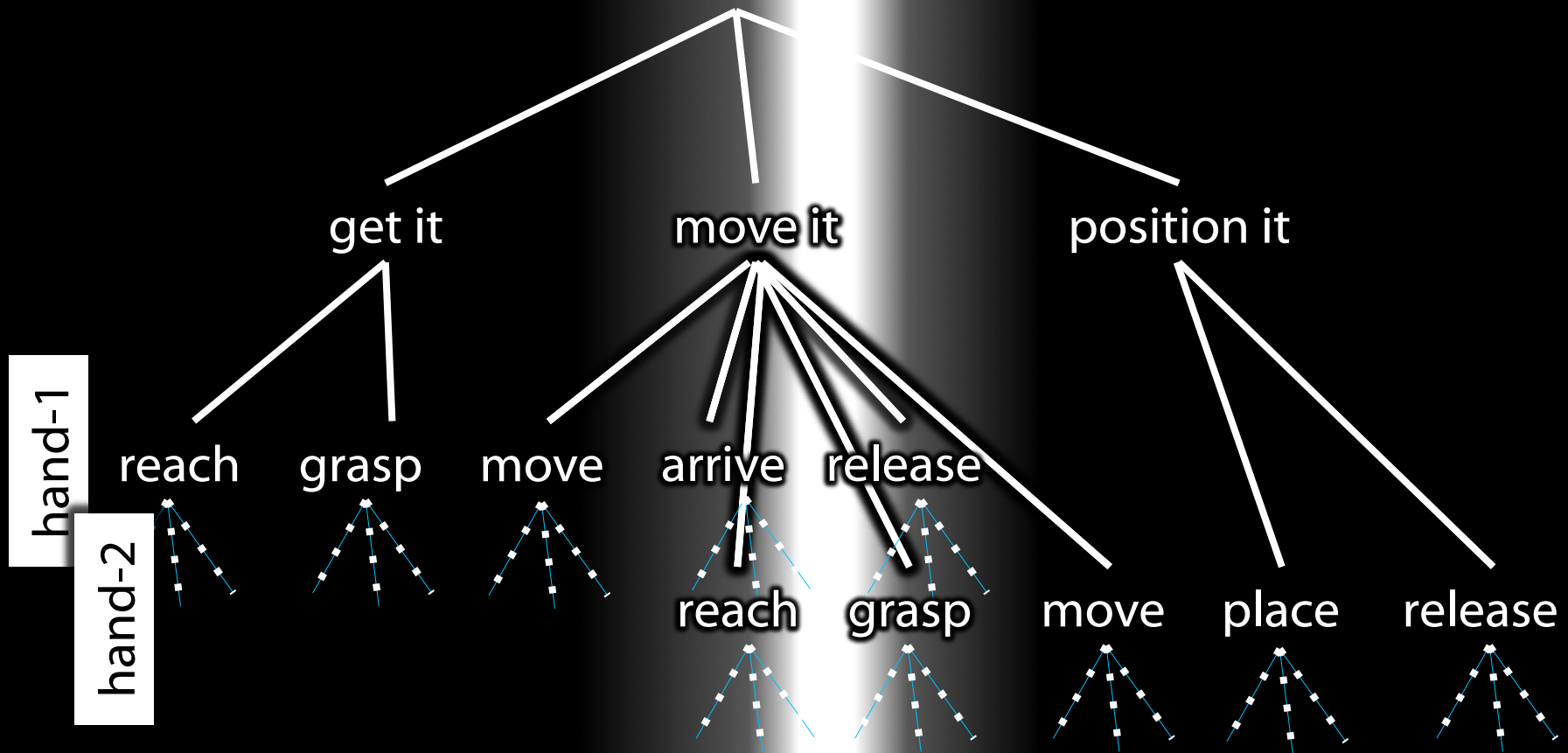
Move it from there to here



Move it from there to here



Move it from there to here



Move it from there to here

joint action:  
same goal

get it

move it

position it

reach

grasp

move

arrive

release

reach

grasp

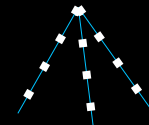
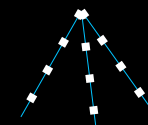
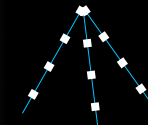
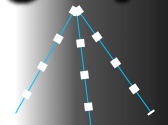
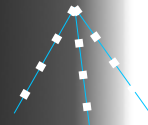
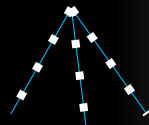
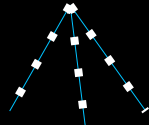
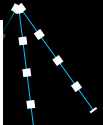
move

