Motor representation in goal ascription [plan]

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Overall Q: What is the role of motor representation in action understanding? There is much evidence **that** motor representation matters for action understanding but varying theoretical claims about what its role might be.

1. Define goal ascription as a part of action understanding (distinguish identifying actual outcomes from identifying outcomes to which action is directed; distinguish identifying outcomes from identifying relation between action and outcome).

2. Pure goal ascription (goal ascription without first attributing mental states such as belief & desires; 'goal ascription without mentalizing')

3. What makes pure action understanding possible? I.e. which principles and facts enable us gain knowledge of to which goals others' actions are directed? (Distinguish this question from issues of how this works in practice.)

4. Maybe it isn't possible (maybe all action understanding depends on full-blown mindreading). How to find out? Try to answer the question (3).

5. Pure Teleology (the Rationality principle is the sole principle): the commitments are (1) pure goal ascription is possible; (2) the Rationality principle is sufficient to explain the possibility of the actual extent of pure action understanding. (But does allow that action understanding can involve ascription of beliefs, desires and mental states as well. It only claims that they are not always necessary for goal ascription.)

6. Objections to pure teleology as a complete solution [see below]

7. Postulate additional principles

8. Demonstration that additional principles enable the objections (6) to be overcome.

9. Link additional principles to possible roles for motor cognition in action understanding.

10. If motor representation plays this role (as identified in (9)), then the interface problem arises …

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Part 1: How much mindreading can be achieved without meta-representation?

Part 2: What happens when multiple processes are involved in mindreading?

Problem for alternative views: how is reference to action possible?
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Is mindreading purely propositional? That is, does it involve only propositional attitudes of only propositional attitudes?
        subject R1 [protagonist R2 x]
The standard way of thinking of mindreading is that both R1 and R2 are propositional attitudes.
This precludes a role for motor representations.
Moves: (1) format; (2) functional attribution rather than representational attribution.

Twin temptations ???: (i) mindreading involves representation but is purely propositional; (ii) mindreading is non-representational; merely perceptual (Cassam?).
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CS: *What is the relation between mindreading and goal ascription?*

A. distinguish two question:
A.1. Is the action goal directed (purposive) or not? (Premack: a cue = self-propelled)
A.2. What is the goal (or goals) to which this action is directed?

G&C Teleological Stance: give answers to A1 & A2 with principle of rationality (/efficiency)

Two questions about Rationality Principle:
1. how could it be implemented? (How do people actually identify goals)
2. is it theoretically sufficient for goal ascription? (How is possible even in principle to know that the goal of an action is G?)

If we rely only on Rationality, we could not know very much about the goals to which actions are directed?

Rationality principle (how to formulate?)
  - the hypothesis that an action is directed to a particular goal, G, is DISCONFIRMED if there is another action available to the agent which would have been a better (more justifiable, more efficient) way of achieving G

Procedure:
1. formulate hypothesis (arrived at randomly, e.g.)
2. attempt to reject
3. accept if (2) fails
I.e. knowledge depends on failing to reject a true hypothesis

Problem 1 E.g. suppose in the original G&C ball jump that we have a new condition where the ball goes slightly higher than necessary to clear the barrier. Now there is an action available to the agent (ball) which would be a more rational (& efficient) way of achieving the goal of meeting the larger ball. Given the principle of rationality it is **not possible** to know that the goal of the small ball is to reach the larger ball. Further, it is a prediction of the theory that **Ss will not identify** reaching the larger ball as the goal of the smaller ball's action (i.e. as a matter of fact this goal will not be ascribed).

Problem 2 In many cases there are two ways of achieving G and there is no fact of the matter concerning which of them is the most efficient

1. Sometimes an action is directed to a goal and it is not the most justifiable way of achieving that goal (i.e. there is another action available to the agent which would be more justifiable as a means to achieving G) AND it IS possible for us to know that this is the goal of the action
2. Sometimes an action is the most justifiable action for achieving an outcome G and G is not the goal of that action AND it is possible for us to know that G is not the goal of the action.

Condition of adequacy for Pure Teleology: if we can know p, then we can know p on by applying the Rationality principle. (NOT that the Rationality principle has to meet this condition: if it is true that p, then p is entailed by the rationality principle.)

Why 1 & 2? Because what makes it the case an action is directed to an outcome is NOT the fact that the action is a most justifiable way of achieving

that outcome but the fact that there is a representation of the outcome which coordinates the action.

How is it possible (even in principle) to know to which outcomes another agent's action is directed?
  - Obstacle: the answer is determined by representations to which other agents have no direct access

What's the alternative to pure teleology? Add principles.

Against rationality principle as the only principle:
 - too cognitively demanding?
 - the epistemic problem (How is it possible even in principle to know to which goal an action is directed?)

