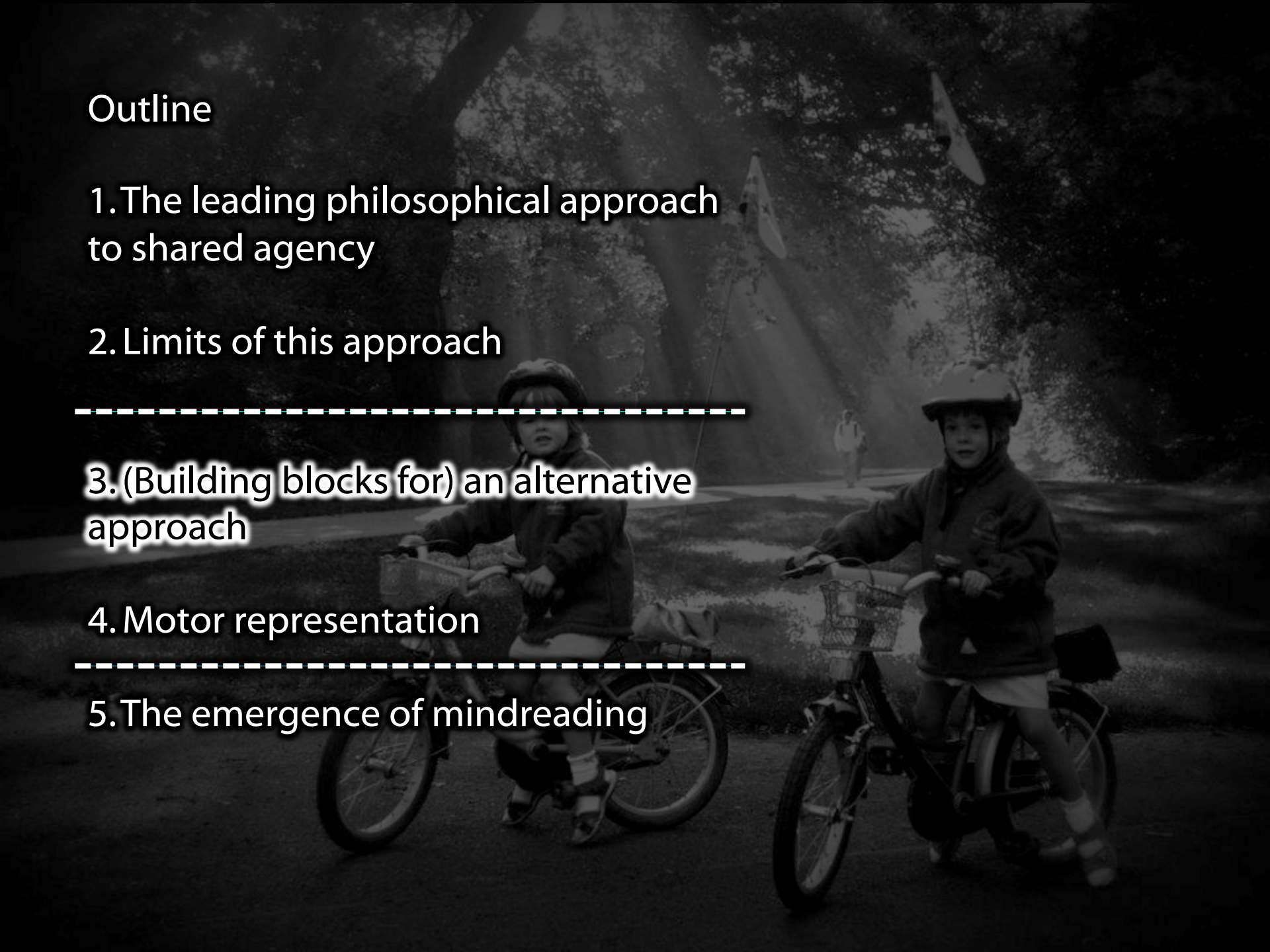
Mindreading & Joint Action

8. Shared Intention & Motor Representation in Joint Action

butterfillS@ceu.hu



Outline

1. The leading philosophical approach to shared agency

2. Limits of this approach

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3. (Building blocks for) an alternative approach

4. Motor representation

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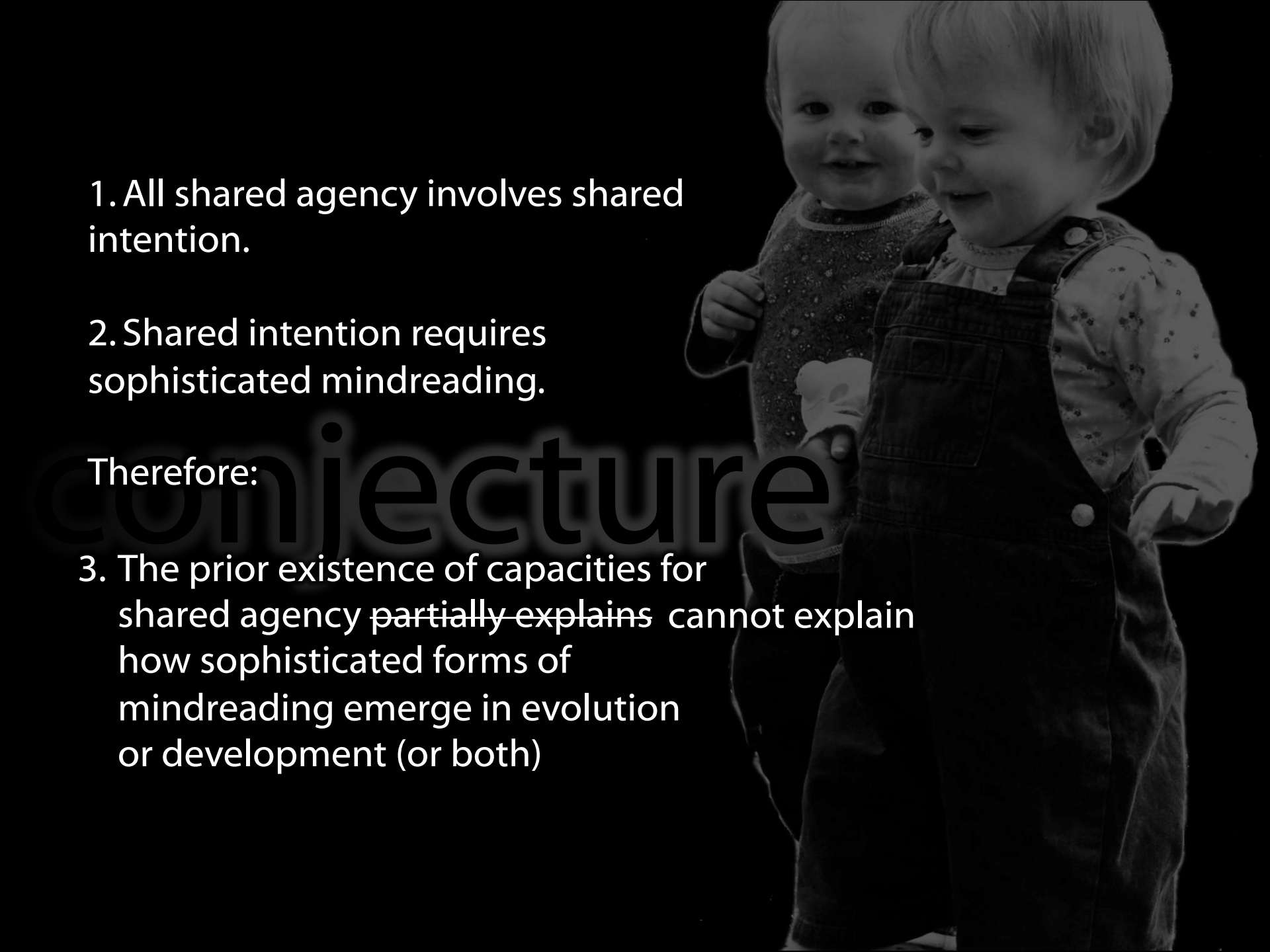
5. The emergence of mindreading

conjecture

The prior existence of capacities for shared agency partially explains how sophisticated forms of mindreading emerge in evolution or development (or both)



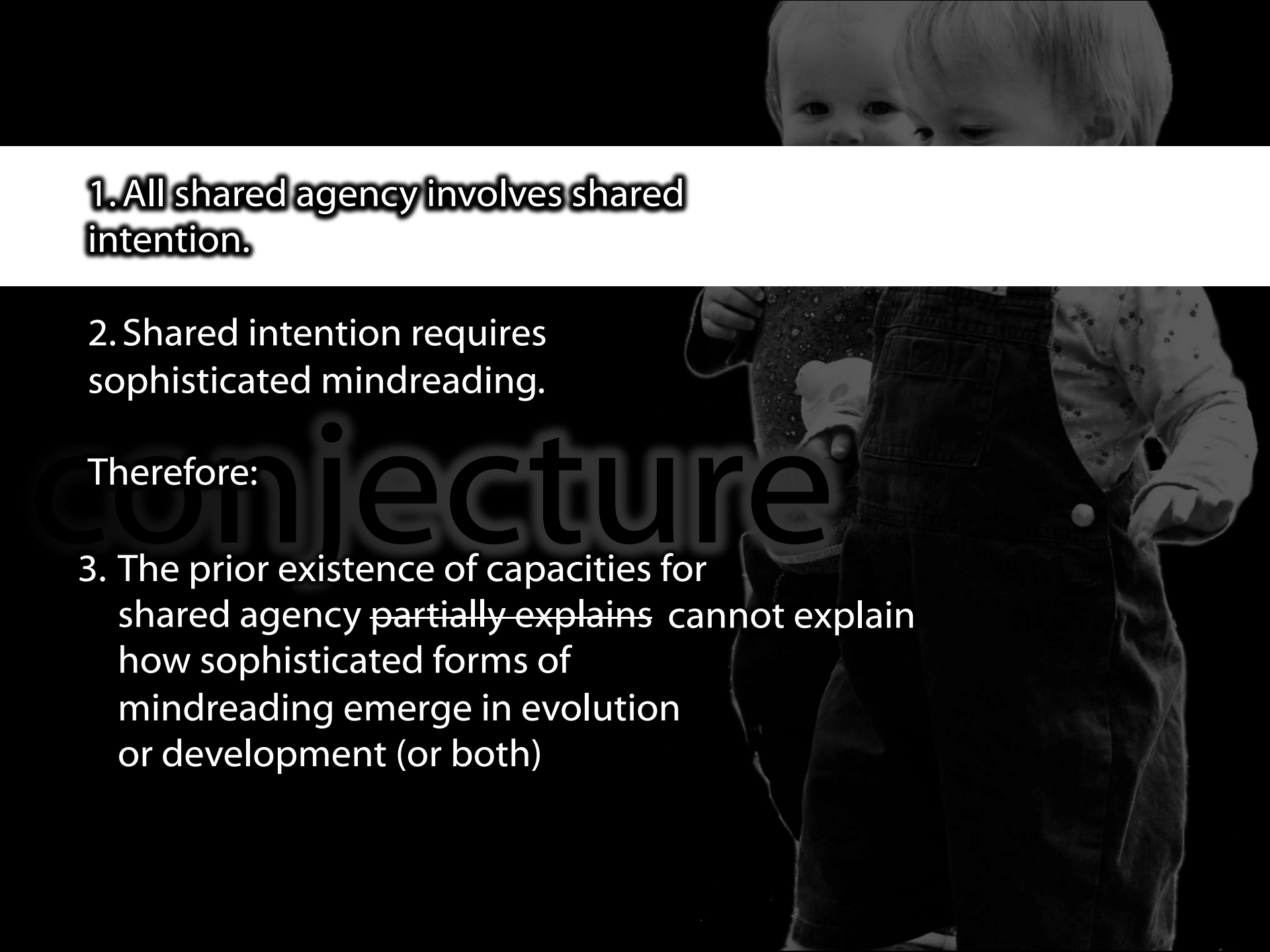
1. All shared agency involves shared intention.

2. Shared intention requires sophisticated mindreading.

Therefore:

conjecture

3. The prior existence of capacities for shared agency ~~partially explains~~ cannot explain how sophisticated forms of mindreading emerge in evolution or development (or both)



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shared agency without shared intention

Joint action:
an ~~action~~ event with two or more agents (Ludwig 2007)

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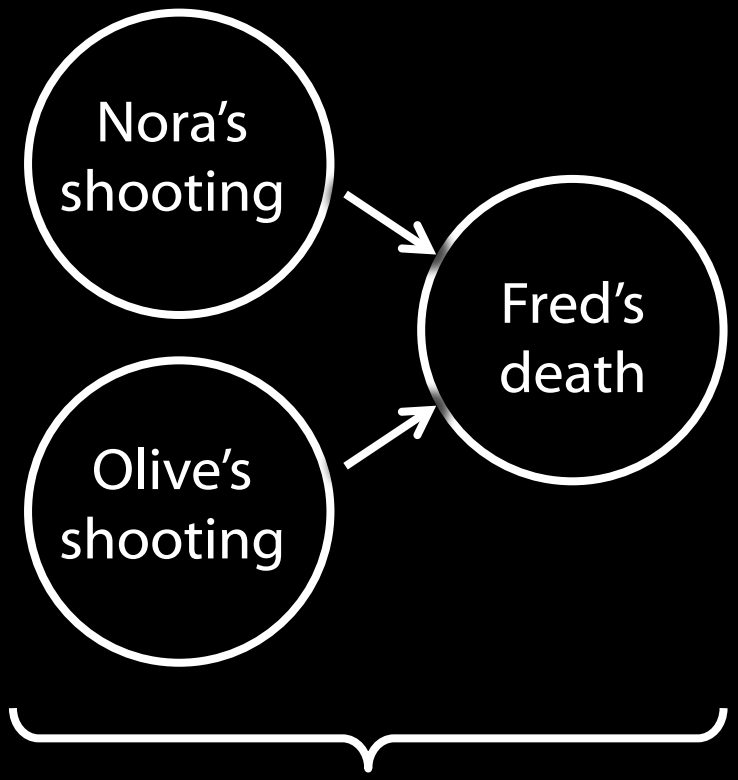

tidying up the toys together
(Behne et al 2005)

cooperatively pulling handles in sequence to make a dog-puppet sing
(Brownell et al 2006)

bouncing a ball on a large trampoline together
(Tomasello & Carpenter 2007)

pretending to row a boat together

Joint action:
an ~~action~~ event with two or more agents (Ludwig 2007)

too broad

…up the toys together
(Behne et al 2005)

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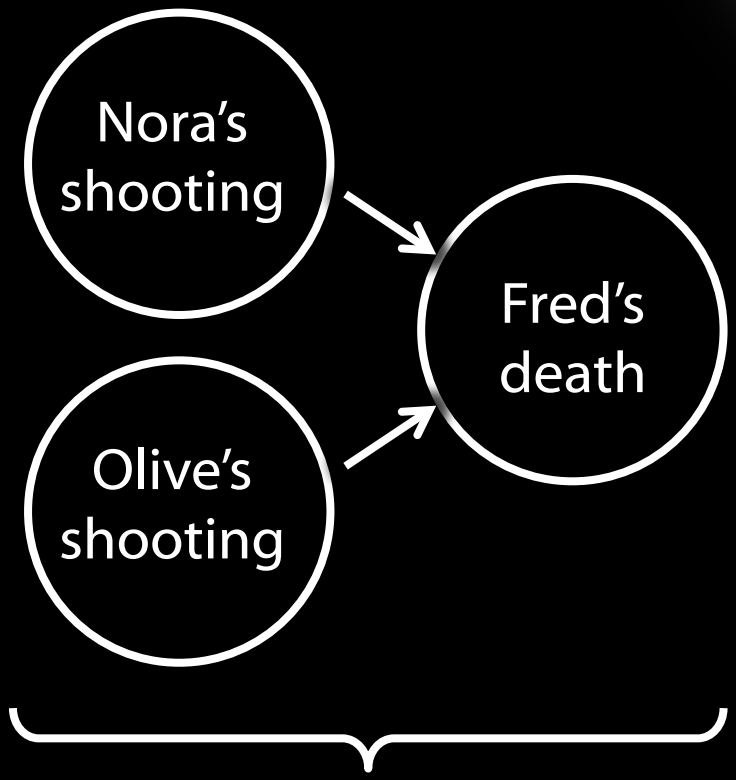

What is the relation between a purposive joint action and the goal or goals to which it is directed?