place

release

hand-1

hand-2



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similar timing  
problem

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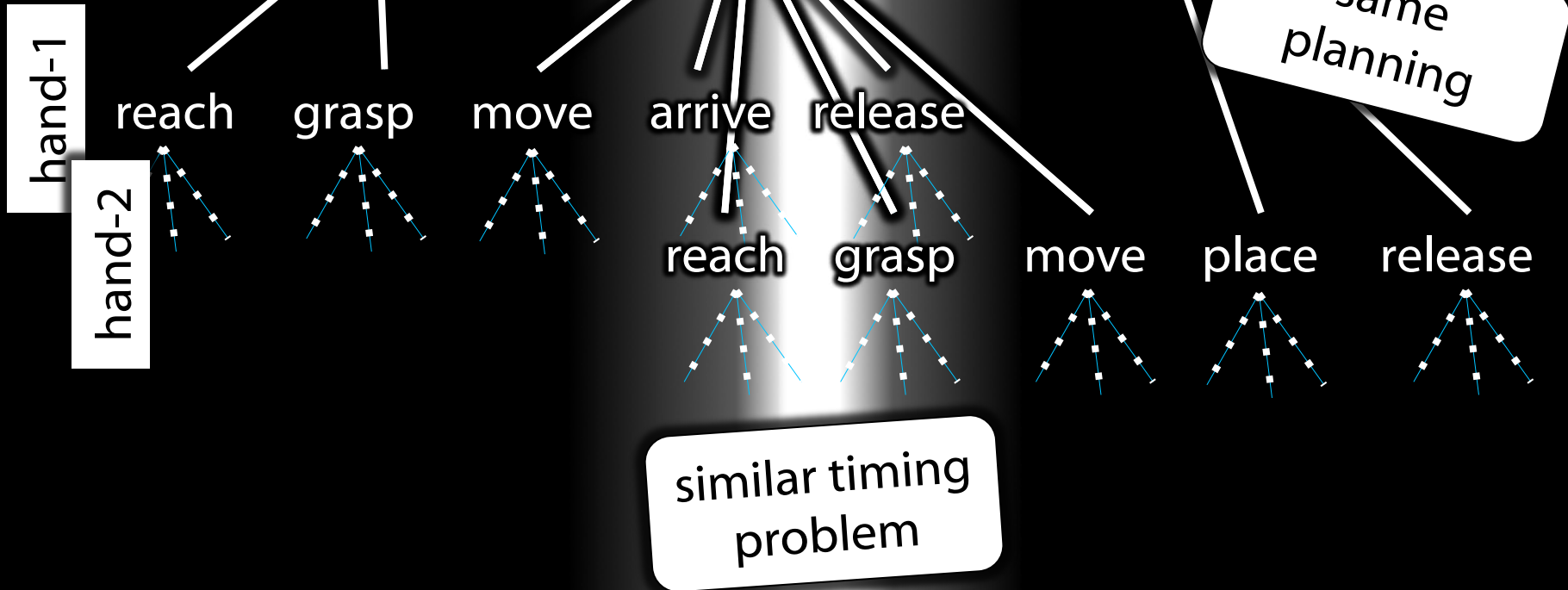
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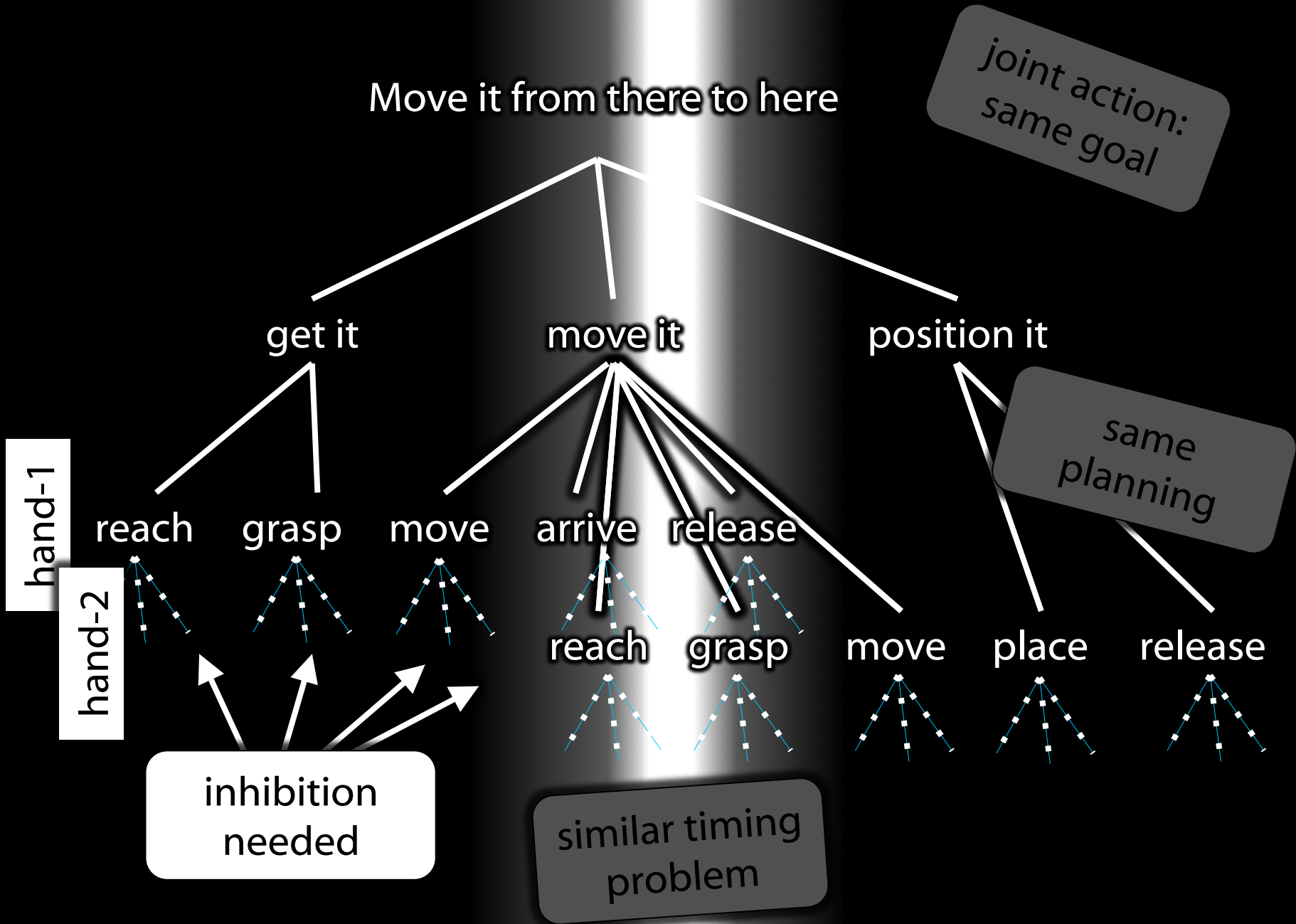
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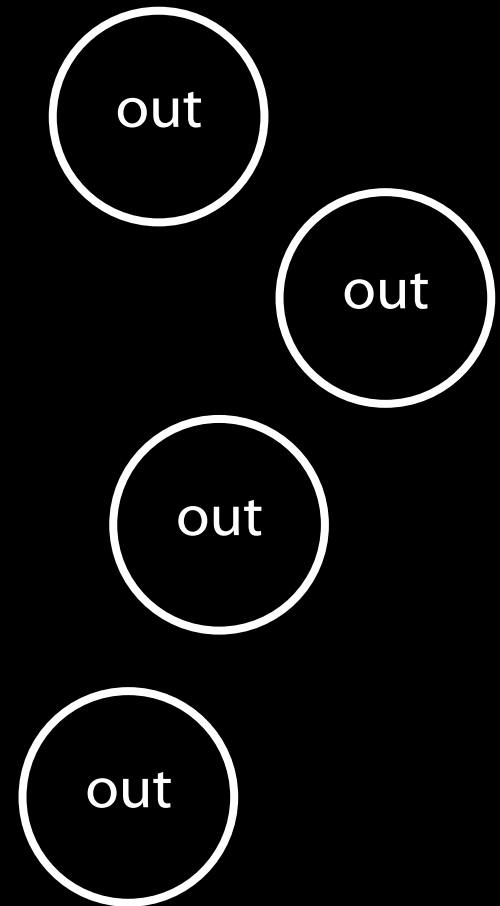
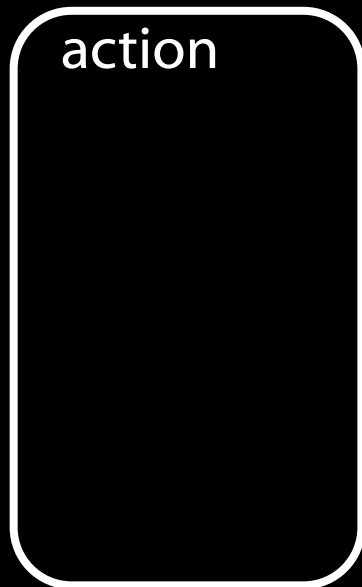
release

inhibition  
needed

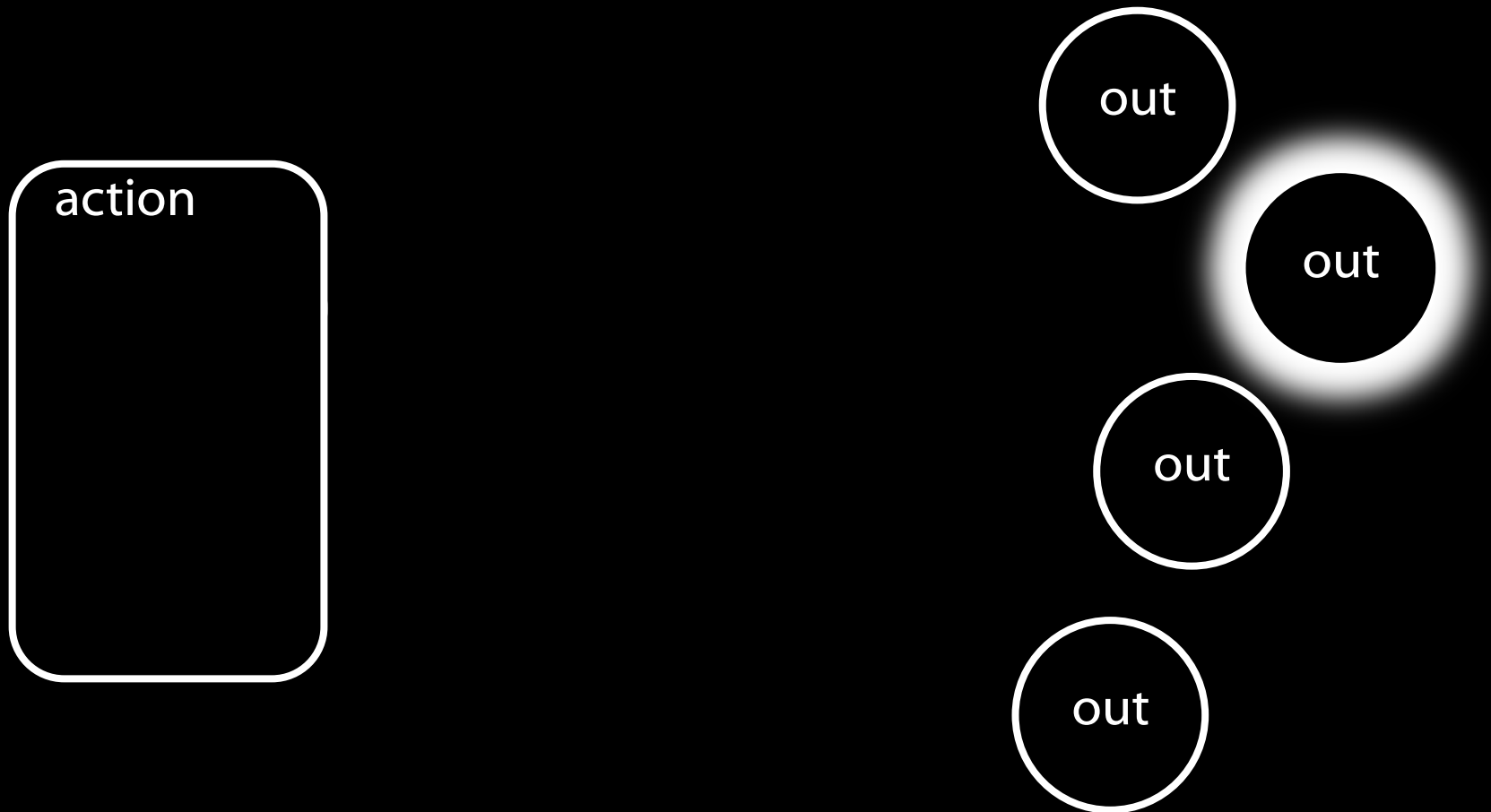
similar timing  
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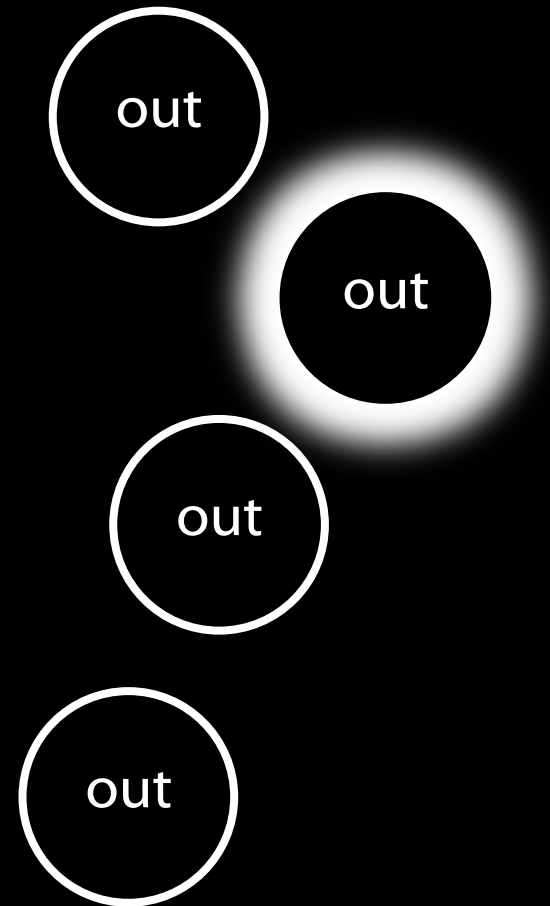
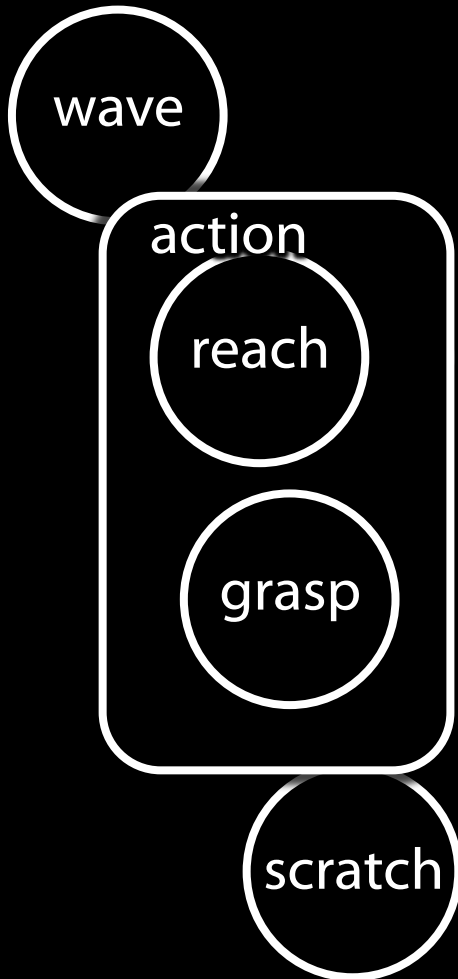
What is the relation between a purposive action and the outcome or outcomes to which it is directed?



