Practical Reasoning and Motor Representation

a workshop organised by
s.butterfill@warwick.ac.uk
corrado.sinigaglia@unimi.it

at the University of Warwick
Which events are actions?
Which events are actions?
Which events are actions?

- Action
  - Intention
    - Event
  - Motor representation
    - Event
Some motor representations carry information about outcomes.
Some motor representations carry information about outcomes.
Some motor representations carry information about outcomes.
Some motor representations carry information about outcomes.

Villiger et al (2010)
Some motor representations carry information about outcomes.

And these representations trigger planning-like processes.
Some motor representations carry information about outcomes.

And these representations trigger planning-like processes.

secure it         transport it         position it
Some motor representations carry information about outcomes.

And these representations trigger planning-like processes.
Some motor representations carry information about outcomes.

And these representations trigger planning-like processes.
Some motor representations carry information about outcomes.

And these representations trigger planning-like processes.
Some motor representations carry information about outcomes.

And these representations trigger planning-like processes.
Some motor representations carry information about outcomes.

And these representations trigger planning-like processes.

steal that apple

secure it

transport it

position it

hand-1

reach  grasp  move  arrive  release

hand-2

reach  grasp  move  place  release
Some motor representations carry information about outcomes.

And these representations trigger planning-like processes.

steal that apple

also in observation

secure it

transport it

position it

reach  grasp  move  arrive  release

reach  grasp  move  place  release

hand-1  hand-2
motor representation = intention ?
motor representation = intention? No!
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...
Head down Rue Cujas toward Rue Victor Cousin. Turn right onto Rue Saint-Jacques. ...
motor representation = intention? No!
steal that apple

secure it
reach
hand-1
grasp
move
arrive
release

transport it

position it
move
place
release

hand-2

reach
grasp
How do motor processes and practical reasoning interact in enabling us to perform and understand actions?
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 Glasgow on Monday is a propositional attitude.

All intentions are propositional attitudes.

No motor representations are propositional attitudes.

No motor representations are intentions.
The Interface Problem
The Interface Problem

Some actions involve both intention and motor representation
The Interface Problem

motor representations:

i. represent outcomes;

ii. ground the purposiveness of some actions

Some actions involve both intention and motor representation
The Interface Problem

motor representations:

i. represent outcomes;

ii. ground the
purposiveness of some
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.

Some actions involve both intention and motor representation
The Interface Problem: How are non-accidental matches possible?

motor representations:

i. represent outcomes;

ii. ground the purposiveness of some 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.

Some actions involve both intention and motor representation
The Interface Problem:
How are non-accidental matches possible?

<table>
<thead>
<tr>
<th>motor representations:</th>
<th>Two outcomes, A and B, <em>match</em> 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.</th>
</tr>
</thead>
<tbody>
<tr>
<td>i. represent outcomes;</td>
<td>Some actions involve both intention and motor representation</td>
</tr>
<tr>
<td>ii. ground the</td>
<td></td>
</tr>
<tr>
<td>purposiveness of some</td>
<td></td>
</tr>
<tr>
<td>actions; and</td>
<td></td>
</tr>
<tr>
<td>iii. differ in format</td>
<td></td>
</tr>
<tr>
<td>from intentions.</td>
<td></td>
</tr>
</tbody>
</table>
The Interface Problem: How are non-accidental matches possible?

motor representations:

i. represent outcomes;

ii. ground the purposiveness of some actions; and

iii. differ in format from 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, at least partially, the occurrence of B or vice versa.

Some actions involve both intention and motor representation
Head southeast on Rue Cujas toward Rue Victor Cousin. Turn right onto Rue Saint-Jacques. ...
Follow *that* route
Follow *that* route
Do that?
(Zhang and Rosenbaum 2007)
(small reward)  \[ \rightarrow \]

ONE WAY

X start here

(big reward)
What is the relation between a purposive action and the outcome or outcomes to which it is directed?
What is the relation between a purposive action and the outcome or outcomes to which it is directed?
What is the relation between a purposive action and the outcome or outcomes to which it is directed?
What is the relation between a purposive action and the outcome or outcomes to which it is directed?
What is the relation between a purposive action and the outcome or outcomes to which it is directed?
What is the relation between a purposive action and the outcome or outcomes to which it is directed?
imagine seeing
imagine

actually

seeing

seeing

1
imagine actually
seeing acting seeing acting
1 2
imagine actually

seeing acting

1 2

seeing acting

3

seeing acting
imagine actually

seeing acting seeing acting

1 2

Fiori et al (submitted)
actually

seeing

imagine (cognitive)

acting

imagine

seeing

acting

actually

acting