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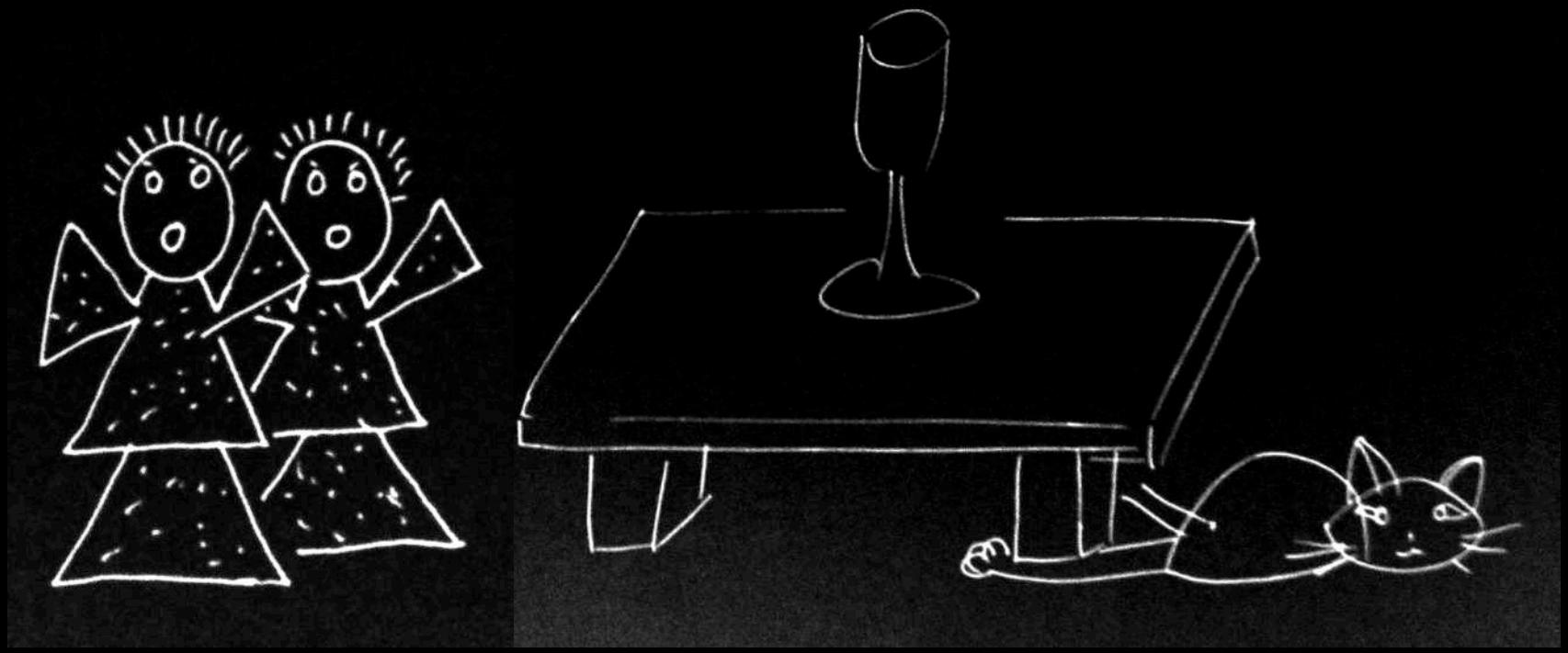

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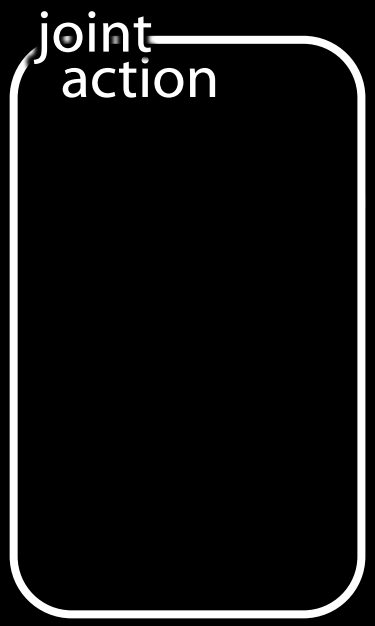

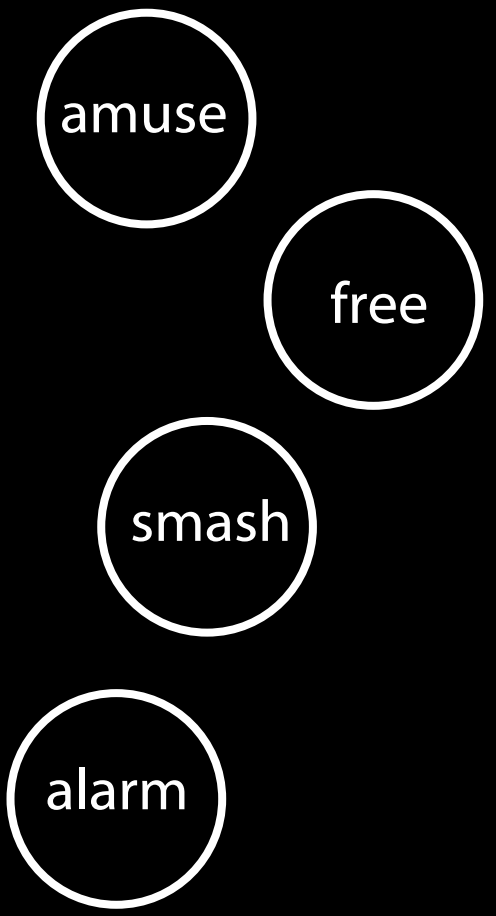

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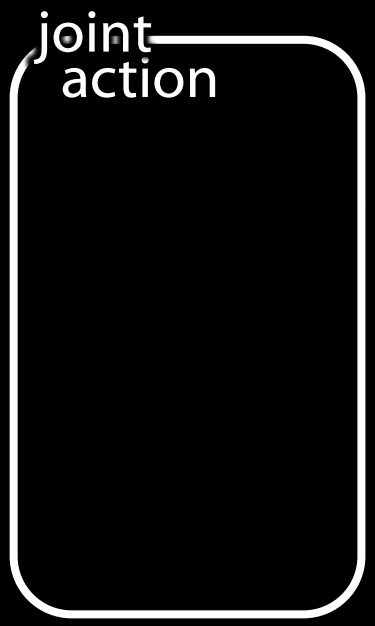

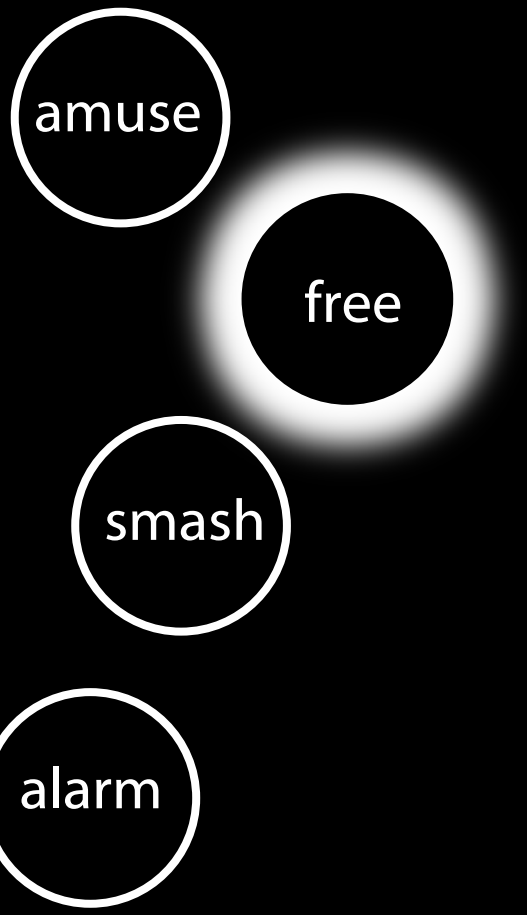

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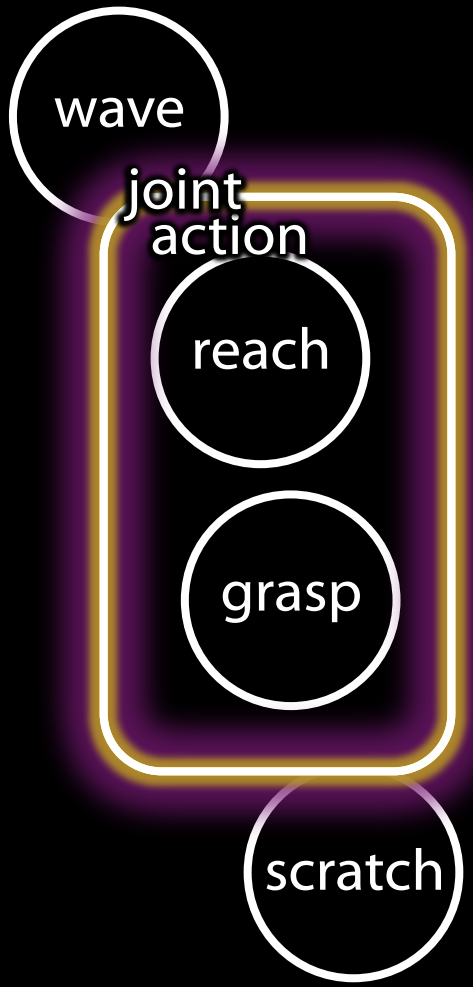

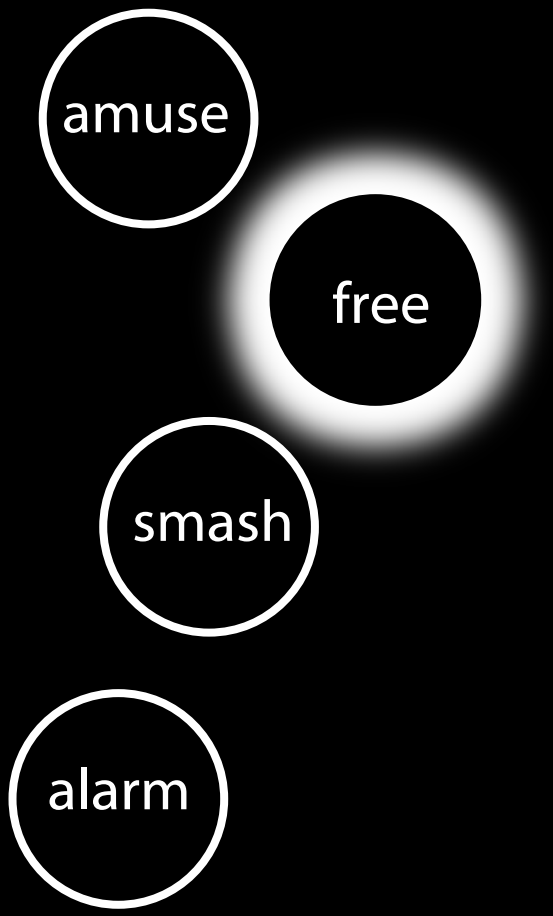

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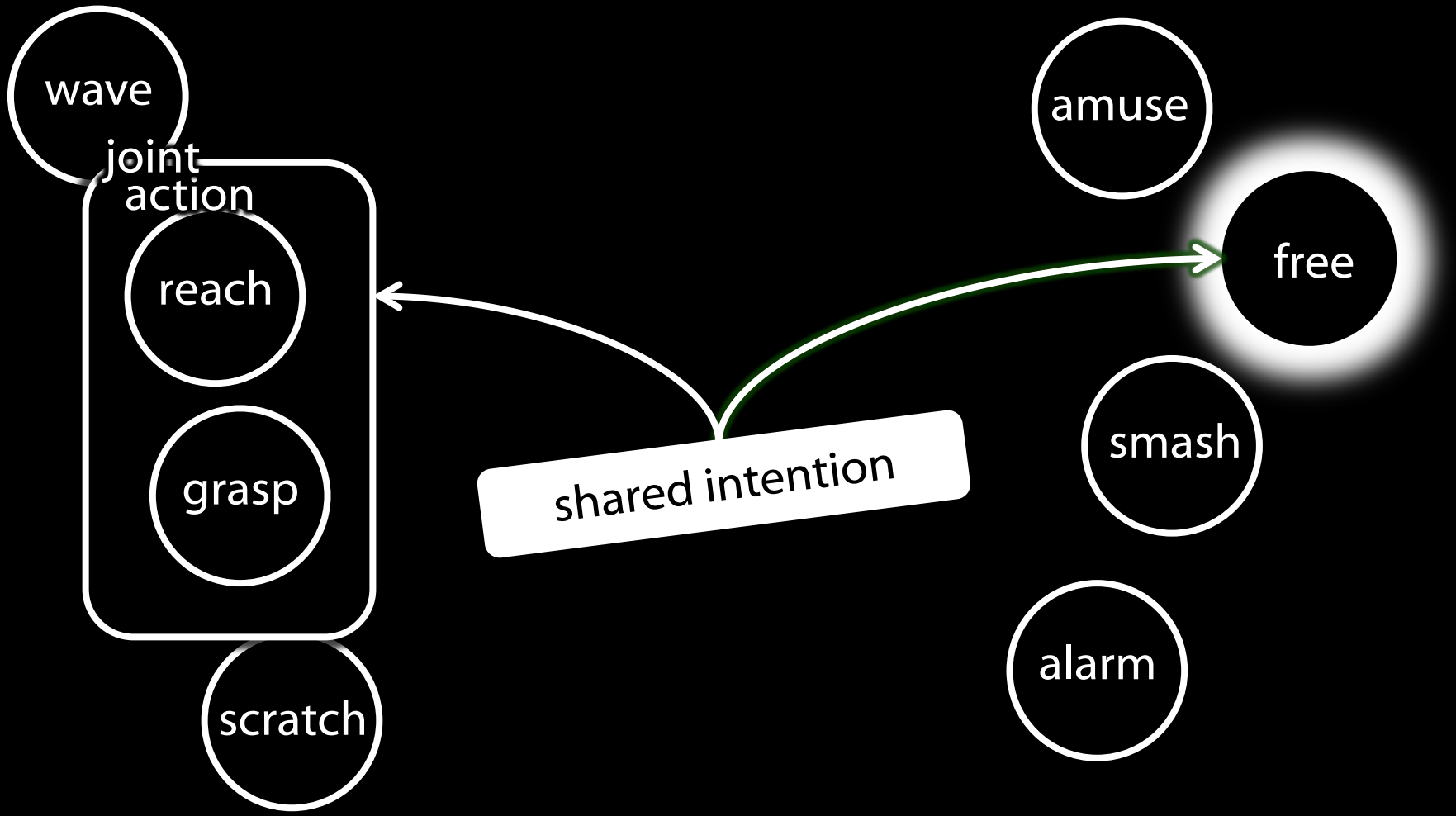

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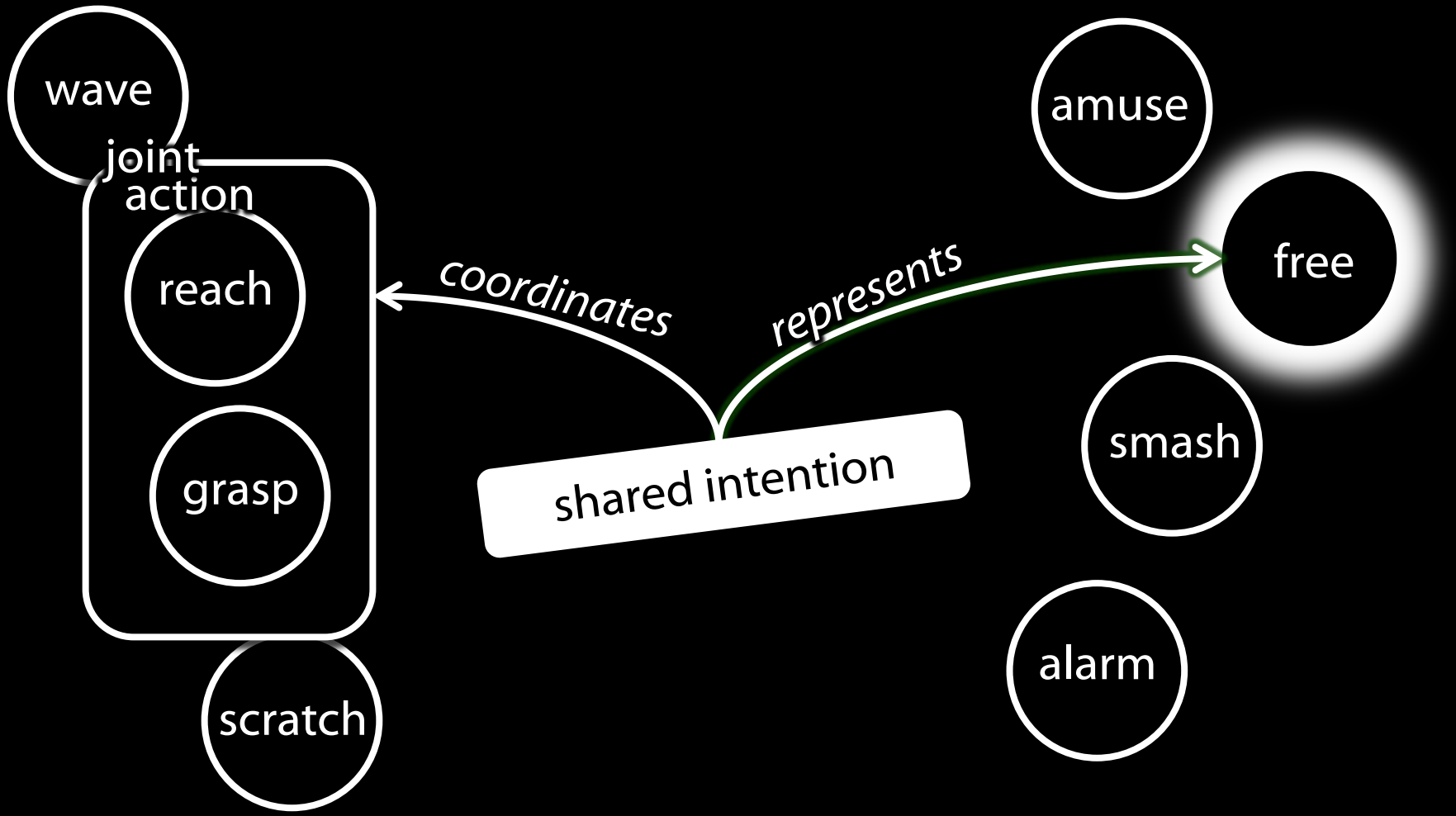