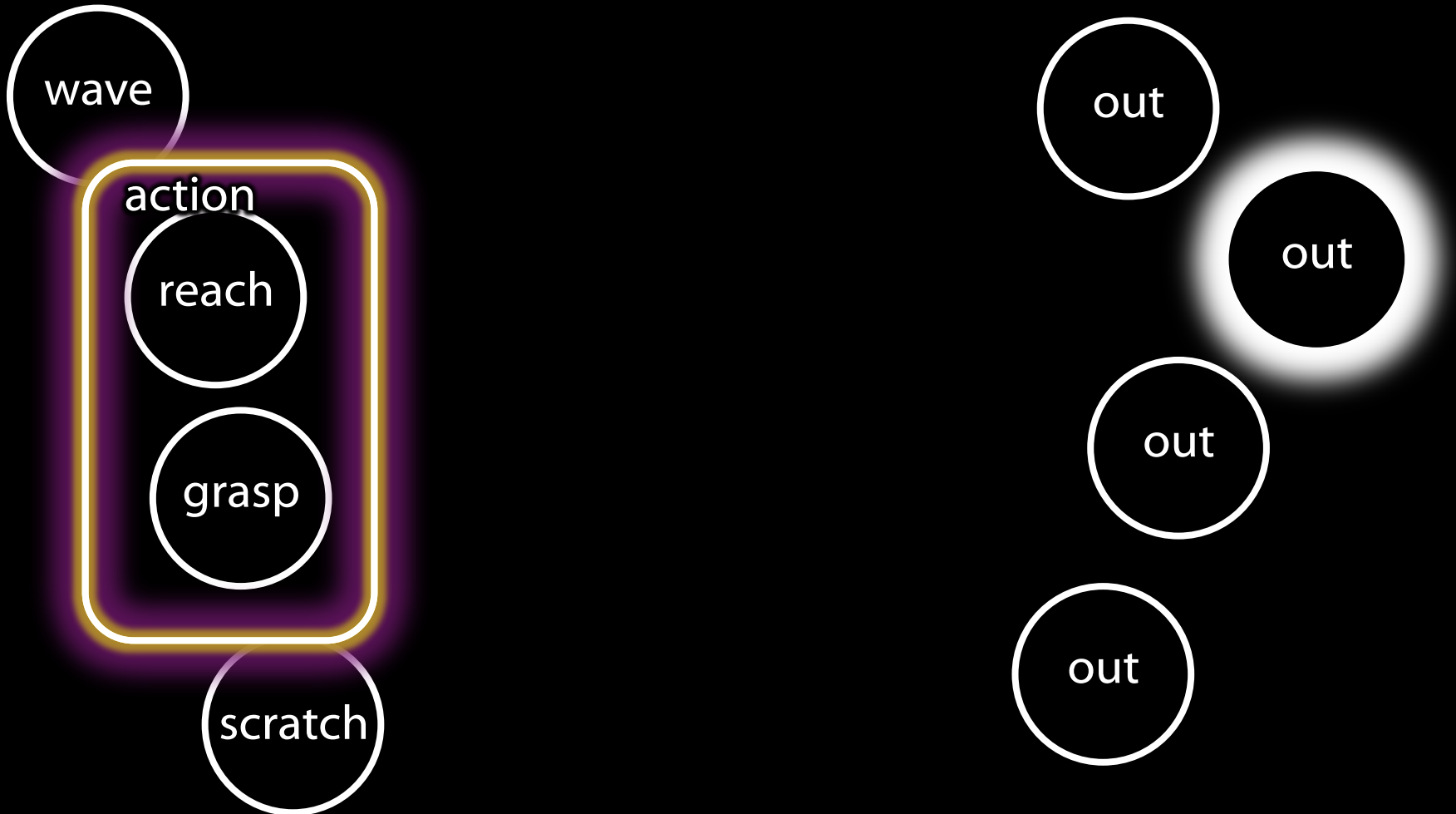
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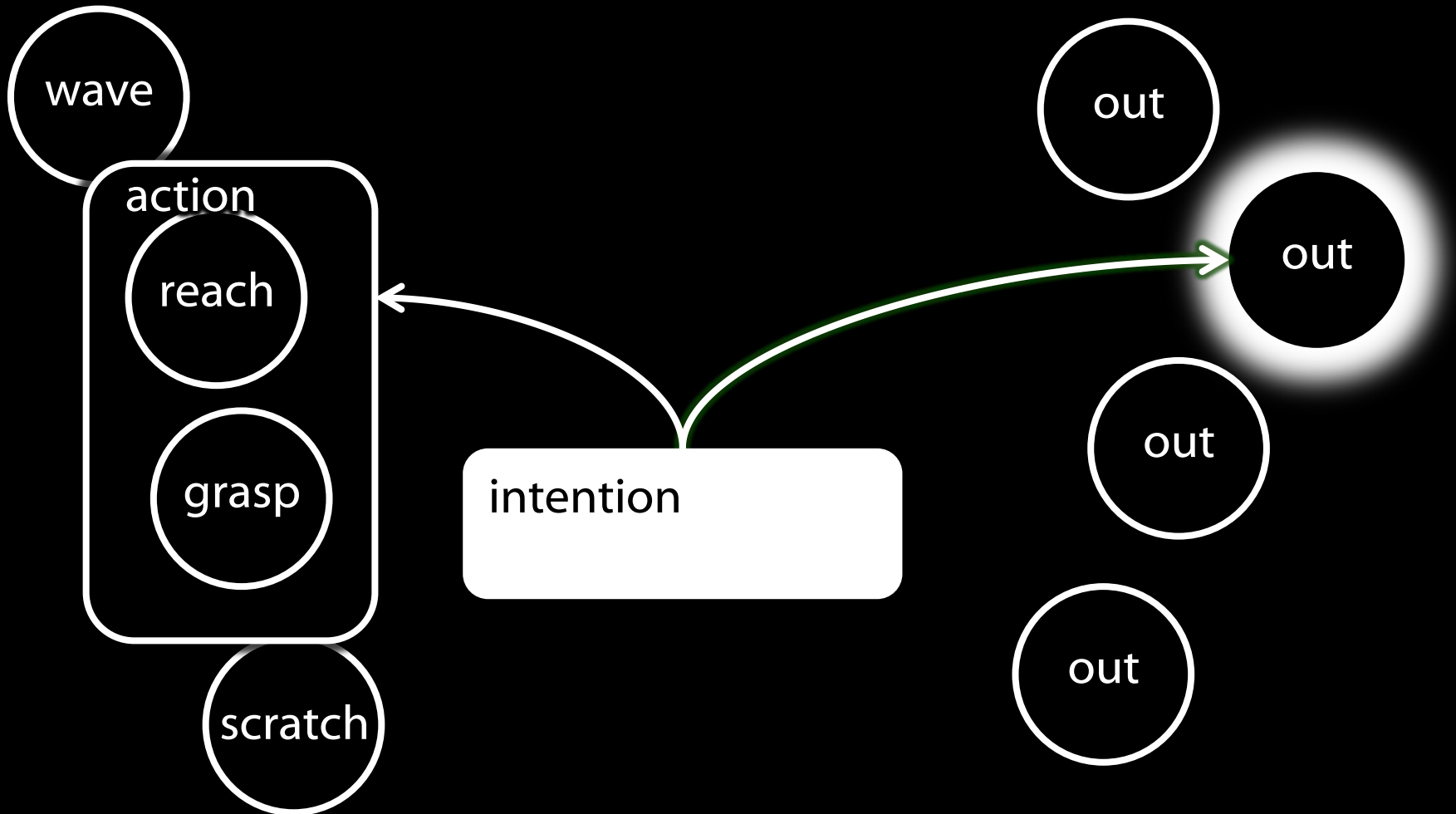
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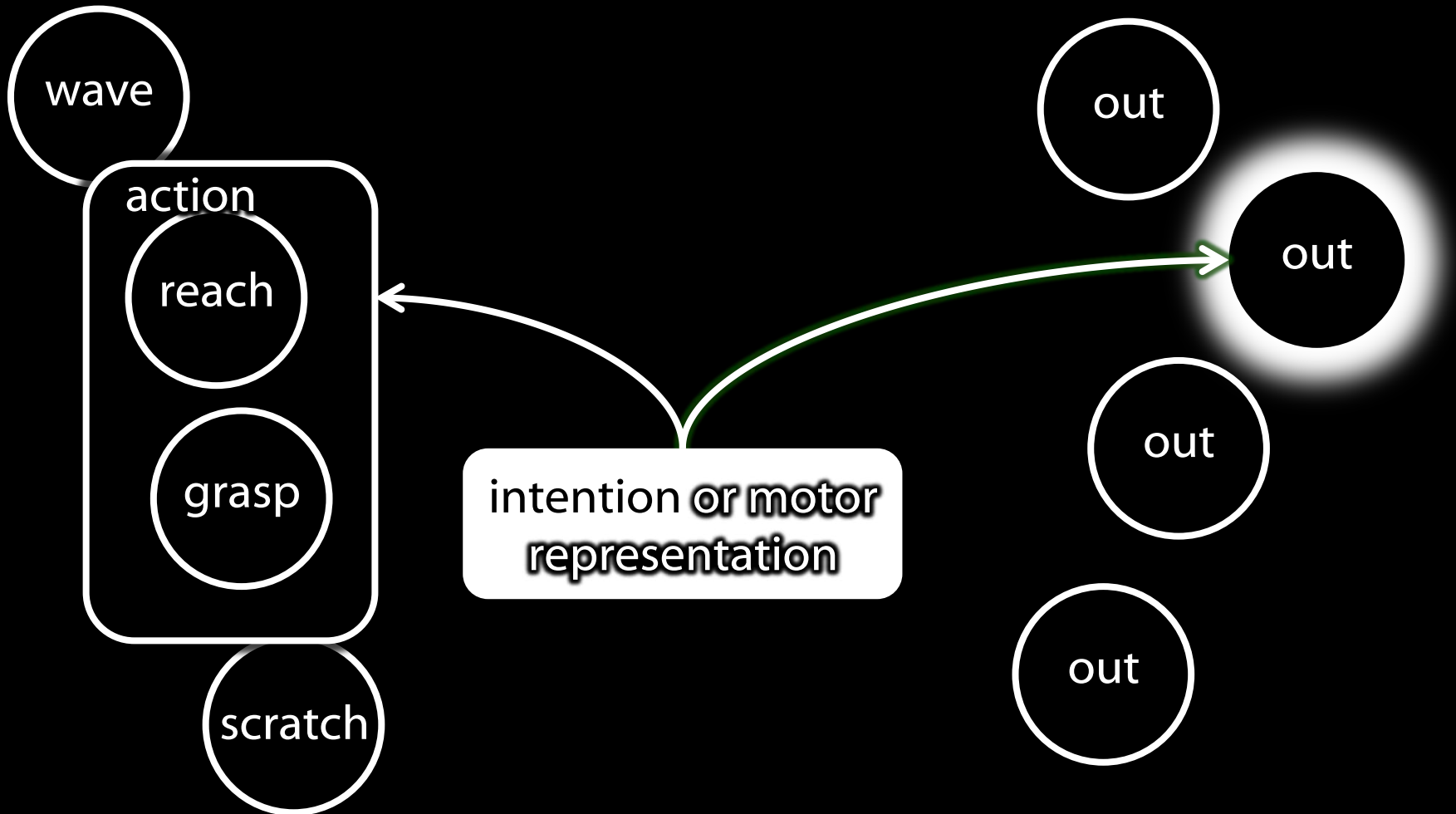
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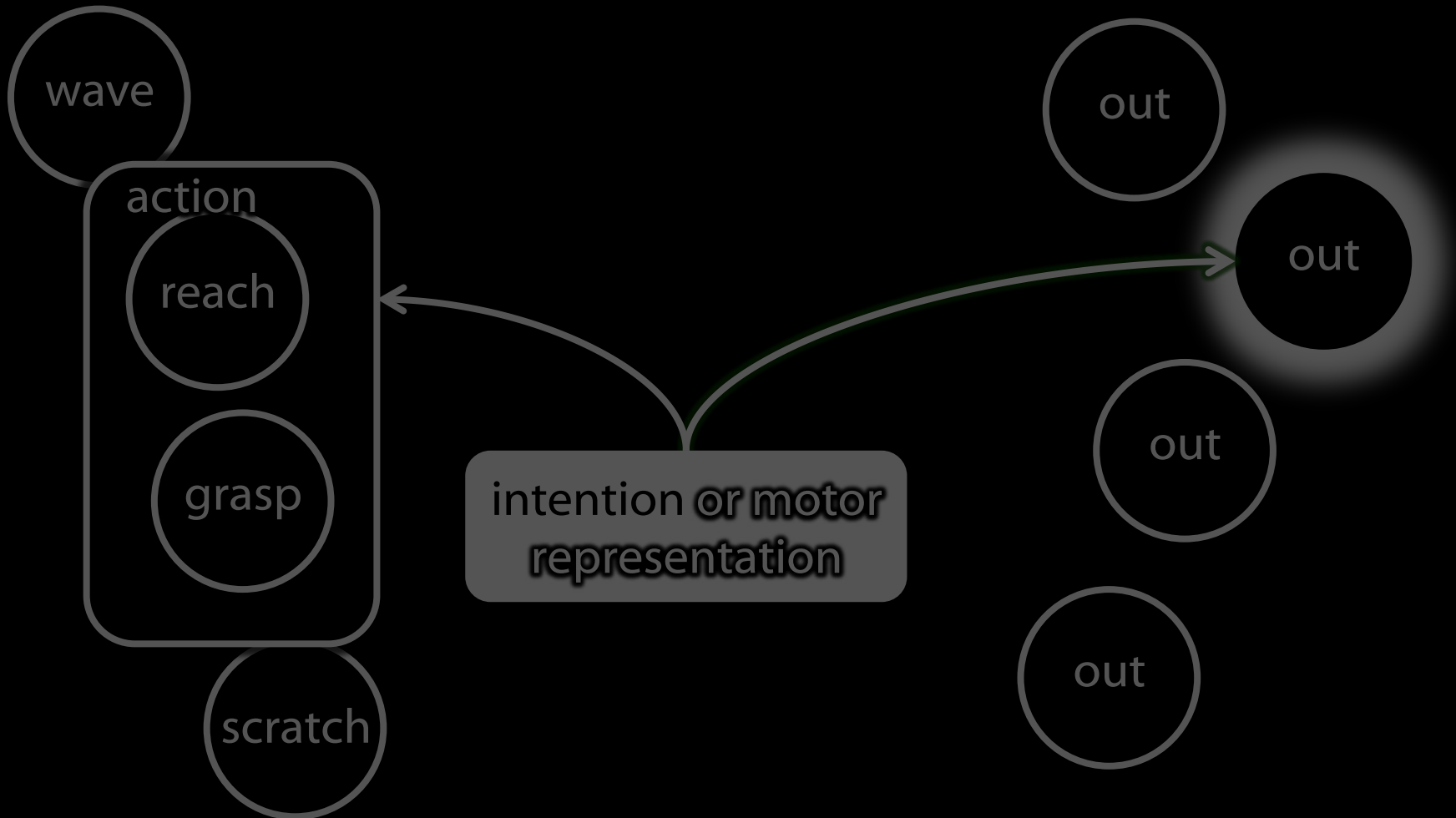
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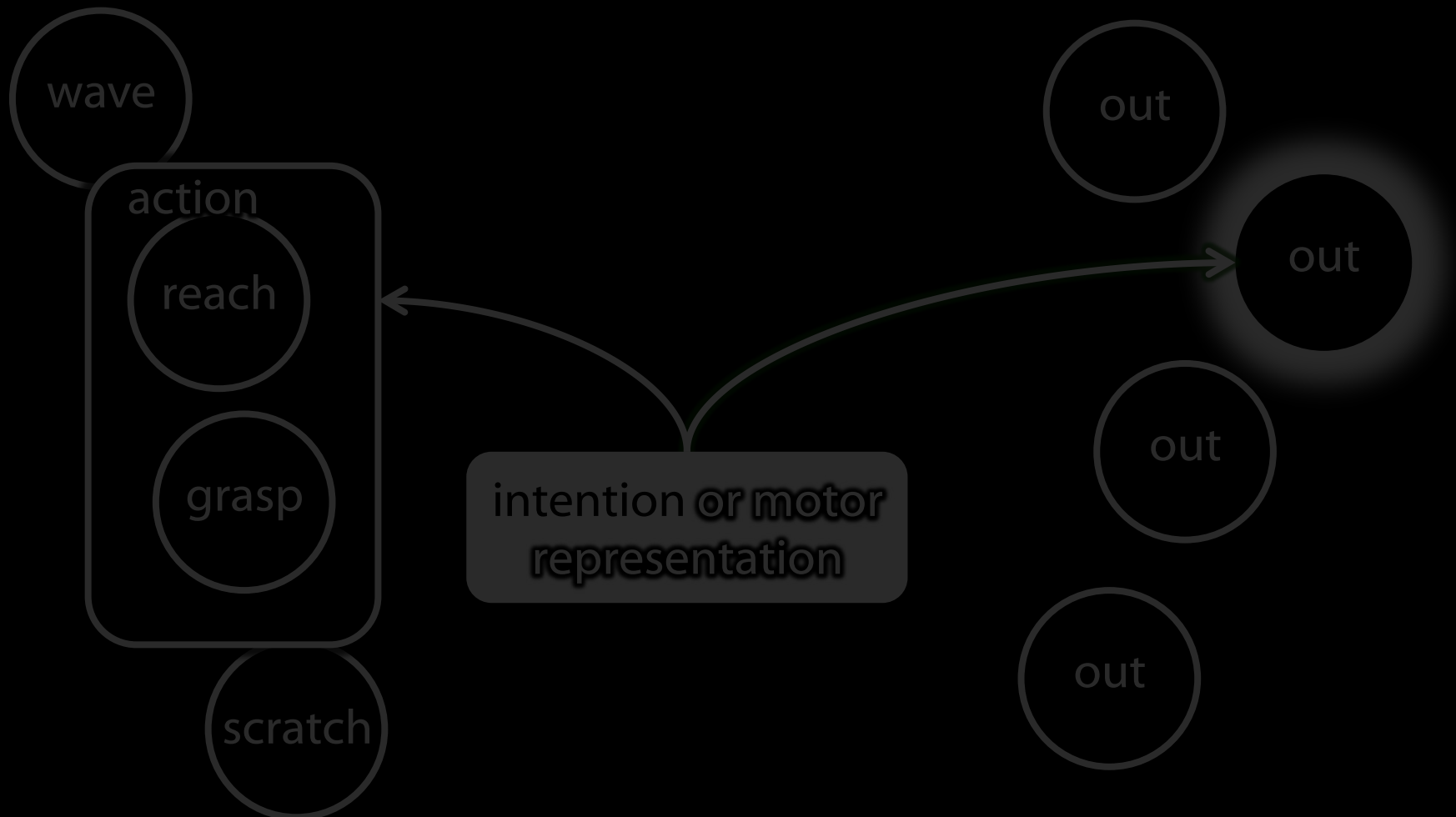