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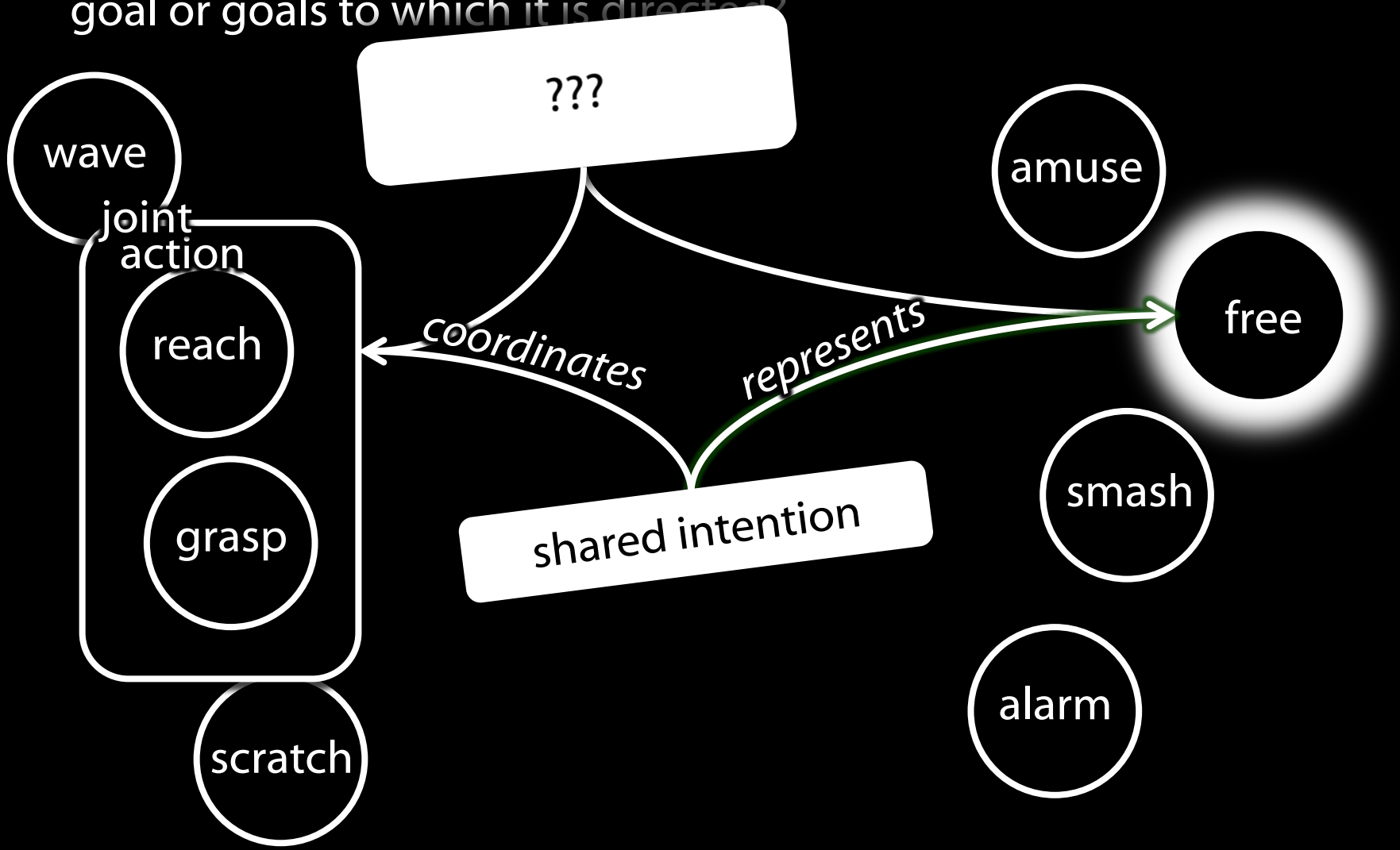

G is a distributive goal: it is an outcome to which each agent's actions are individually directed and it is possible that: all actions succeed relative to this outcome.

Shared Agency	Merely Parallel Individual Agency
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Members of a flash mob simultaneously open their newspapers noisily	Onlookers simultaneously open their newspapers noisily (cf. Searle 1990: 92)
Two friends walk to the metro station together.	Two strangers walk the same route side-by-side. (Gilbert 1990)

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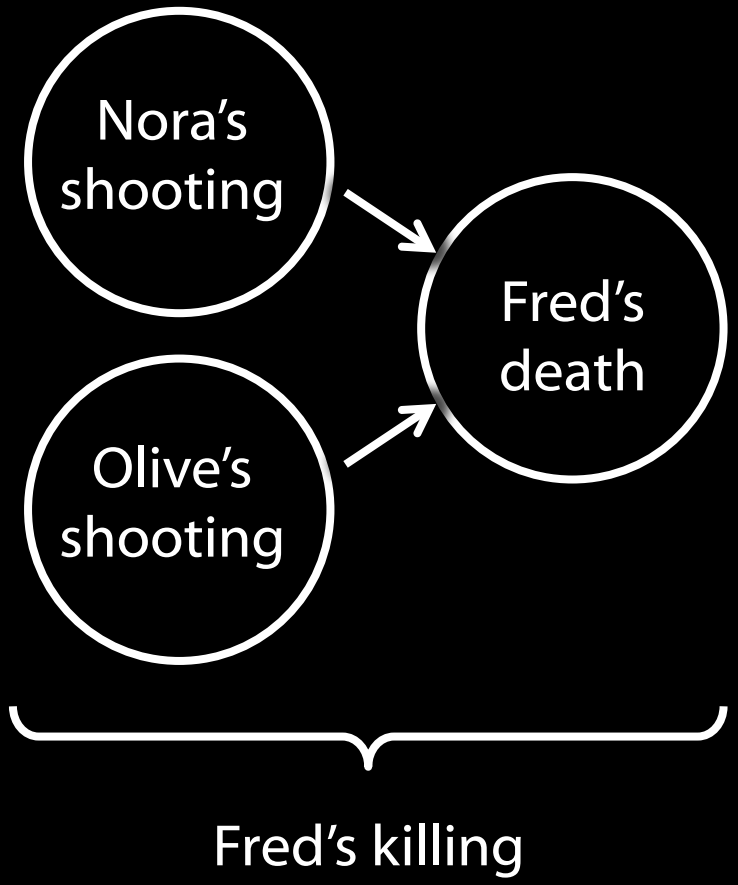

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Nora's

Two friends walk to the metro station together.

Two strangers walk the same route side-by-side.
(Gilbert 1990)

Nora and Olive, deadly enemies, kill Fred.

Two friends collaboratively kill Fred.

G is a distributive goal: it is an outcome to which each agent's actions are individually directed and it is possible that: all actions succeed relative to this outcome.

G is a collective goal

(a) it is a distributive goal;

(b) the actions are coordinated; and

(c) coordination of this type would normally facilitate occurrences of outcomes of this type.

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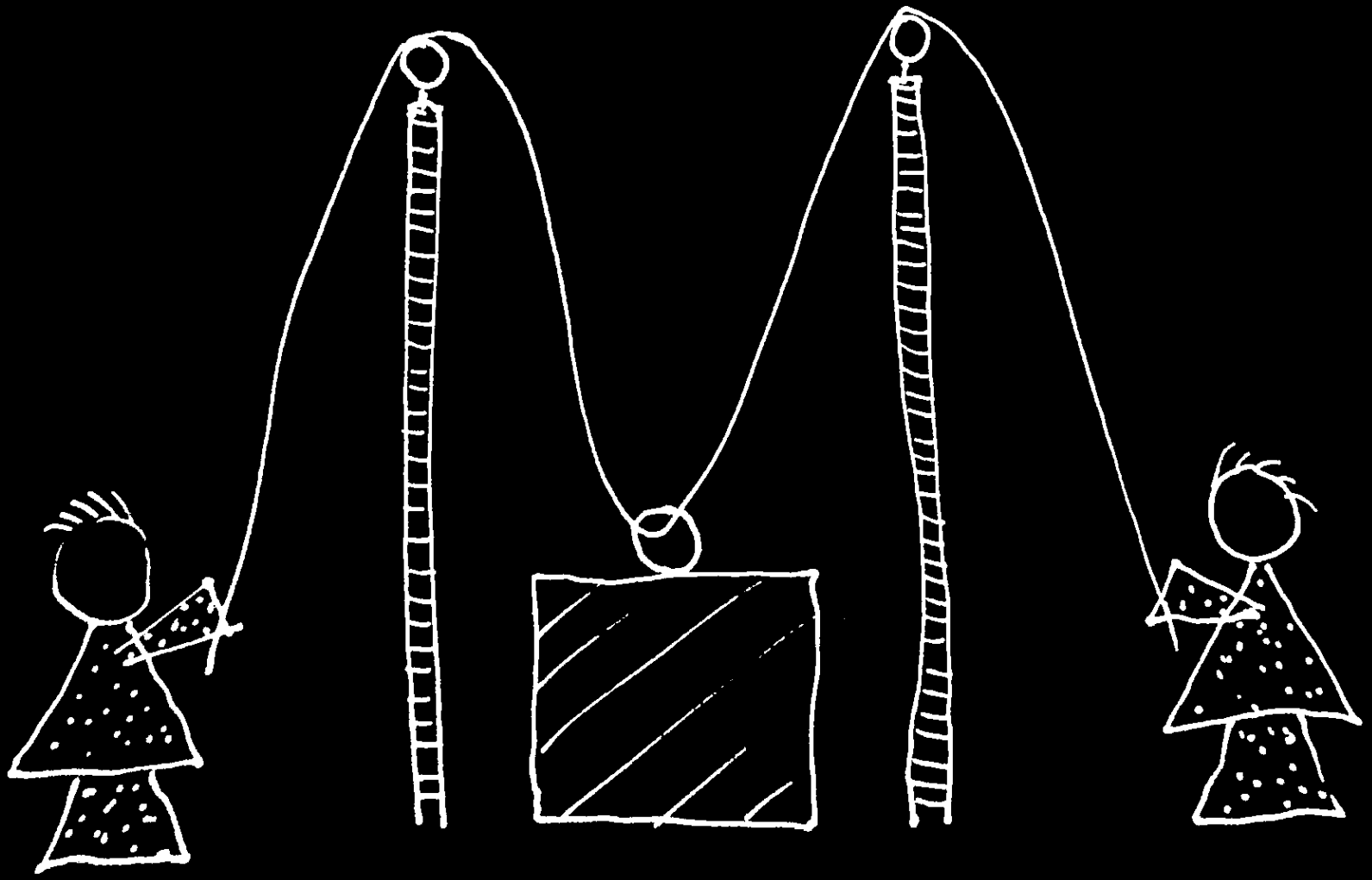
sting
sting
sting
sting
sting
sting
sting
sting
death
of fly



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"It ... seems useful to draw a distinction between elementary or thin forms of joint action common to humans and other social mammals and sophisticated or thick forms of joint action, perhaps unique to the human species."

(Pacherie & Dokic 2006, 110)

agent-neutral

agent-neutral

planning
for outcomes whose realisation would normally involve
one's own and another's (or others') actions.

reciprocal, parallel
agent-neutral

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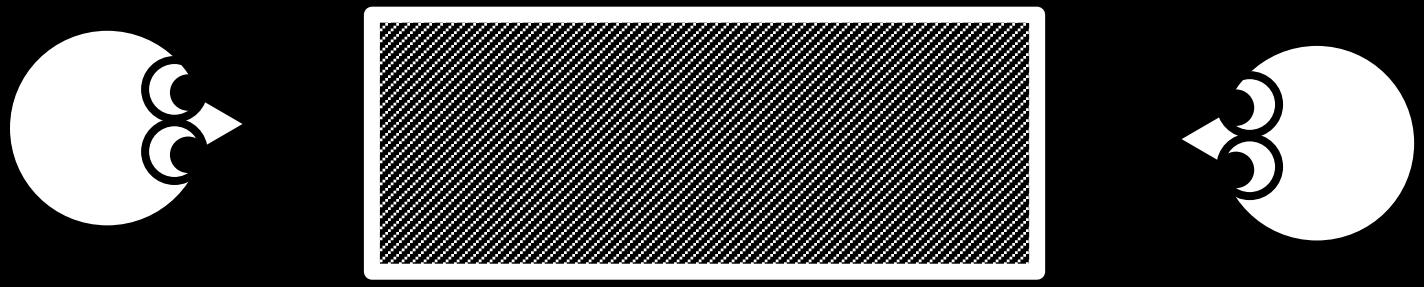

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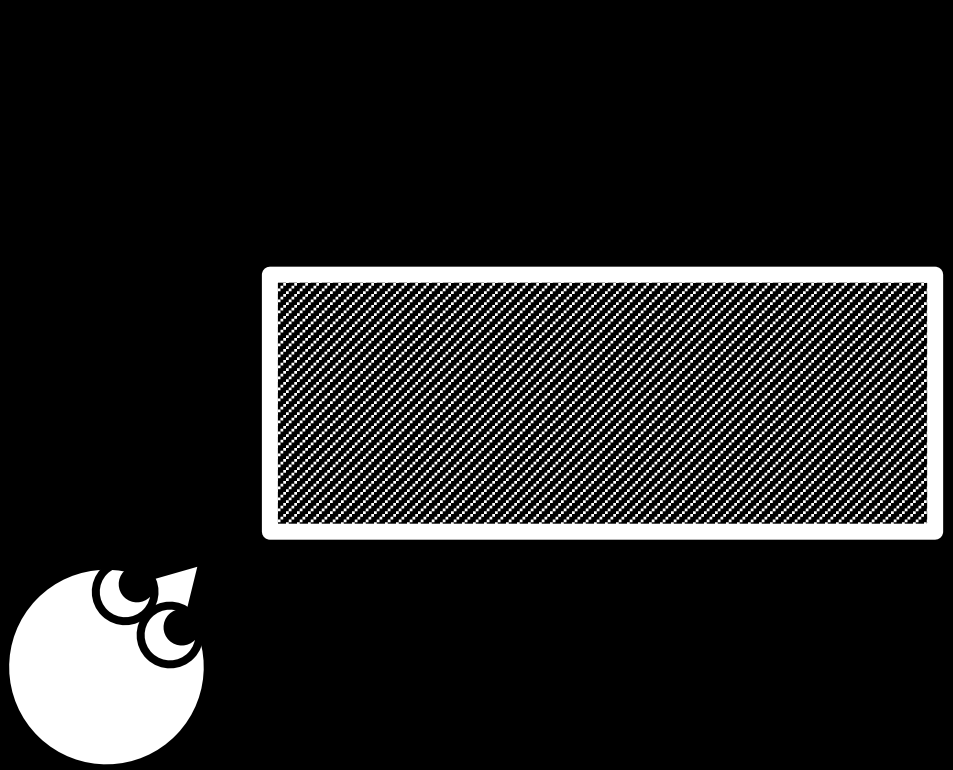

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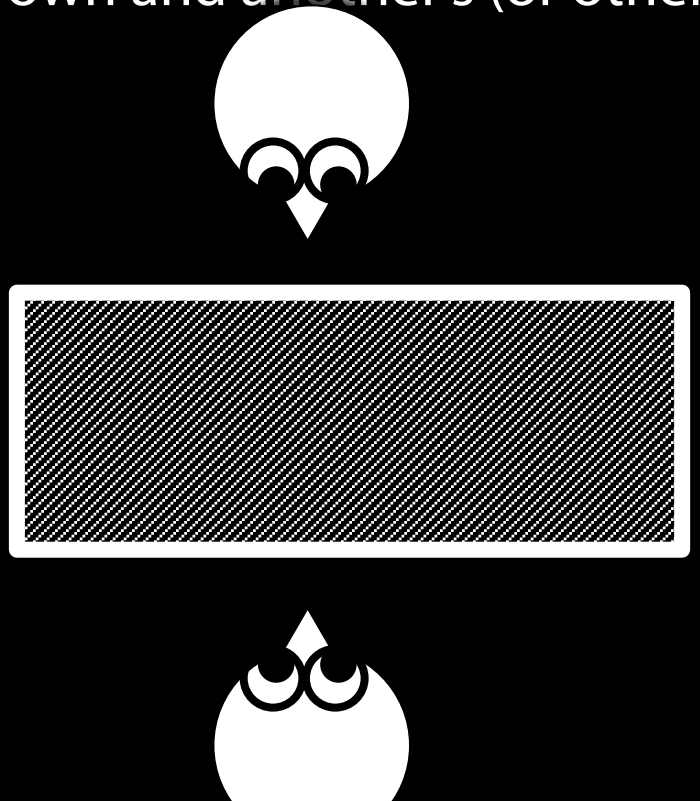