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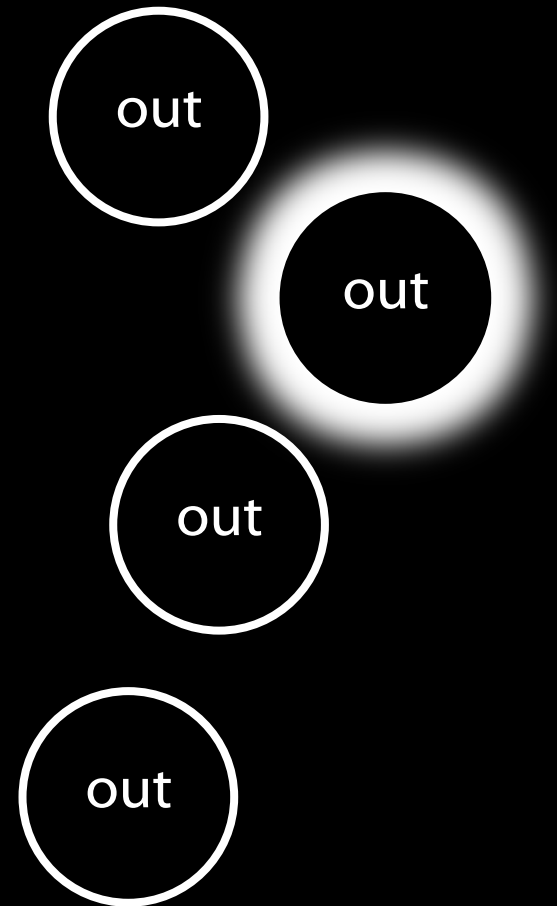
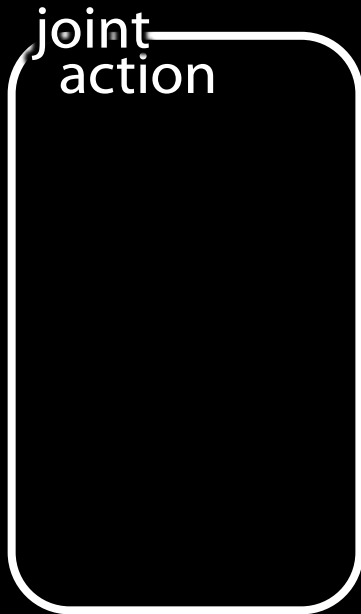




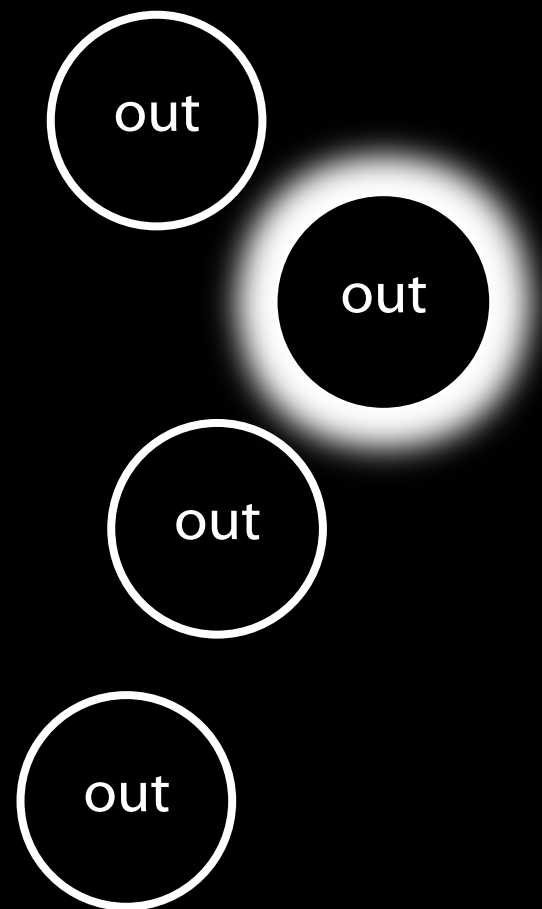
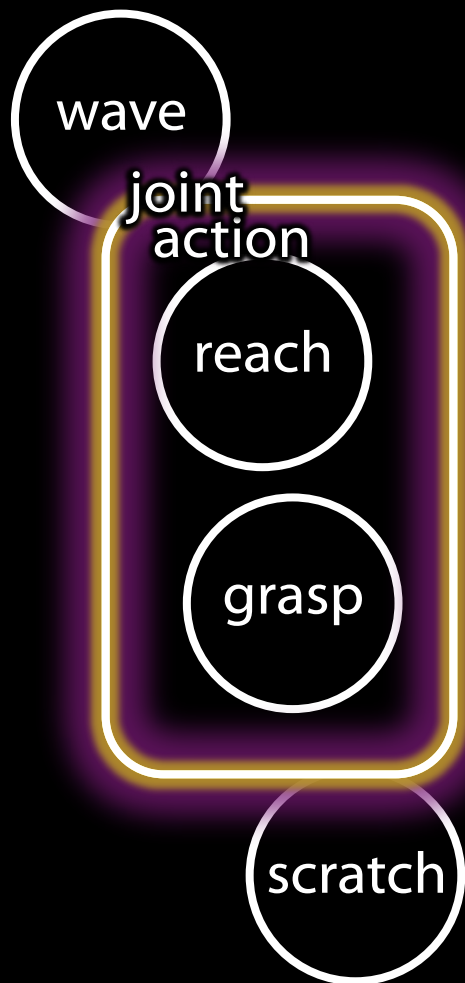
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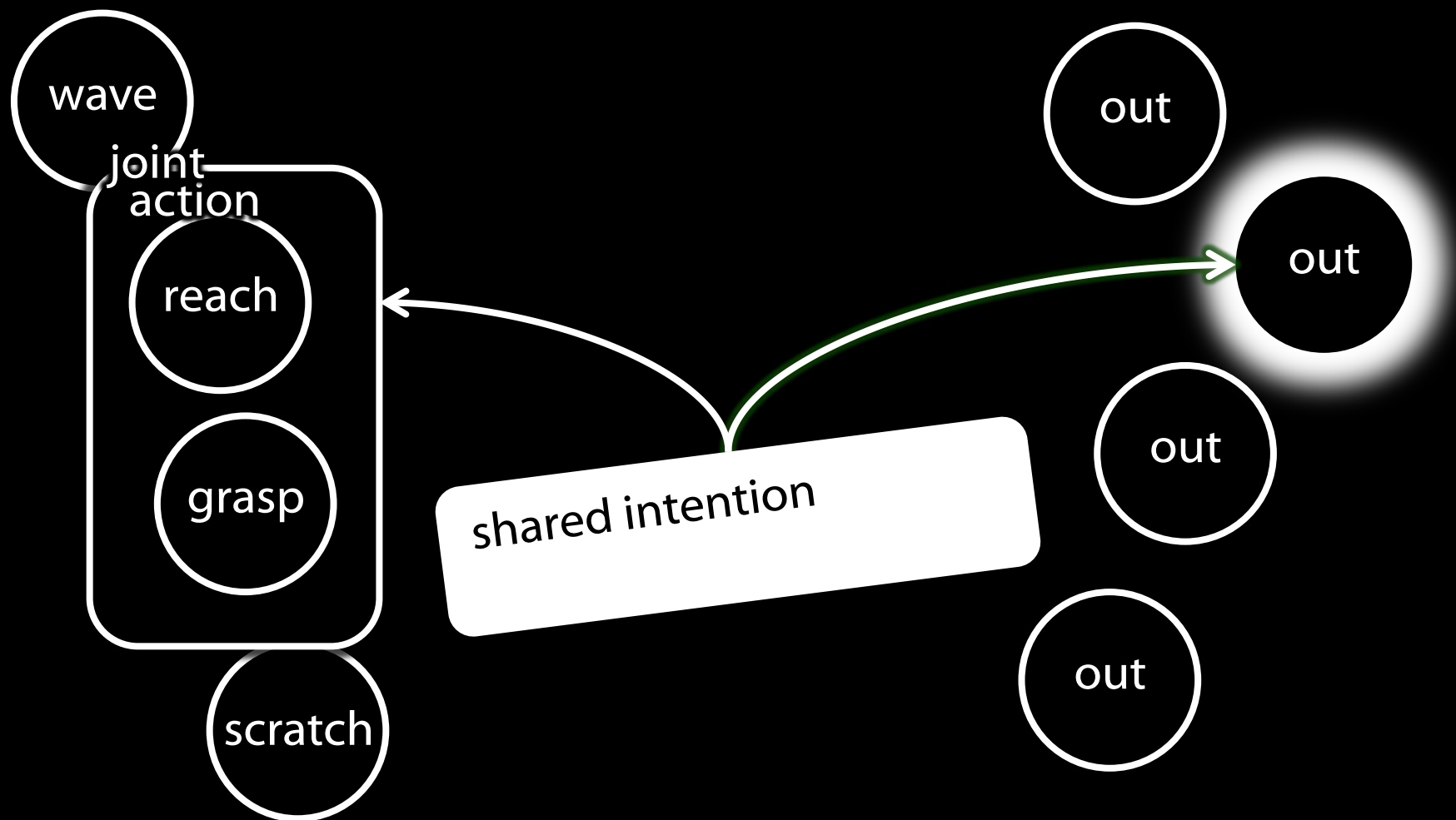
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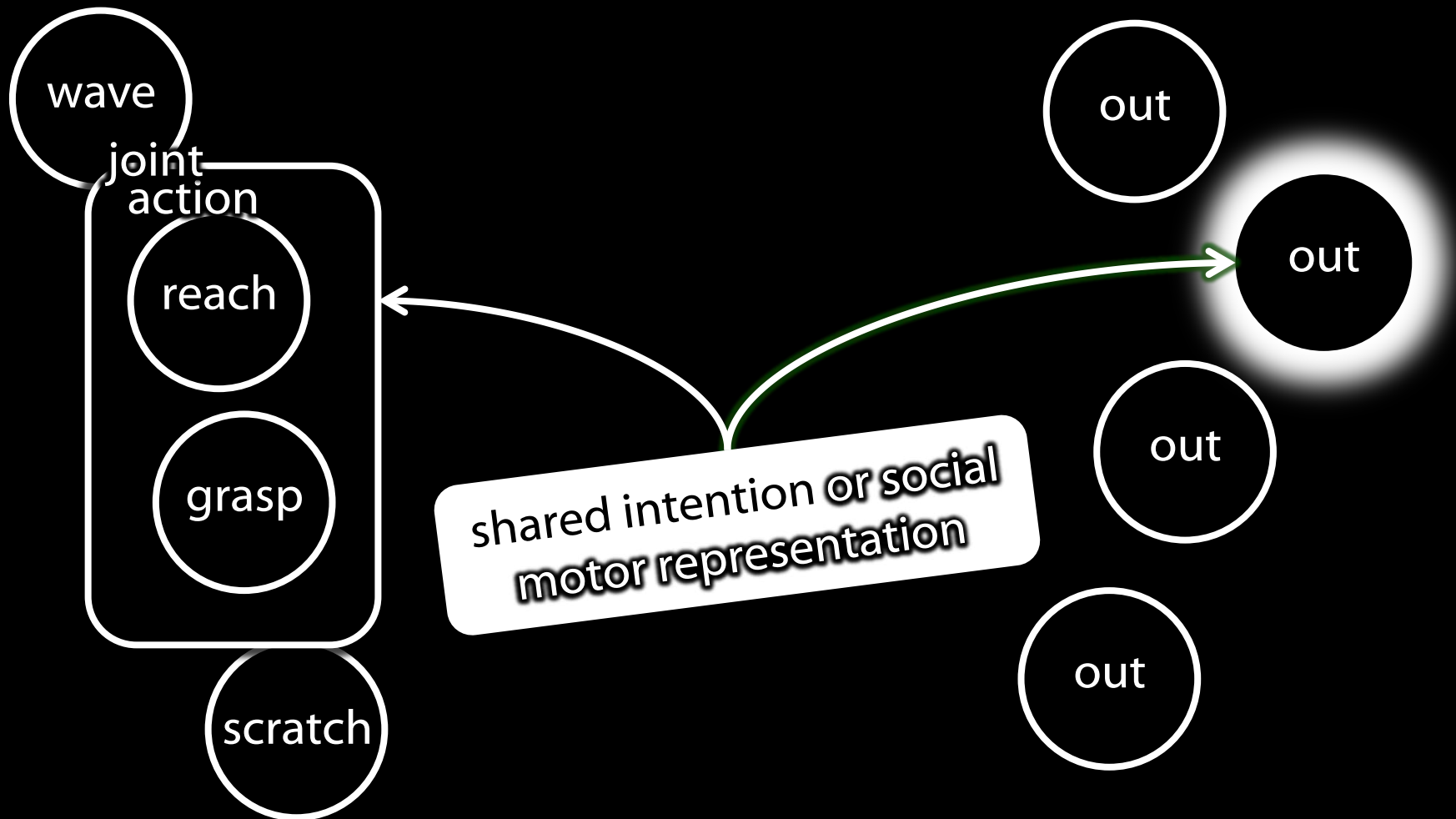
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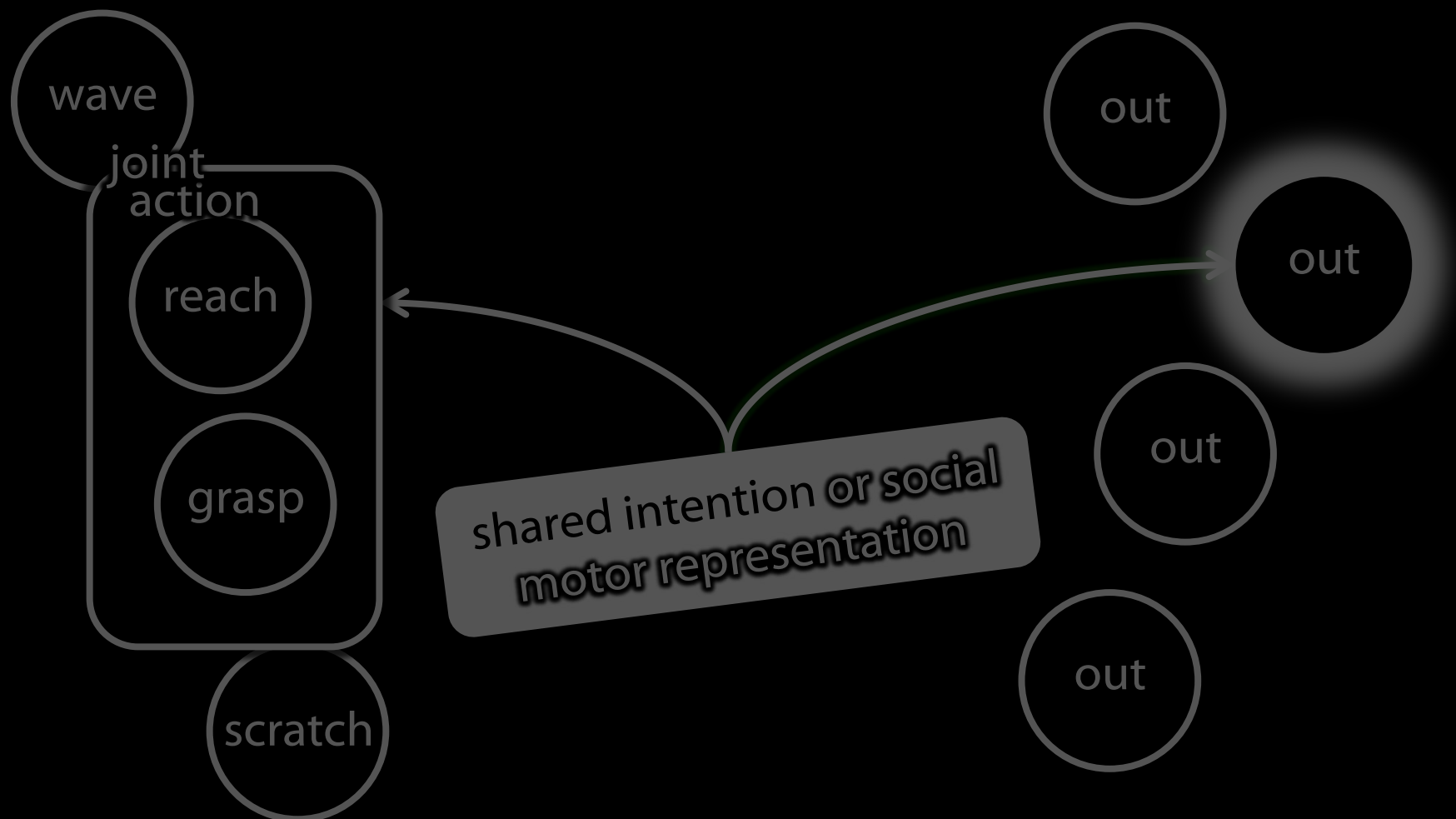
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## Sufficient conditions