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agent-neutral
motor
planning
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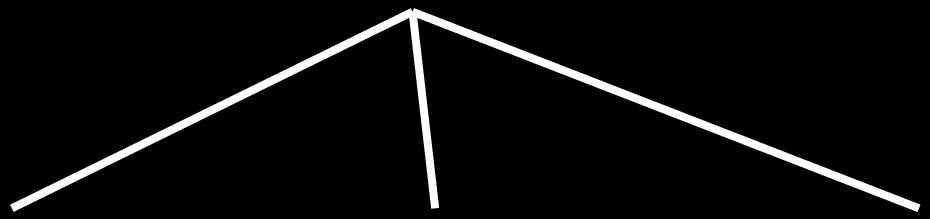
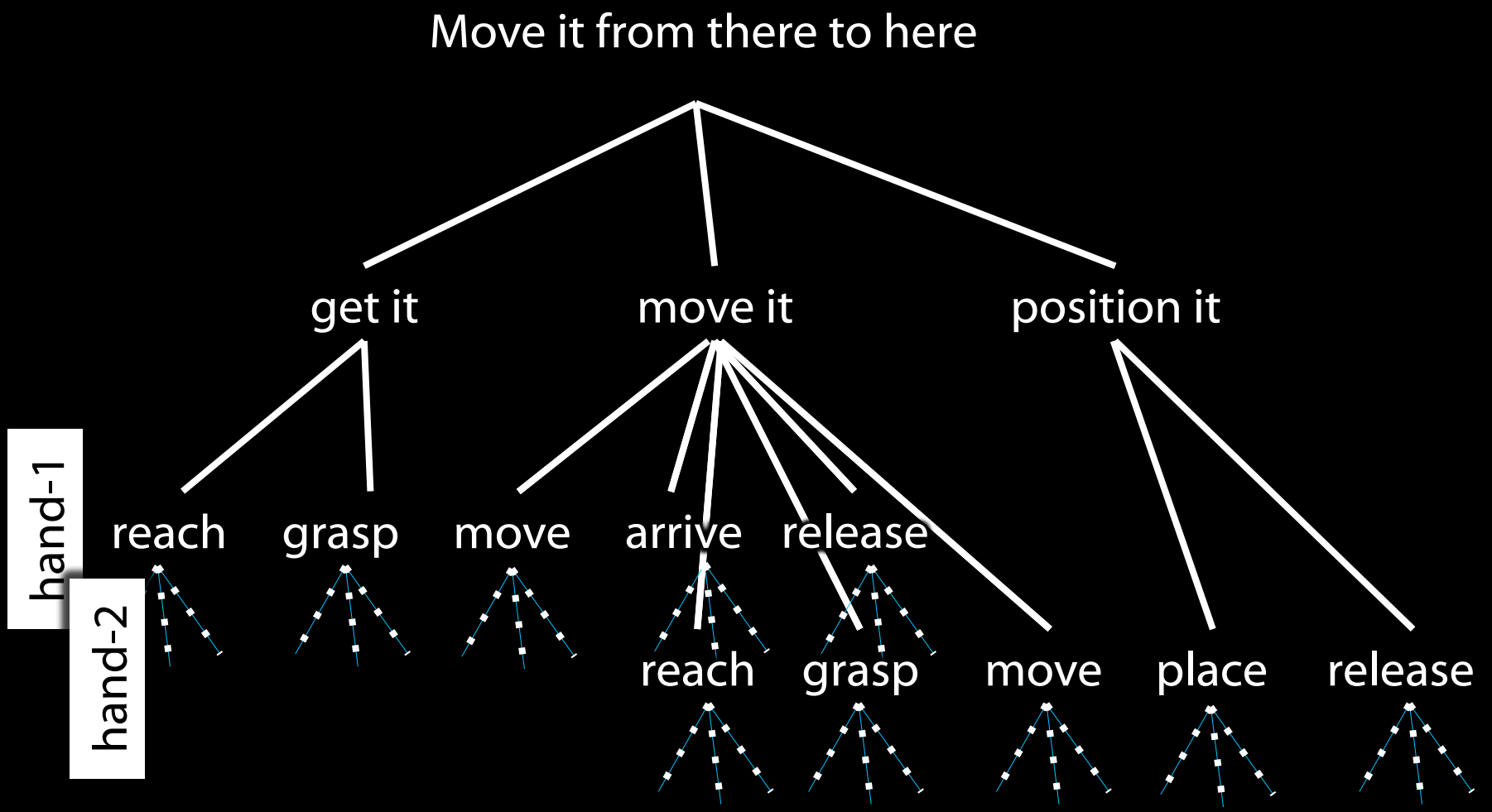
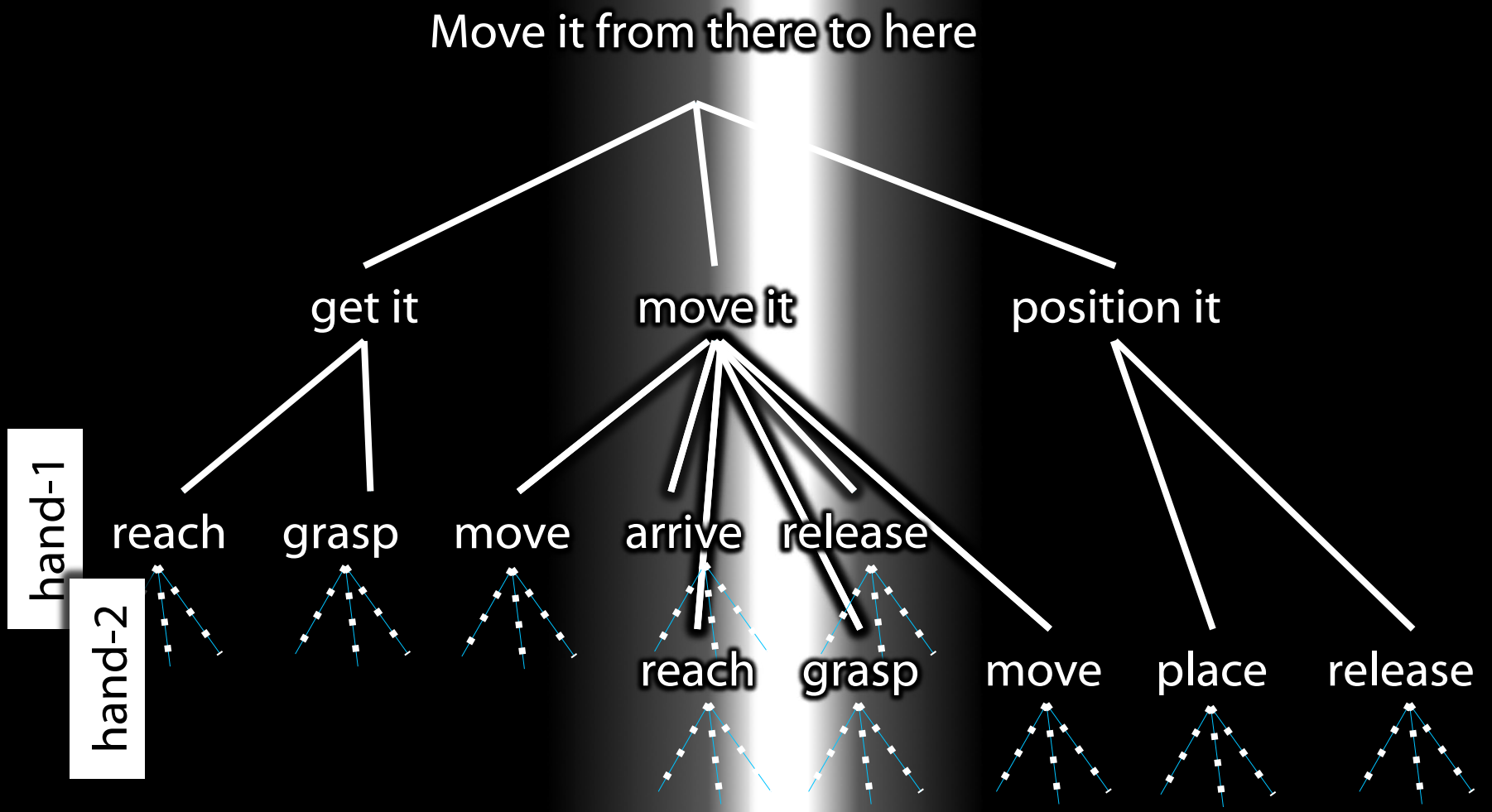
Move it from there to here




Move it from there to here
get it
move it
position it
hand-1
hand-2
reach
grasp
move
arrive
release
reach
grasp
move
place
release


Move it from there to here
get it
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reach
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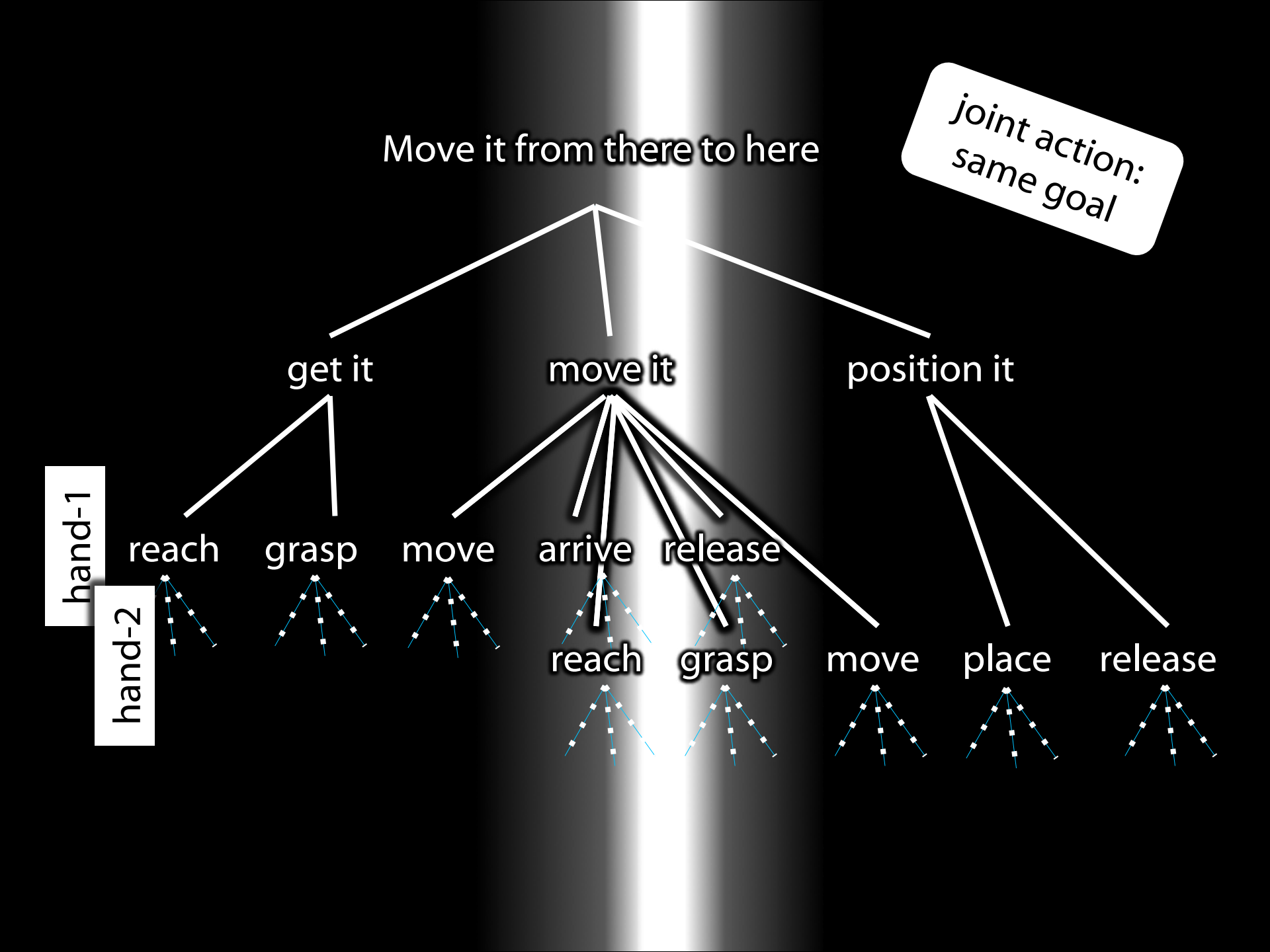
Move it from there to here
joint action: same goal
get it
move it
position it
hand-1
hand-2
reach
grasp
move
arrive
release
reach
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move
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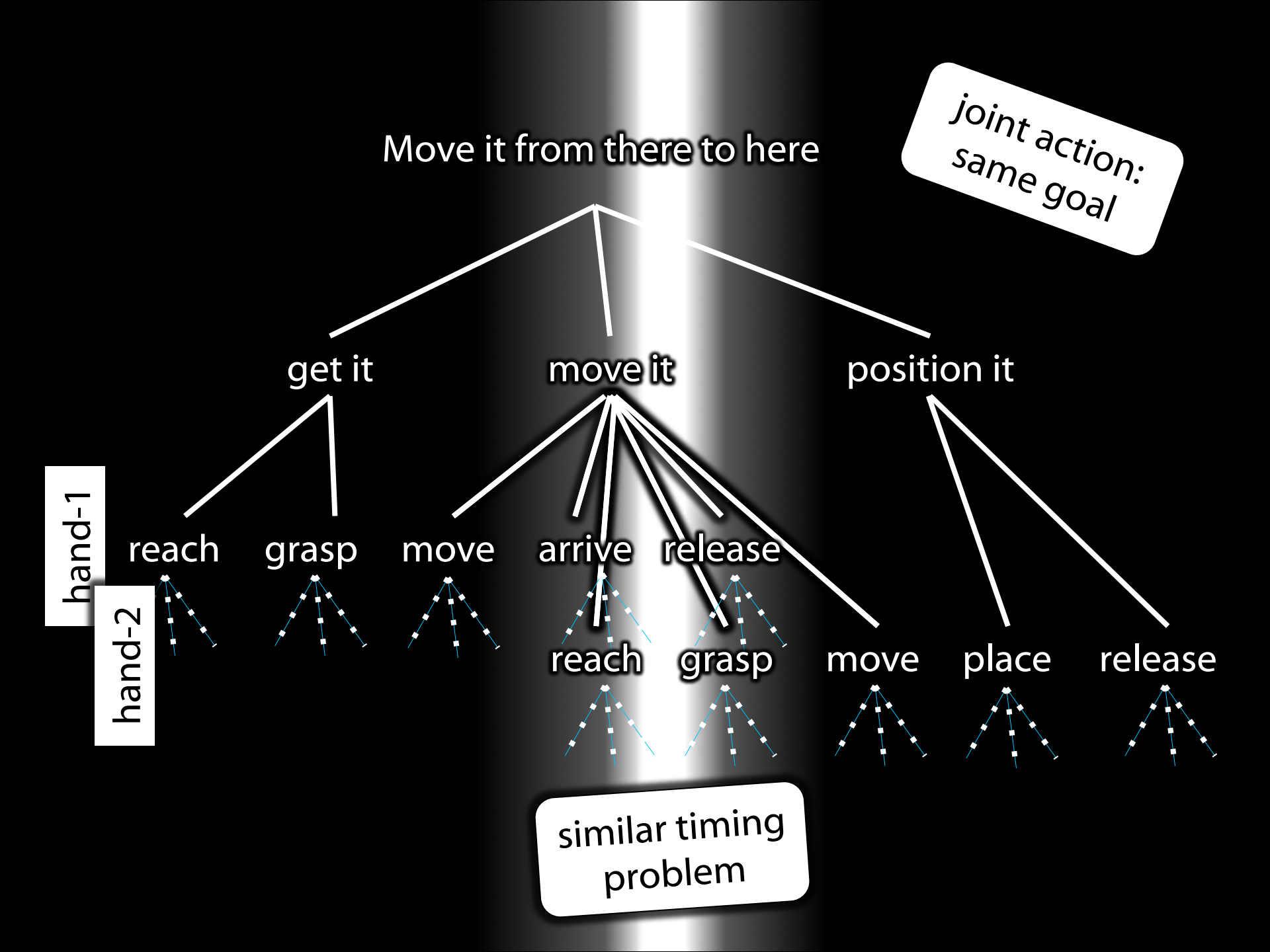
Move it from there to here
joint action: same goal
get it
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position it
hand-1
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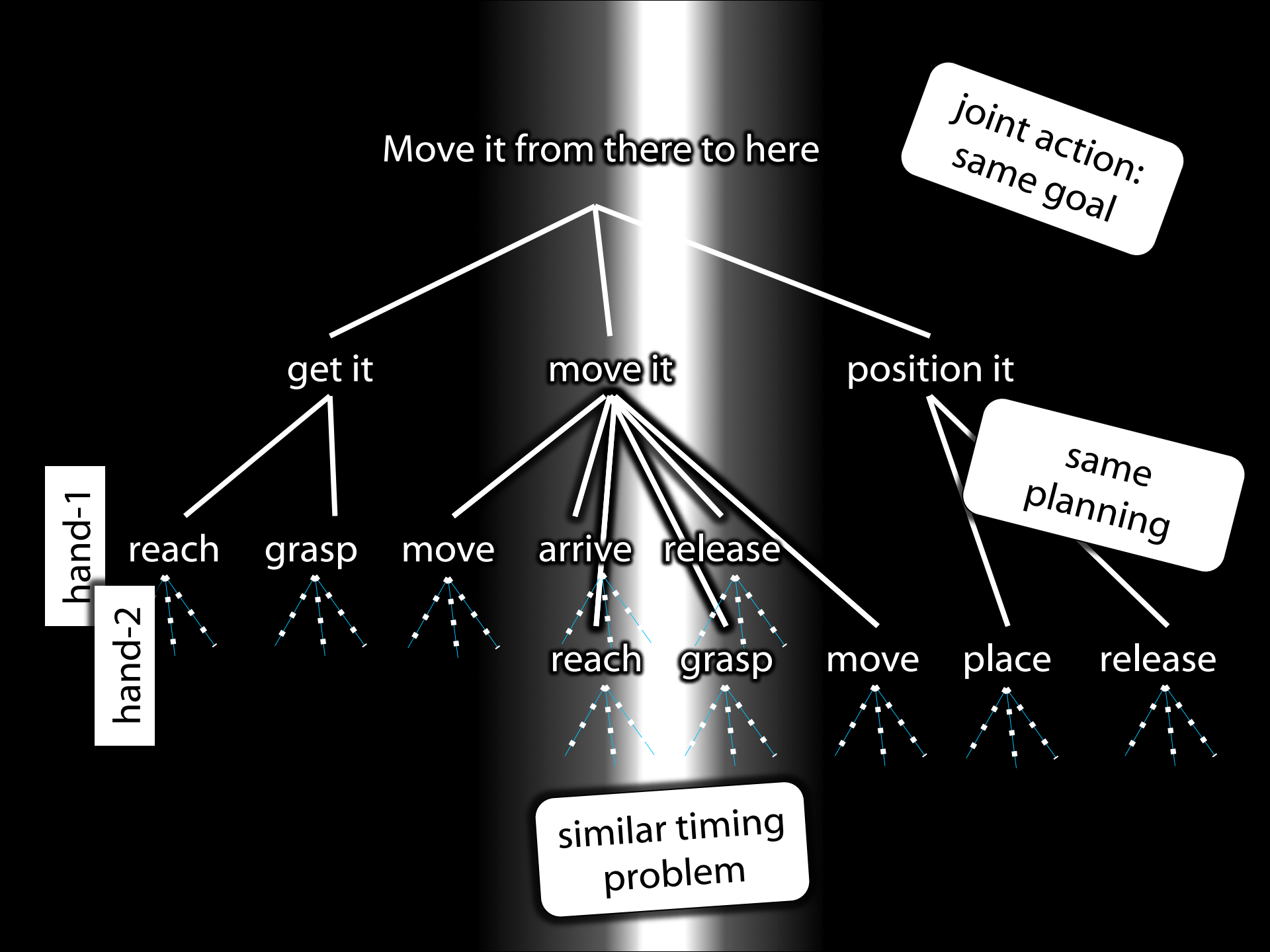
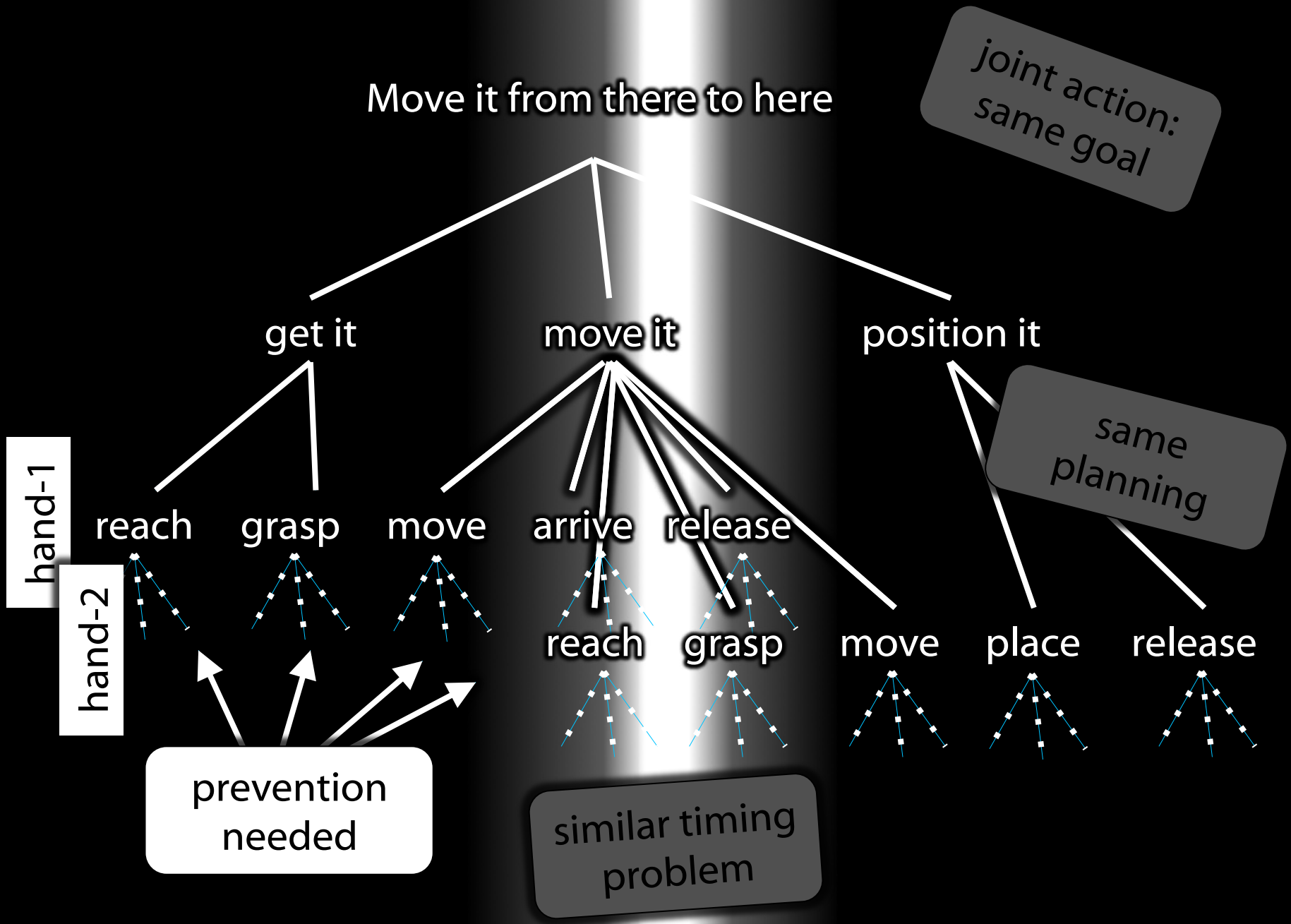
reach
grasp
move
arrive
release
reach
grasp
move
place
release
similar timing problem