We have a shared intention  
that we J if

“1. (a) I intend that we J and  
(b) you intend that we J

“2. I intend that we J in  
accordance with and  
because of Ia, Ib, and  
meshing subplans of Ia and  
Ib; you intend [likewise] ...

“3. 1 and 2 are common  
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(Bratman 1993: View 4)

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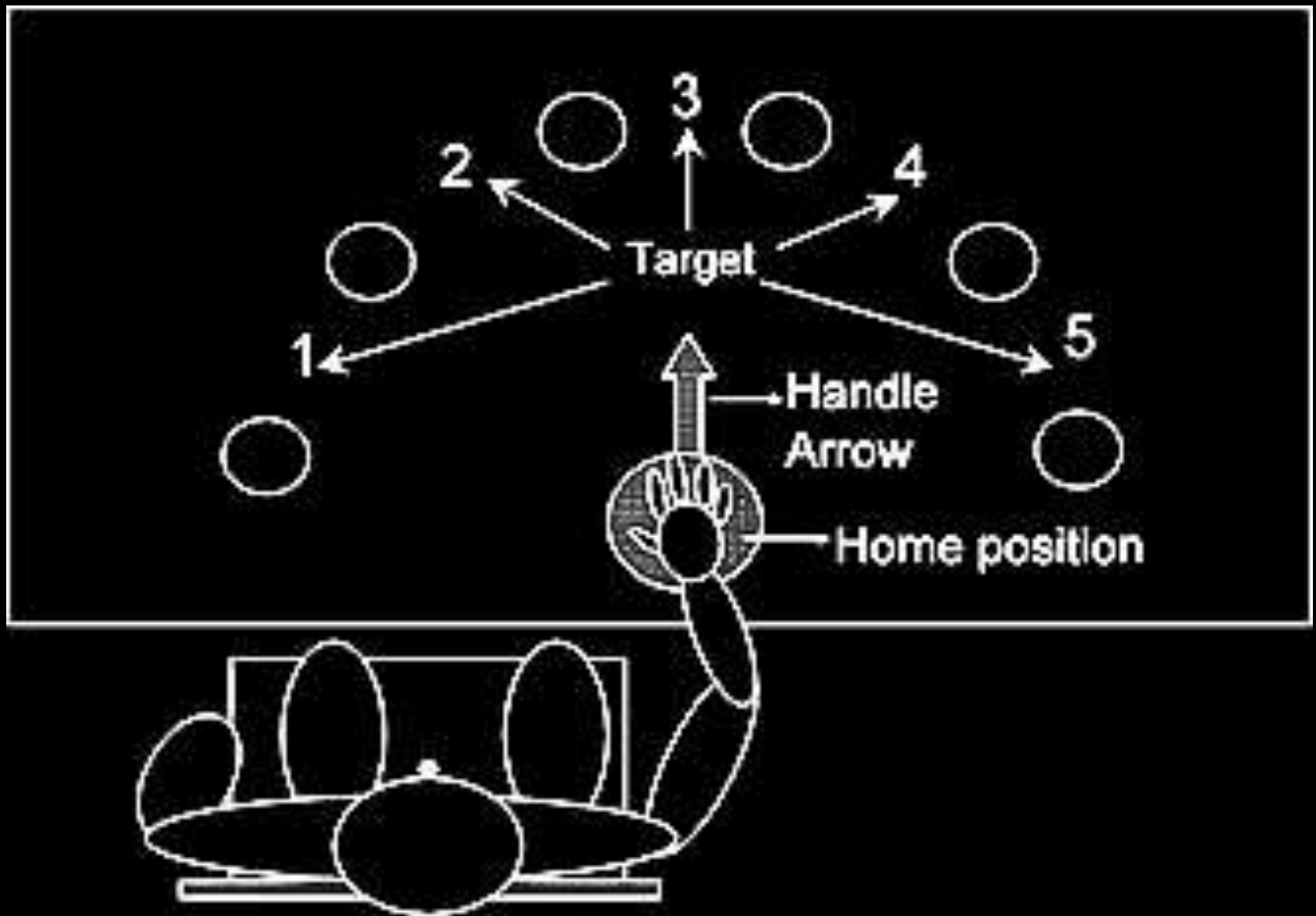
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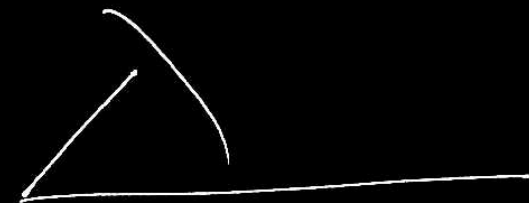
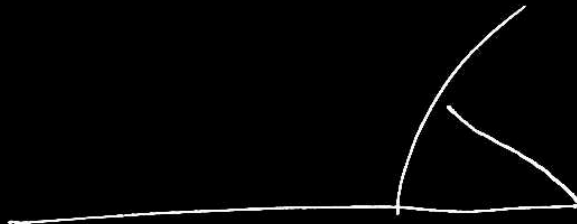
What are intentions for?



(Zhang and Rosenbaum 2007)



(big  
reward)



↑  
ONE  
WAY



x

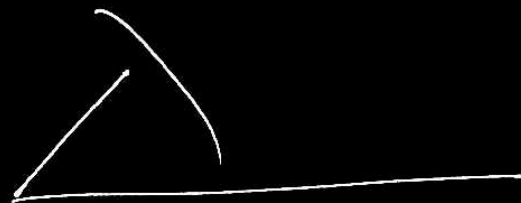
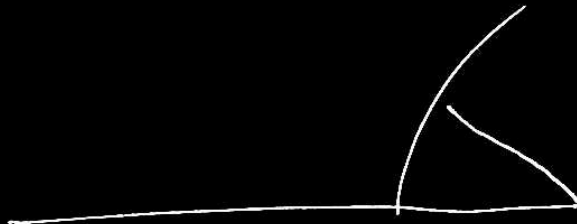
start here

shared  
What are intentions for?  
人





(big  
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↑  
ONE  
WAY



x

start here

moving an object together

(Kourtis et al 2010)

tidying up the toys together

(Behne et al 2005)

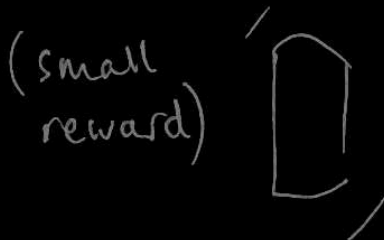
cooperatively pulling  
handles in sequence to  
make a dog-puppet sing

(Brownell et al 2006)

bouncing a cube on a large  
trampoline together

(Tomasello & Carpenter 2007)

pretending to row a boat  
together



ONE  
WA~

X

start here

'I take a collective action to involve a collective  
[shared] intention.'

(Gilbert 2006, p. 5)

'The sine qua non of collaborative action is a joint goal  
[shared intention] and a joint commitment'

(Tomasello 2008, p. 181)

'the key property of joint action lies in its internal  
component [...] in the participants' having a  
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(Alonso 2009, pp. 444-5)

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joint action is built.'

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Joint

Not joint

Joint

Jack and Sue walk  
together

Not joint

Jack and Sue walk  
alongside each other

(Gilbert 1990)

## Joint

Jack and Sue walk  
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We collectively perform a  
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We each individually run  
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sudden shower).

(Searle 1990, 92)

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We lift a sofa together.

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raise either end of a sofa,  
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How might reciprocal agent-neutral motor representations differ from shared intentions?

< different content >



< different content >

< different format >

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

=



?

Only representations with a common format can be inferentially integrated.

Any two intentions can be inferentially integrated in practical reasoning.


My intention that I visit Paris on Friday is a propositional attitude.



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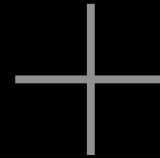
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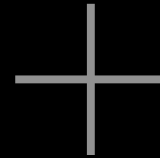
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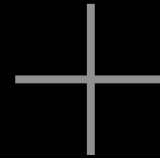
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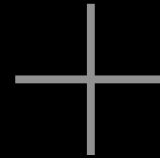
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# The Interface Problem

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Some joint actions involve  
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reciprocal agent-neutral  
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Reciprocal agent-neutral  
motor representations:

i. represent outcomes;

ii. ground the  
purposiveness of some  
joint actions

Some joint actions involve  
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## The Interface Problem

Reciprocal agent-neutral motor representations:

- i. represent outcomes;
- ii. ground the purposiveness of some joint actions; and

Two outcomes, A and B, *match* in a particular context just if, in that context, either the occurrence of A would normally constitute or cause, at least partially, the occurrence of B or vice versa.

Some joint actions involve both shared intention and reciprocal agent-neutral motor representation

## The Interface Problem: How are non-accidental matches possible?

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both shared intention and  
reciprocal agent-neutral  
motor representation

## The Interface Problem: How are non-accidental matches possible?

Reciprocal agent-neutral  
motor representations:

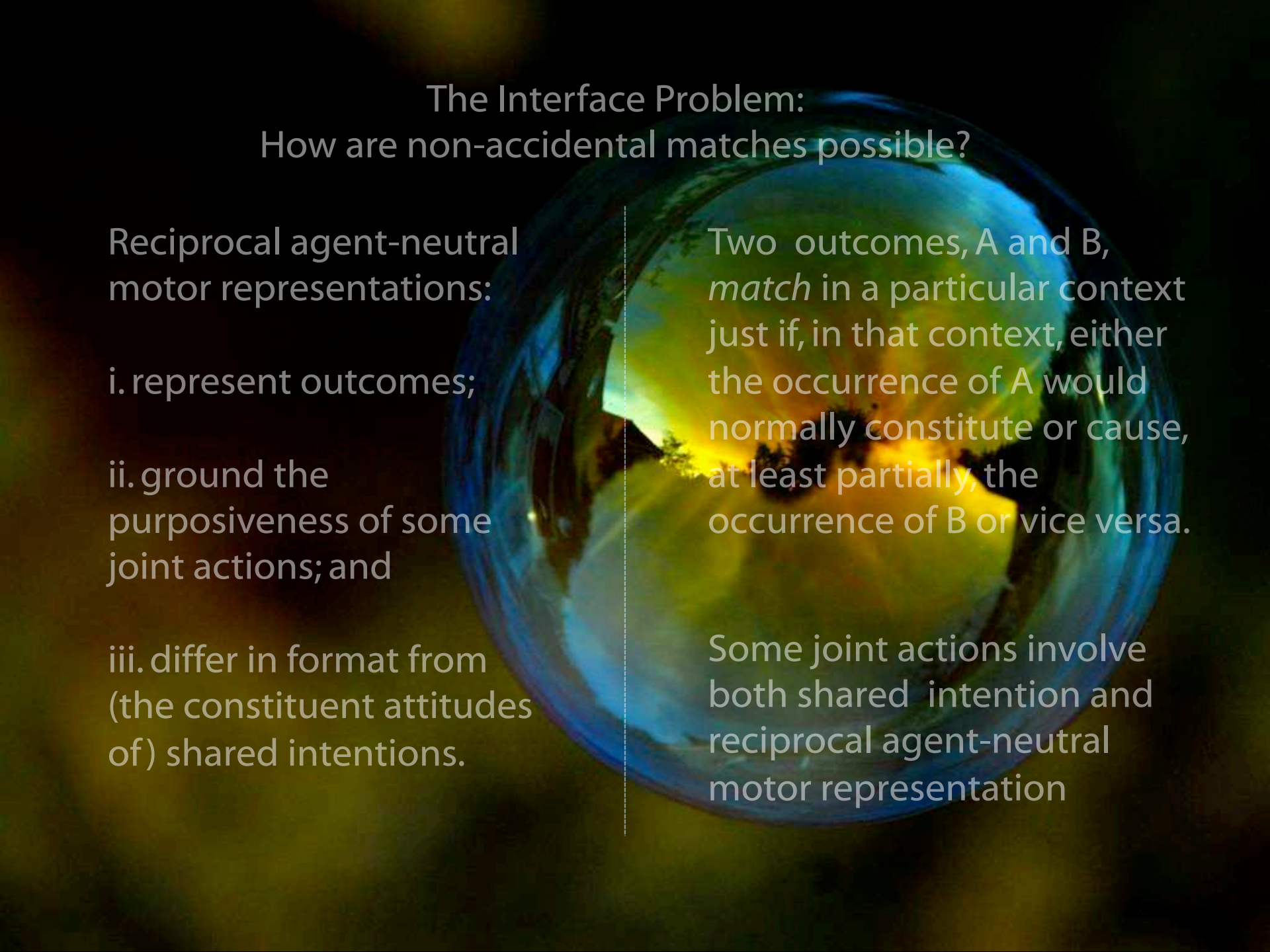
i. represent outcomes;

ii. ground the  
purposiveness of some  
joint actions; and

iii. differ in format from  
(the constituent attitudes  
of) shared intentions.

Two outcomes, A and B,  
*match* in a particular context  
just if, in that context, either  
the occurrence of A would  
normally constitute or cause,  
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