Move it from there to here
joint action: same goal
get it
move it
position it
same planning
hand-1
hand-2
reach
grasp
move
arrive
release
reach
grasp
move
place
release
similar timing problem


Move it from there to here
joint action: same goal
get it
move it
position it
same planning
hand-1
hand-2
reach
grasp
move
arrive
release
reach
grasp
move
place
release
prevention needed
similar timing problem

G is a distributive goal: it is an outcome to which each agent's actions are individually directed and it is possible that: all actions succeed relative to this outcome.

shared motor action

G is a collective goal

(a) it is a distributive goal;

(b) the actions are coordinated; and

(c) coordination of this type would normally facilitate occurrences of outcomes of this type.

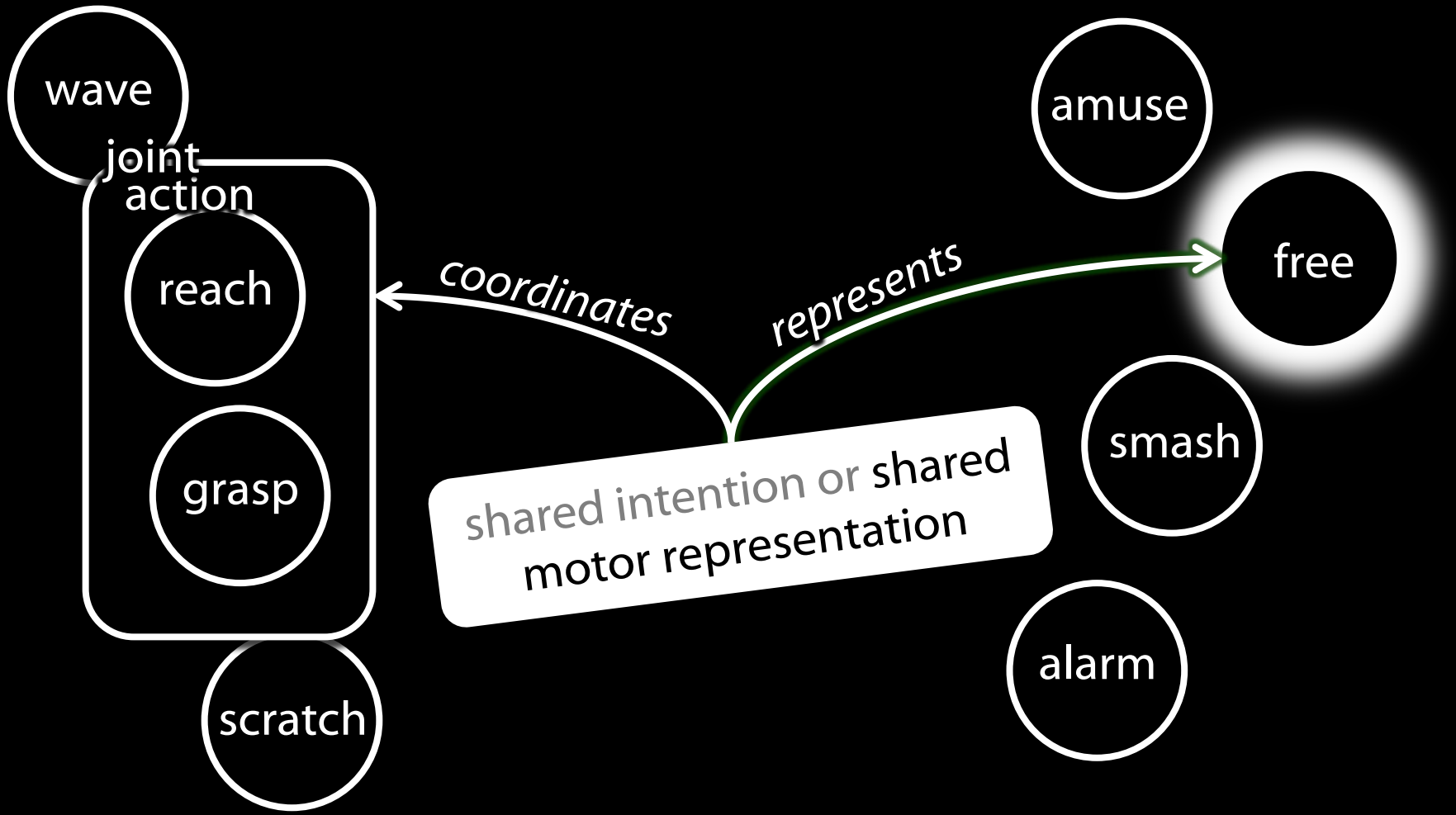
1. we each have a motor representation of G;

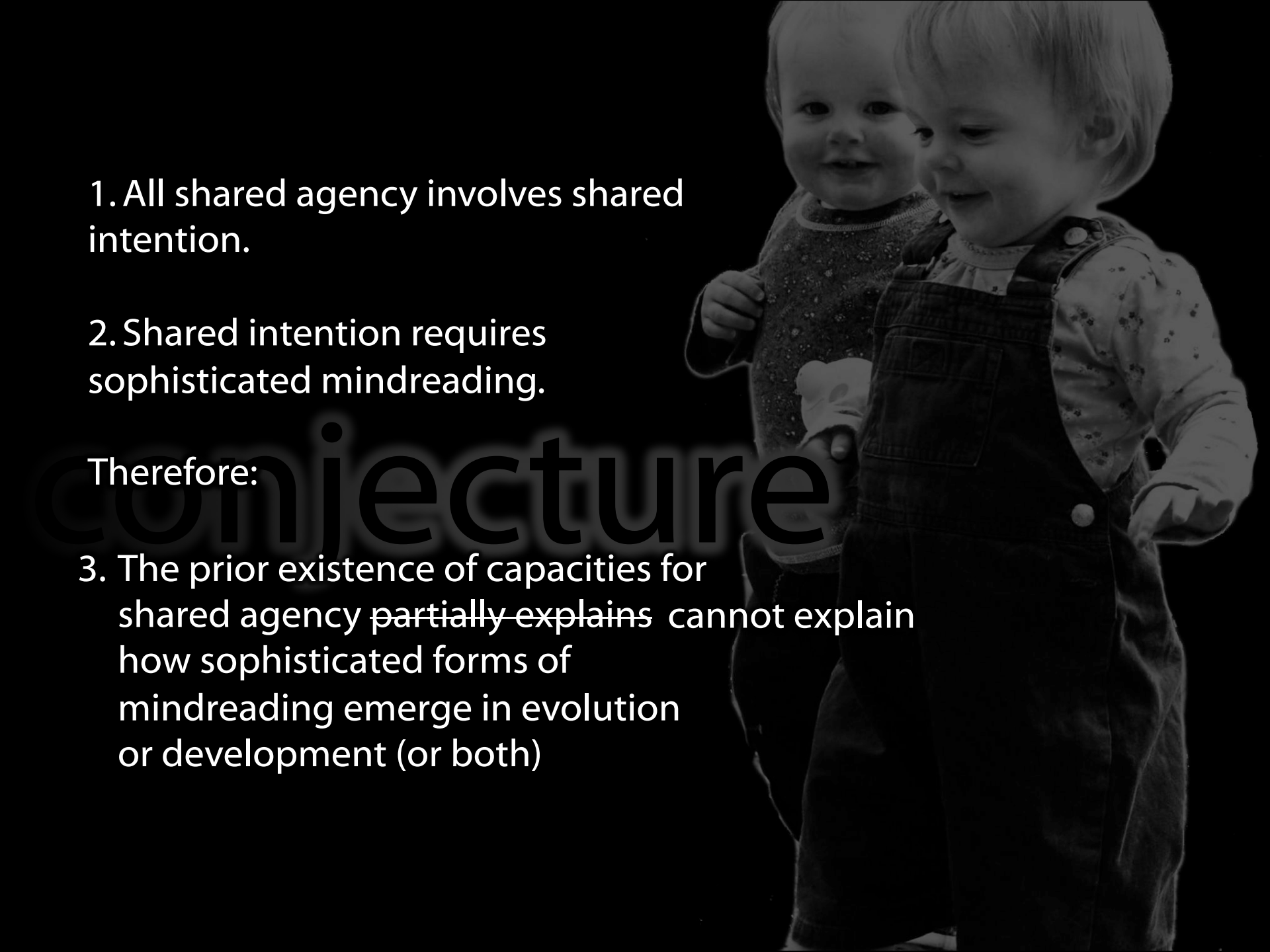
2. we are each disposed to inhibit some (not all) of the resulting planning or actions;

3. we each expect that if G occurs, we will all be agents of it; and

4. (1) and (2) because (3)

What is the relation between a purposive joint action and the goal or goals to which it is directed?





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conjecture

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< 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.

< different content >

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

=

?

The Interface Problem

The Interface Problem

Some joint actions involve both shared intention and shared motor representation

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Shared motor representations:

i. represent outcomes;

ii. ground the purposiveness of some joint actions

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ii. ground the purposiveness of some joint actions

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.

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

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Some ~~joint~~ actions involve both ~~shared~~ intention and ~~shared motor representa~~tion

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

=

?

Follow *that* route

=

?

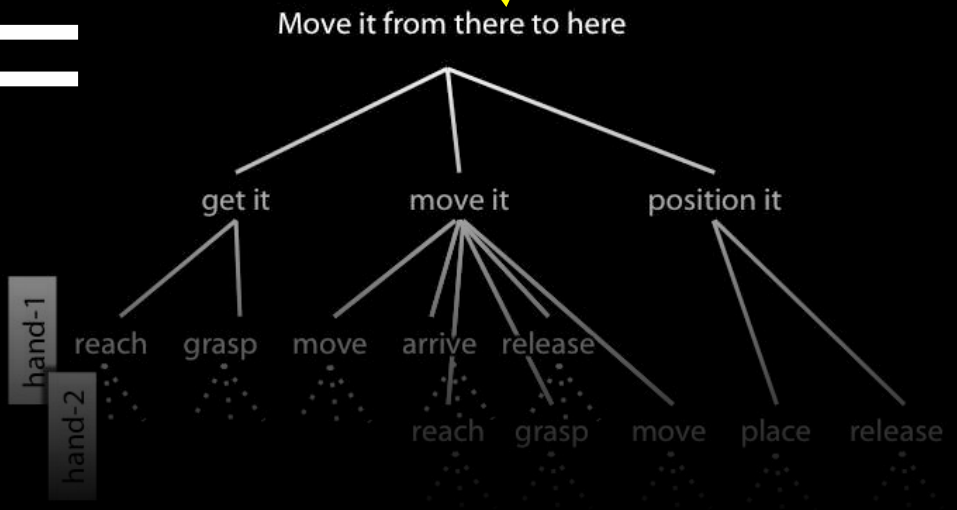
Follow *that* route

=

?

Do *that*

=


Move it from there to here
get it
move it
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Planning Others' Actions (slides from Natalie Sebanz)

Kourtis et al., subm.

'interaction partners ... not only represent their own part of the joint task but also generate a representation of their co-actor's part'

(Kourtis et al 2012: 8)

Kourtis et al., subm.

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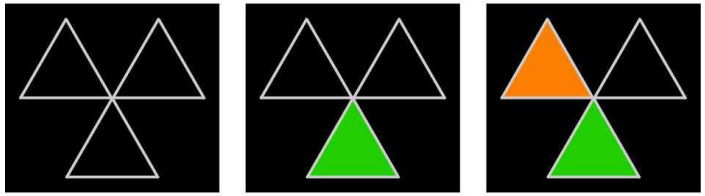
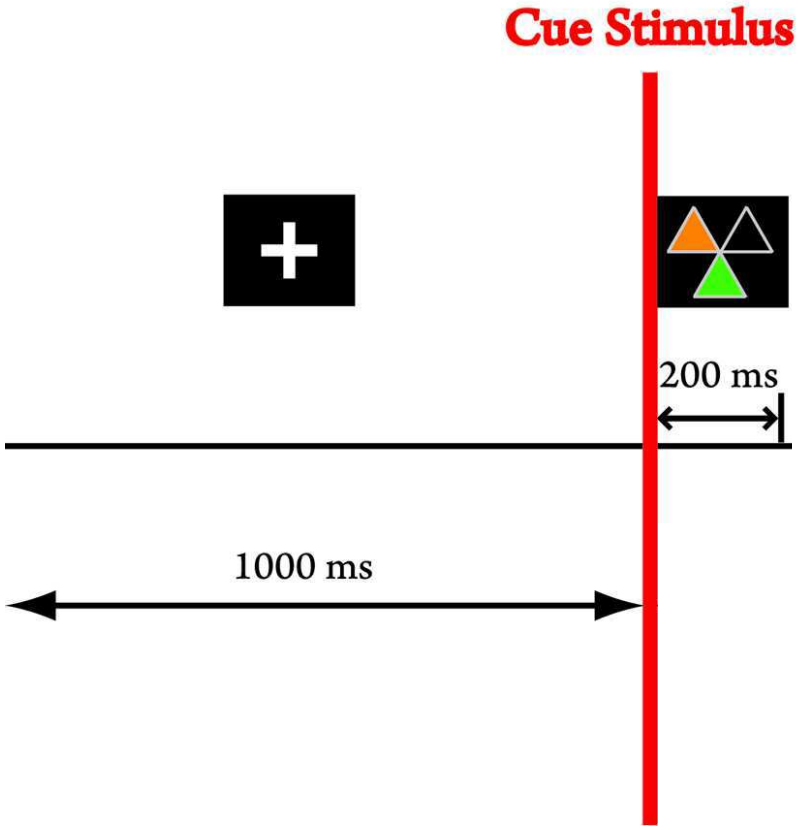
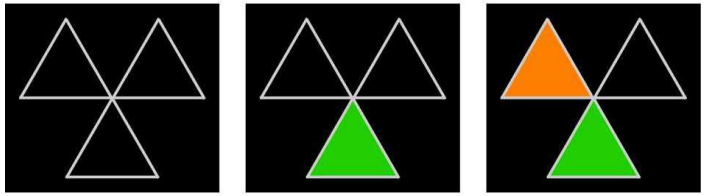
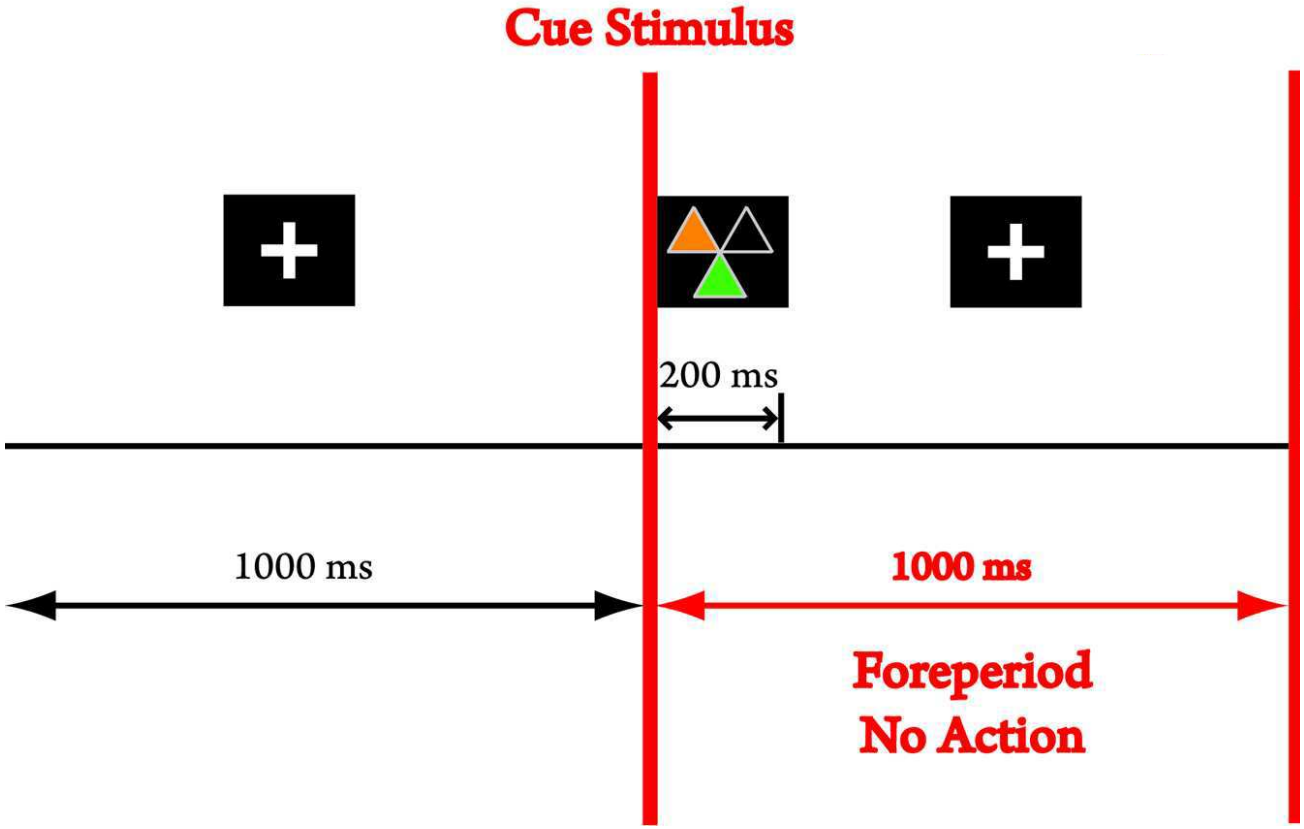




Kourtis et al., subm.





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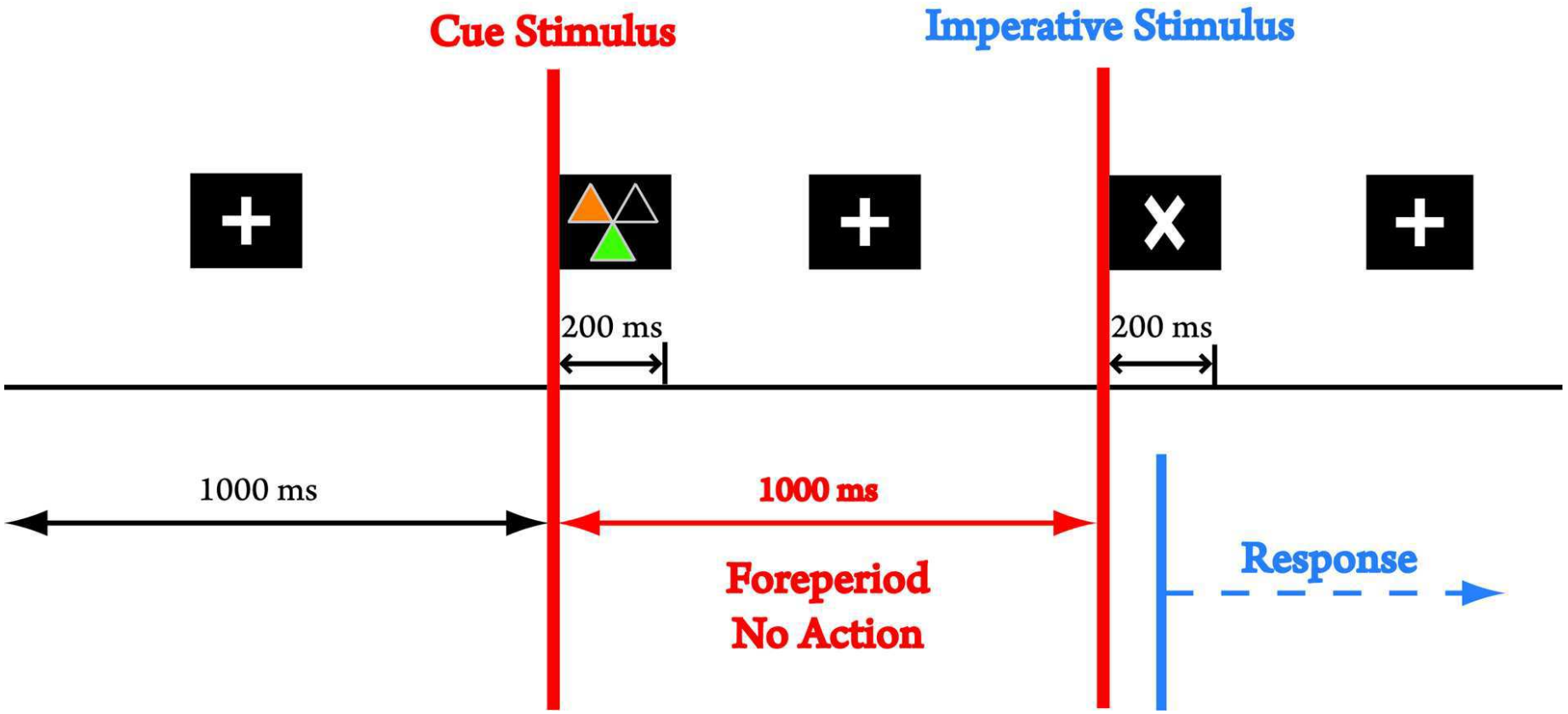

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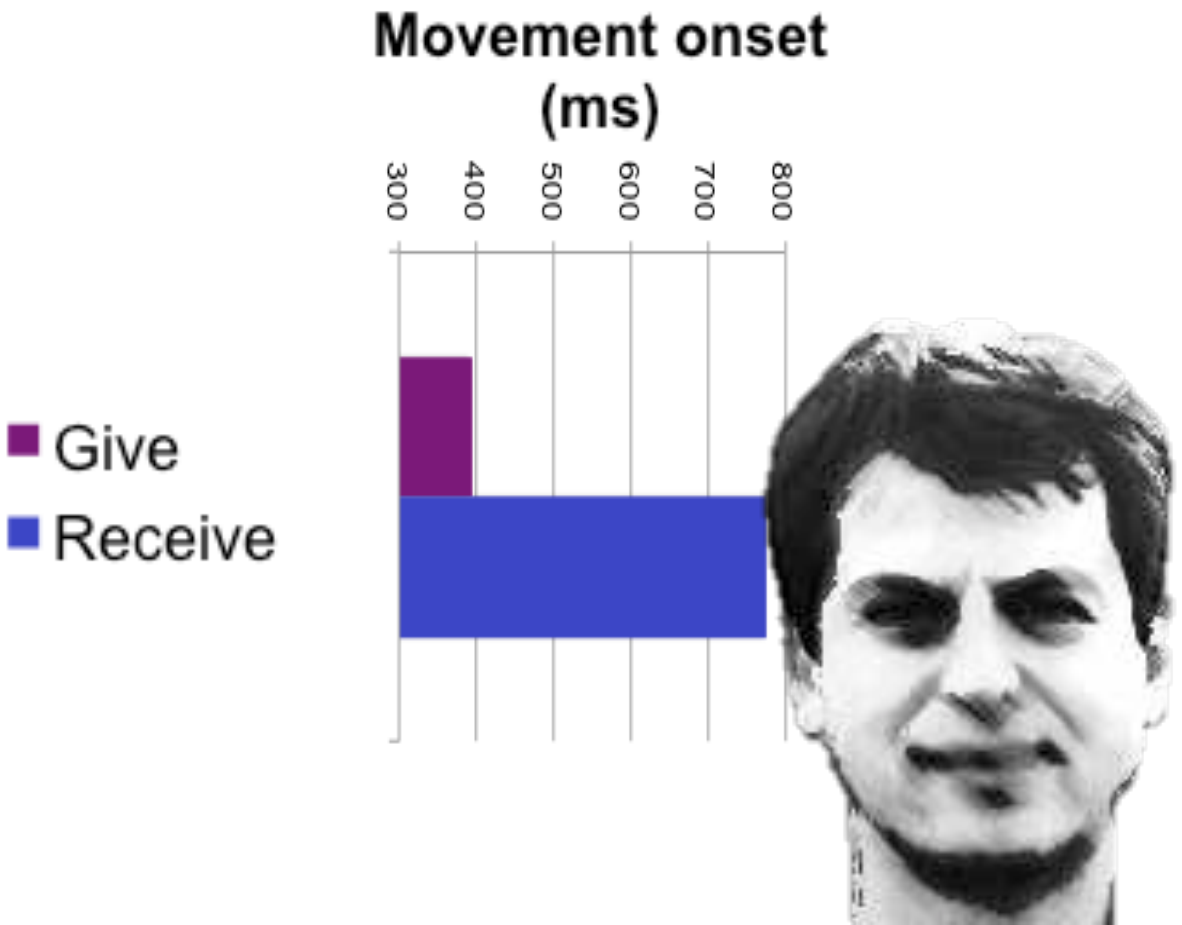

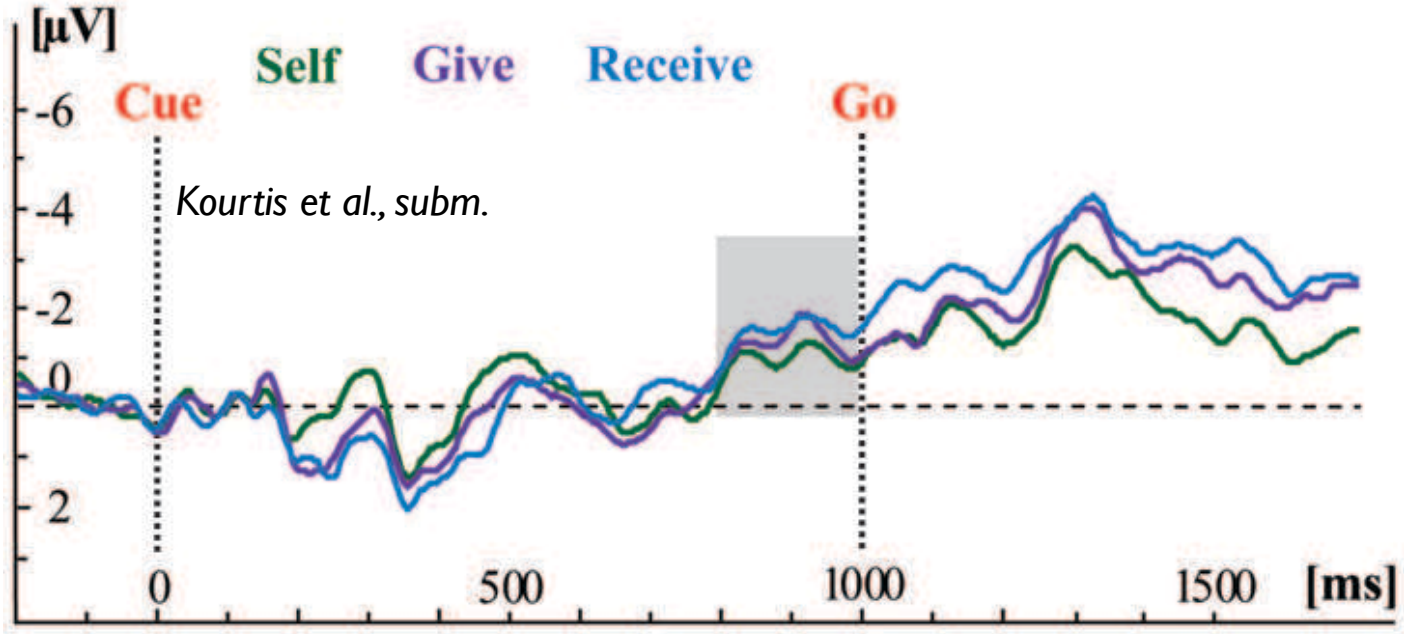

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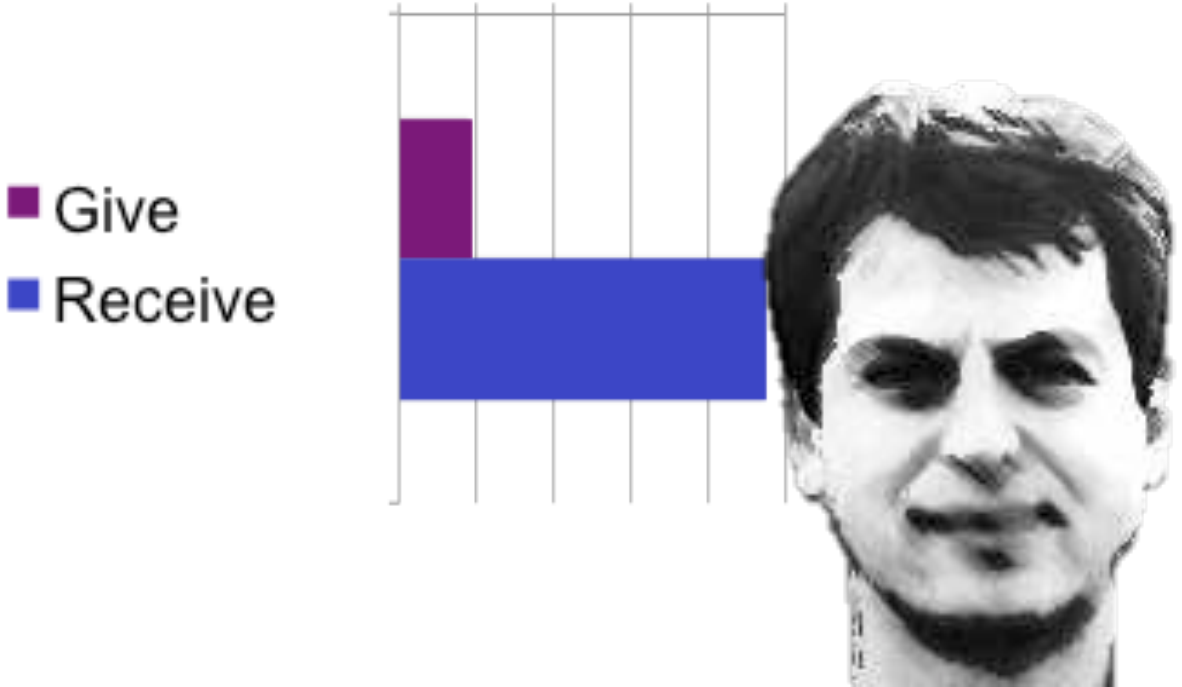
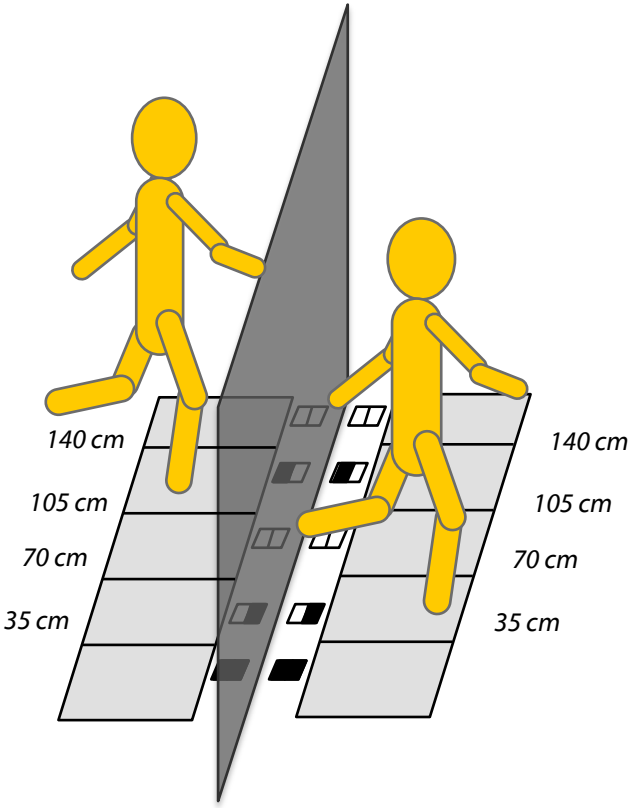
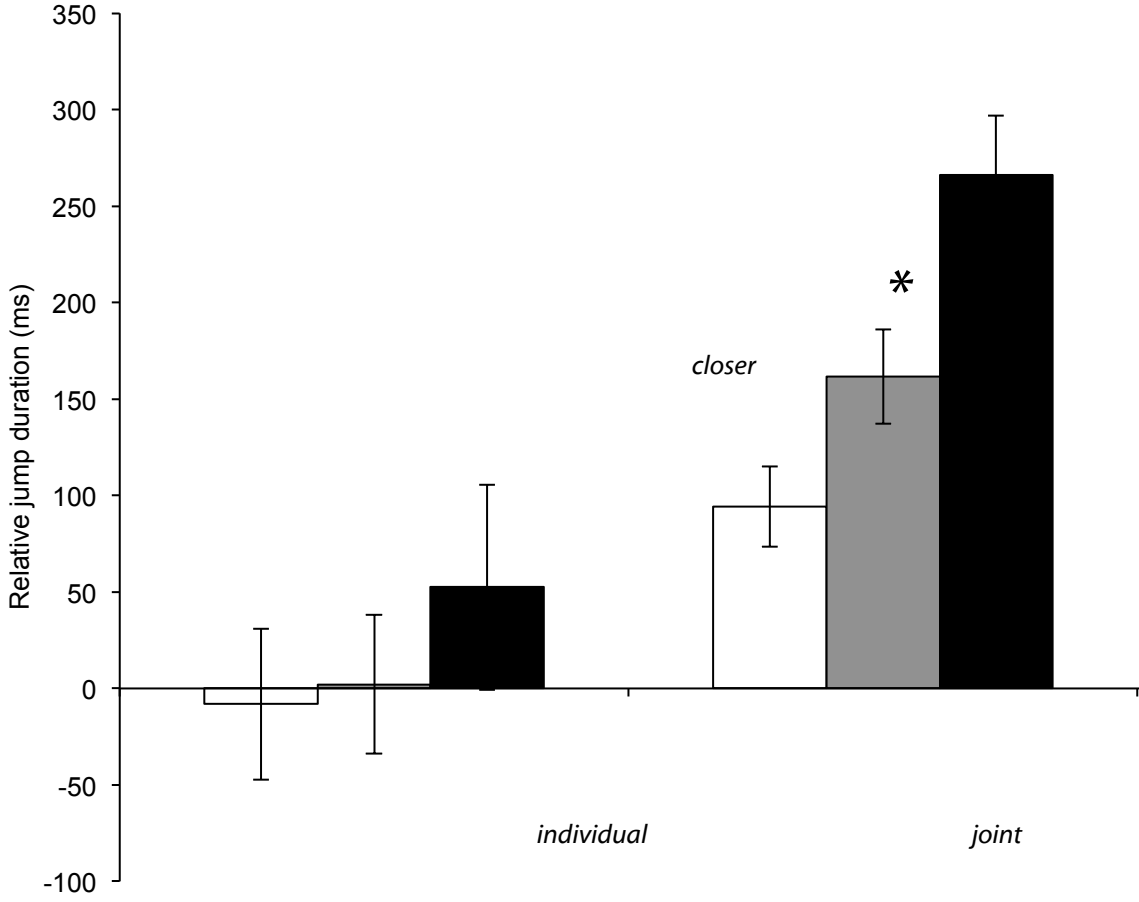


Planning others' actions can inform planning for one's own (slides from Cordula Vesper)

Joint jumping task (performance): „Land at the same time!“



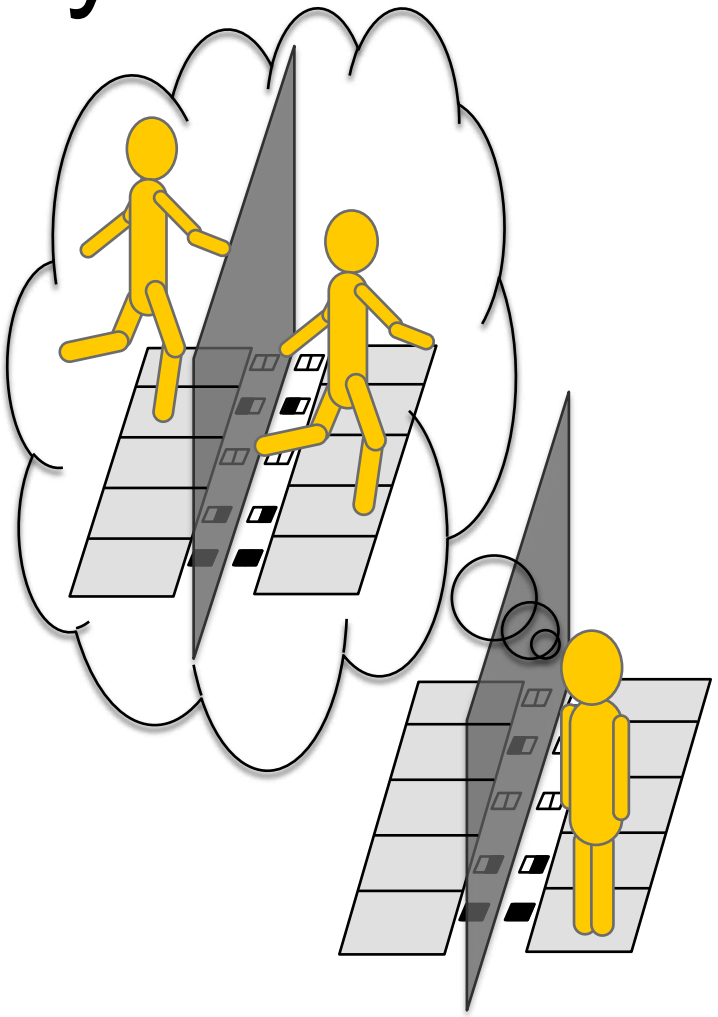


Imagery

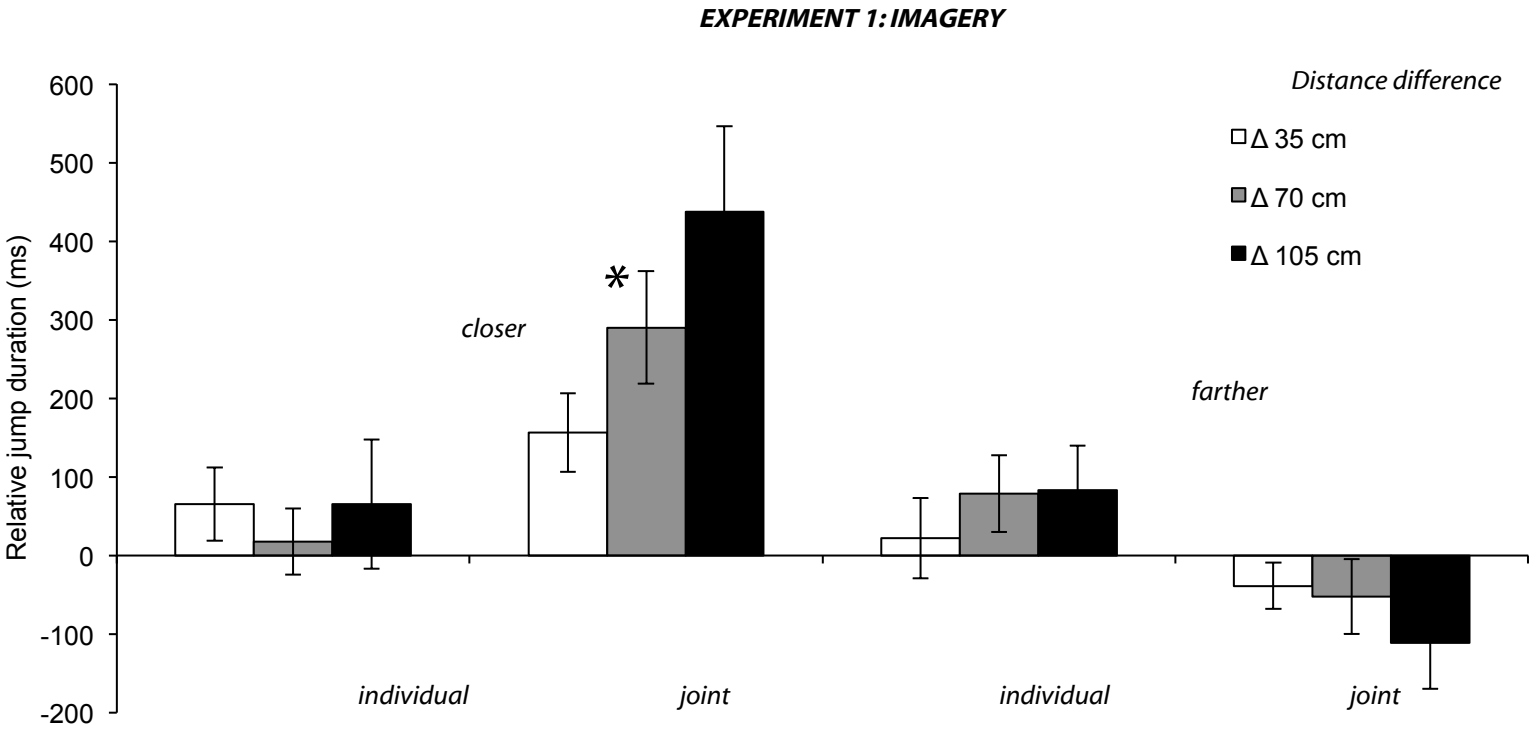
Joint jumping imagery

- Task: “Imagine to jump while landing at the same time as another person on the other side of the occluder!”

- Measurement: Self-reported duration of imagined jump



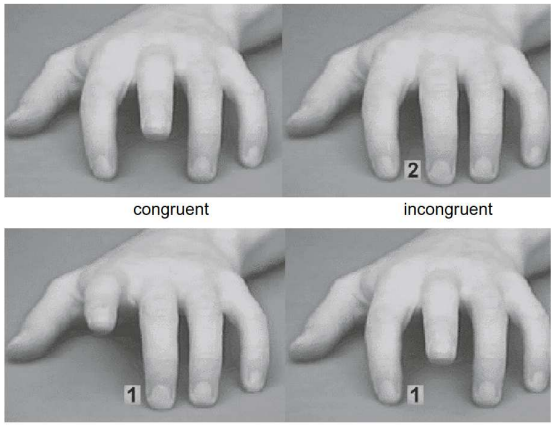
Imagery


EXPERIMENT 1: IMAGERY
Distance difference
Δ 35 cm
Δ 70 cm
Δ 105 cm
Relative jump duration (ms)
600
500
400
300
200
100
0
-100
-200
*
closer
farther
individual
joint
individual
joint

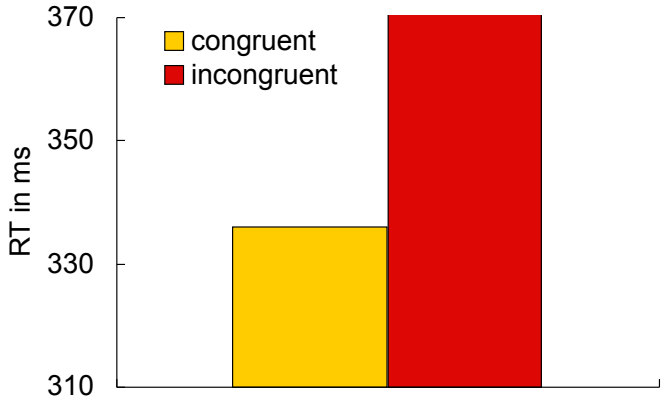
In some joint actions, the agents have a single representation of the whole outcome (slides from Natalie Sebanz)

Group-level action planning?

Experimental paradigm is based on the phenomenon of 'perception-action matching': Observing an action creates a tendency to perform this action. That is, individual action plans are activated based on the observation of individual actions.



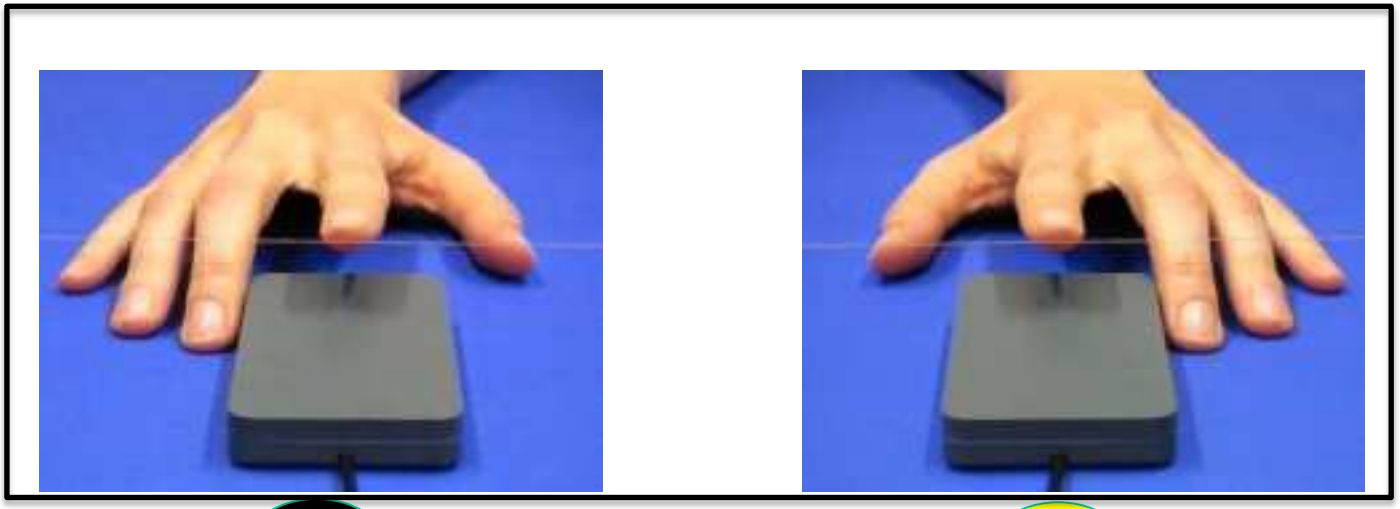
As a consequence, performing an action that is similar to the observed action is easy while performing an action that is opposite to the observed action is more difficult (e.g., Brass et al., 2001).

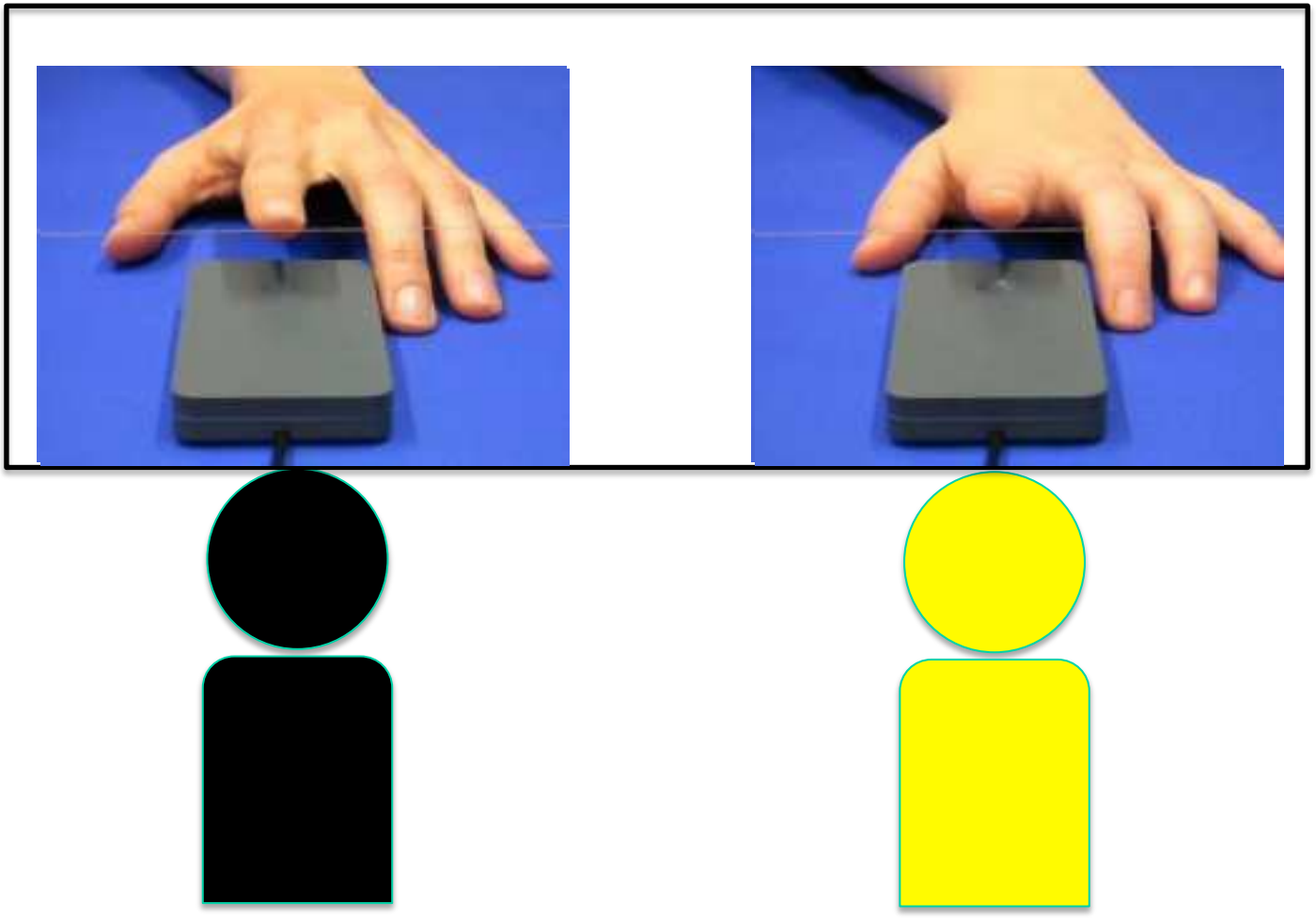


Group-level action planning?

If co-actors form group-level action plans, then observing joint action should create a tendency to perform joint actions (perception-action matching at an inter-group level).

It should be more difficult to perform joint actions when observing individual actions.





Participant´s task is to press a key when the right hand is moving.

Congruent condition: Confederate moves when left hand is moving and when both hands are moving.

C

P

C

P

C

P

Participant´s task is to press a key when the right hand is moving.

Inongruent condition: Confederate moves when left hand is moving and when right hand is moving, but not when both hands are moving.

C

P

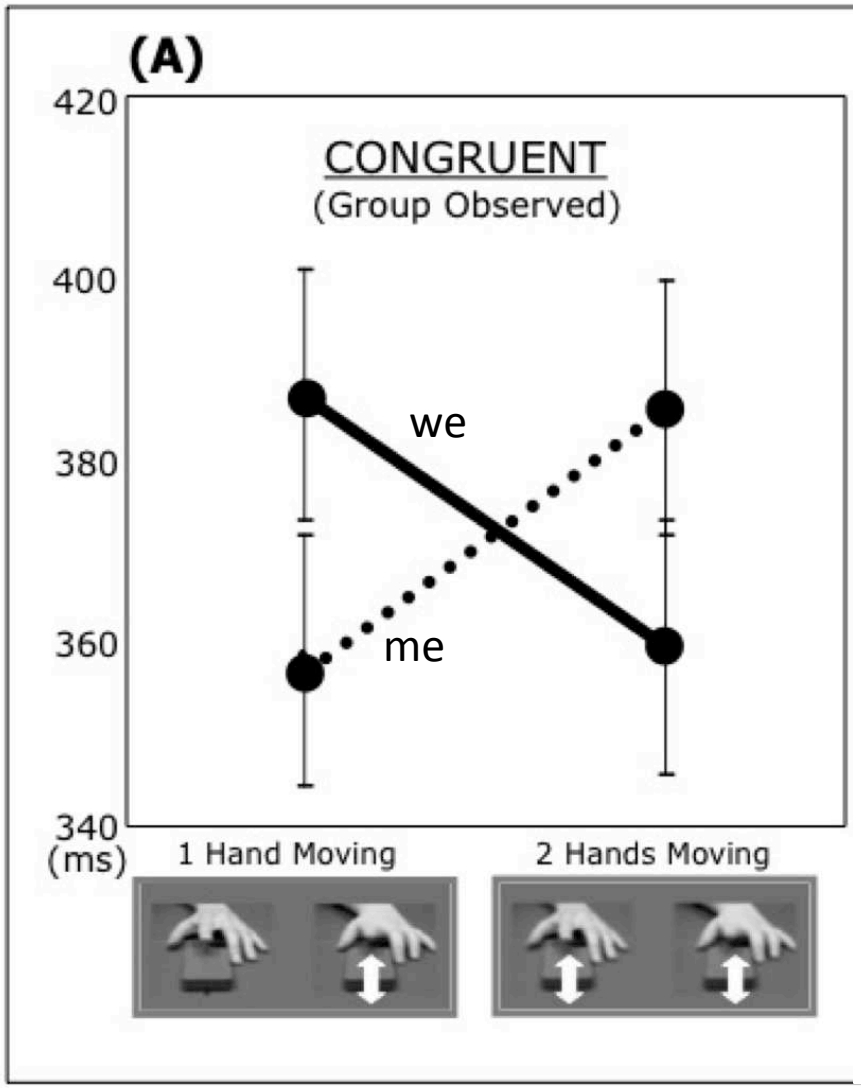
C

C

P

P

Tsai, Sebanz, & Knoblich, 2011, Cognition



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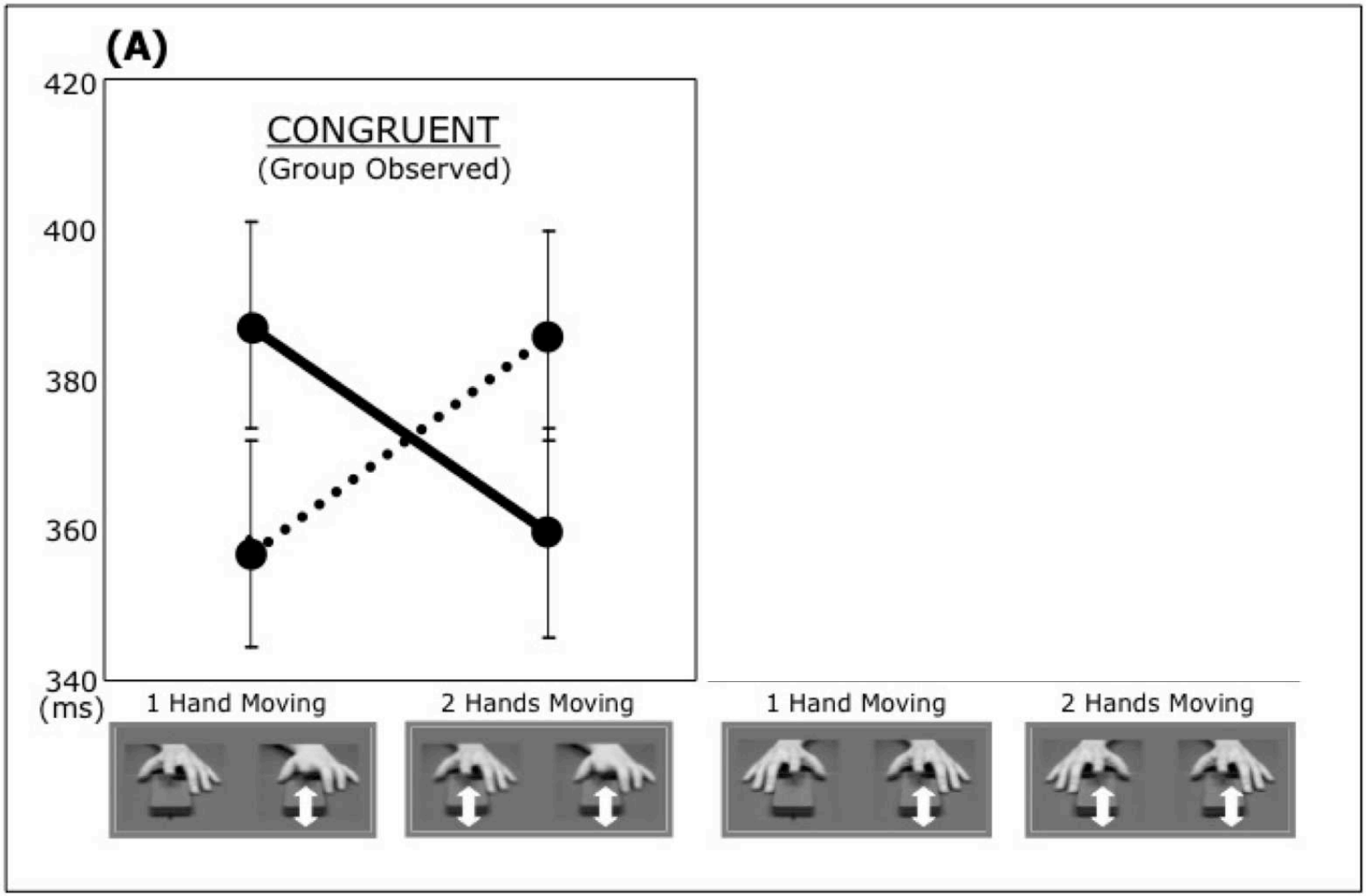

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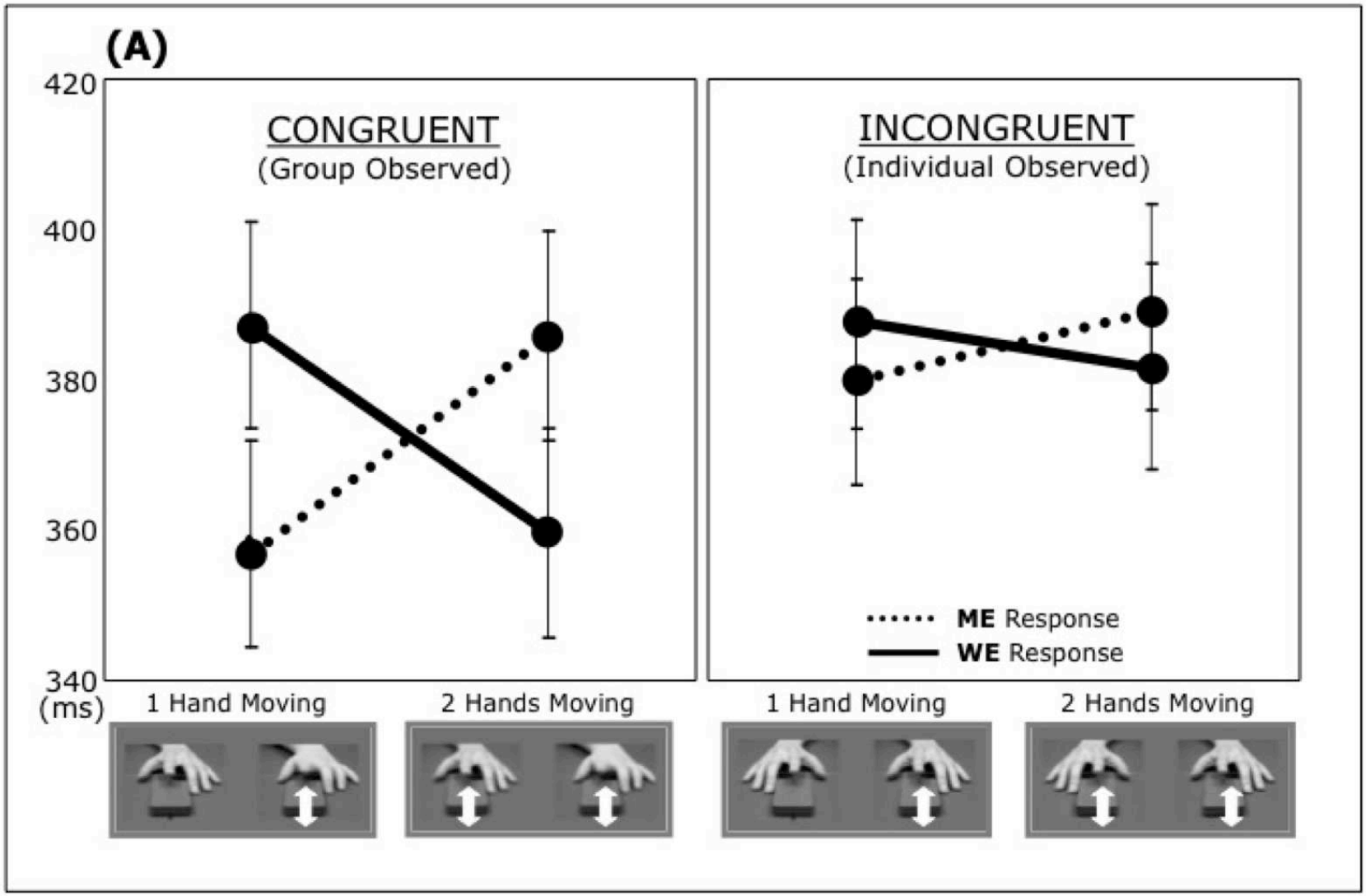

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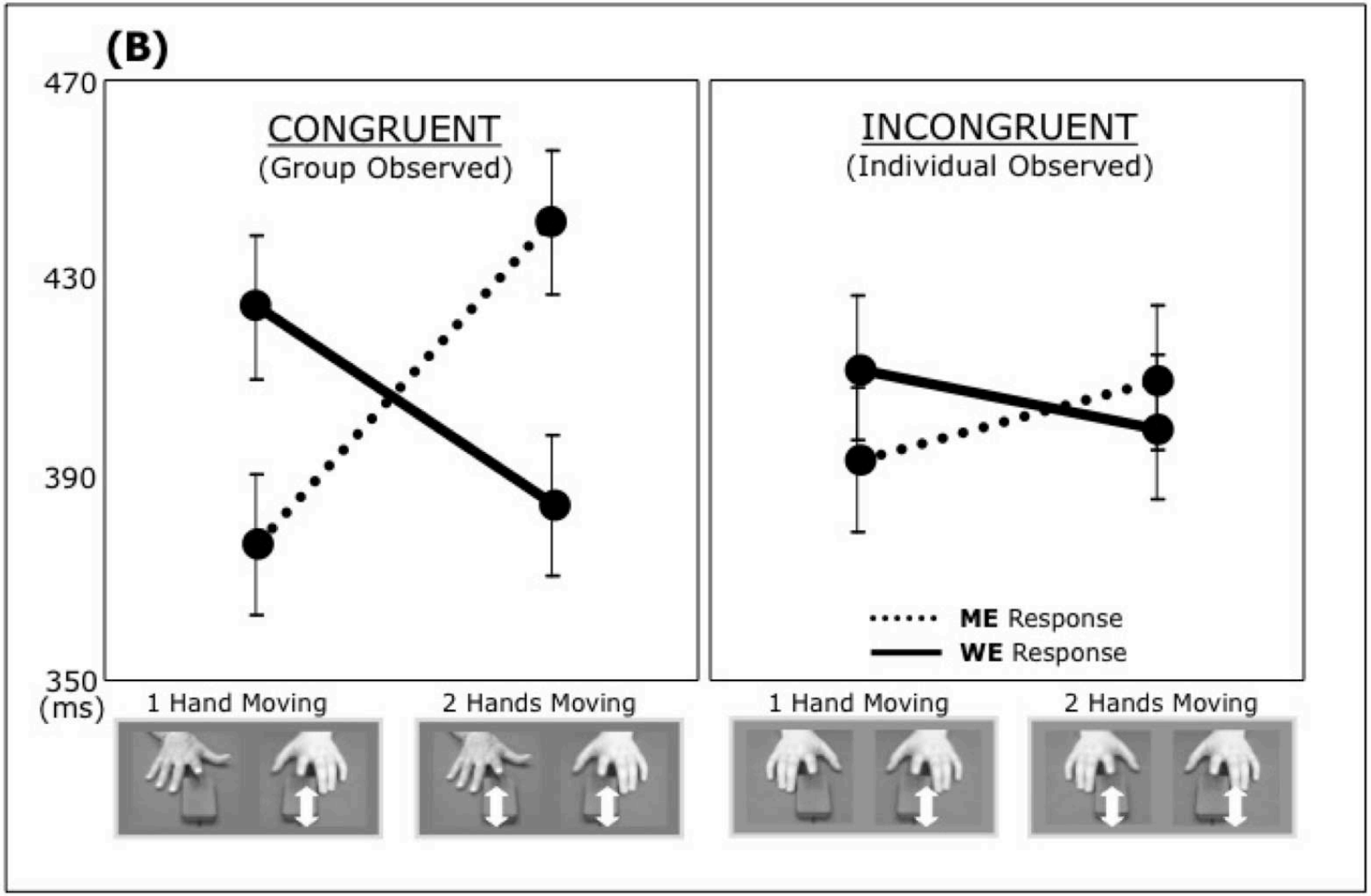

Evidence for…

Perception-action matching at an inter-group level.

Observing actions being performed simultaneously by two agents activates a corresponding action plan. This action plan specifies an agent´s own action in relation to their co-actor´s action (possibly in terms of perceptual events). Performing an individual action in response to an observed joint action is difficult, because the joint action plan activated through joint action observation needs to be replaced by an individual action plan.

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 knowledge between us"

(Bratman 1993: View 4)

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What is the relation between a purposive joint action and the goal or goals to which it is directed?