Principle of Fitting:
 - if something looks like a basic action (!) then, all other things being equal, it is. (e.g. if something looks like jumping then, all other things being equal, it is jumping).

Principle of Rationality is for assembling basic actions into larger units of purposive action and identifying their goals.

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Abstract

Is mindreading purely propositional?
How could the motor system be involved in mindreading?
Whereas in most discussion of mindreading the focus has been on non-motor processes and representations, there is a considerable body of evidence showing that the motor system appears to play some role in enabling mindreading (*Sinigaglia; Southgate f.b., ...). It is one thing to say **that** the motor system is somehow involved in mindreading; another thing entirely to identify its role.
What roles could motor representation possibly play in mindreading?
One key step in mindreading is goal ascription (or, if goal ascription is not mindreading proper, then it is often a prerequisite).
Among the best developed, most empirically well-supported views, there are two main alternative hypotheses.
  - Southgate & Csibra: Motor emulation. == Mindreading is propositional
  - Sinigaglia & … : Goal Identification.
We identify a conceptual difficulty facing the Goal Identification hypothesis: since motor format representations of outcomes cannot be inferentially integrated with propositional format representations of intentions and other mental states, it is unclear how, even if it were true that motor processes

identified goals, this would facilitate mindreading. (I.e.: suppose for the sake of argument that there are motor goal representations; show that there is a difficulty understanding how these could facilitate mindreading.)
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Q1: What roles could (not does) motor representation play in mindreading?
Q2: How is it possible

Take a grasping action (say).

Q1. Is the action merely purposive or purposive?
--- It's purposive; the directedness of the action to an outcome is grounded by a *motor representation*

Q2. Does a mindreader (interpreter) have to represent the action as purposive?
--- Not necessarily. Suppose the interpreter represents it as merely purposive. That is, the interpreter correctly identifies, from all the possible and actual outcomes of the action, the outcome (or outcomes) to which it is directed. And the interpreter represents this outcome as one to which the action is in some sense directed. What more would the interpreter gain by also representing the motor representation which underpins the actions outcome-directedness?

What would be the cost of doing so? Metarepresentation would be required (the interpreter would have to represent the motor representation).

On this line of thought, cf. Gallese & Sinigaglia (TICS 2011) on functional attribution.

Q2* metarepresentation = R(R(x)) by def
      RF: there are multiple representational formats (e.g. motor & propositional)
      Rp = Representation in propositional format
         Rp(Rp(x)) (x is propositional)
      Rm = Representation in motor format
         ?is there? Rm(Rm(x))? (x is an action outcome)

This was the reason why Goldman stated that MN might cause (but not constitute) mind-reading:
    1. Mindreading involves metarepresentation
    2. Mirroring is having a representation

3. Having a representation is not representing someone having a representation
Therefore,
4. Mirroring is not mindreading

What kind of representation is a meta-representation? Meta-representations are always representations with a propositional format. (E.g. representing someone seeing is not a matter of seeing, or visually representing them. It's a matter of thinking about them.)

My suggestion in (Gallese & Sinigaglia 2011) was that ("one form of") mind-reading does not necessarily involve meta-representation

But what is mind-reading? (How to avoid a merely terminological debate?)

Goldman: Mind-reading is simulation plus attribution (projection)

Low level: mirroring plus attribution $Rp(Rp(x))$
High level: E-imagination plus attribution $Rp(Rp(x))$

If this is true, the only difference you have has to do with what causes mindreading, not with the mindreading itself.

motor imagery plus attribution $Rp(Rm(x))$

What's missing from this picture? It considers only *representational* attribution. However there are several reasons to suppose that functional attribution is also an important basis for many theory of mind abilities, particularly those which are automatic.

I believe that:
 you desire that:
   you grasp* the mug*.

process: mirroring
what is attributed: motor outcomes
type of attribution: functional

We can identify the outcome to which an action is directed by virtue of---
        1. motor representation of the action
        2. representation of outcome as function of action

Argument v2: goal ascription (v1 is below)

      1. goal ascription can involve propositional representations of actions and the outcomes to which they are directed $Rp(f(A,O))$

      2. goal ascription can involve motor representation of action outcomes $Rm(A,O)$

      3. in some cases goal attribution involves BOTH … interface problem!

Argument v3: goal ascription/mind-reading

1. goal ascription can involve propositional representations of actions and the outcomes to which they are directed $Rp(f(A,O))$

2. goal ascription can involve motor representation of action outcomes $Rm(A,O)$

1* Representational attribution, the paradigm case of mindreading, typically involves propositional representations of actions and the outcomes to which they are directed

2* Functional attribution typically involves motor representation of action outcomes

3* [solution] Representational attribution involves propositional representation of actions featuring demonstrative action concepts

<u>attribution type</u>		<u>format</u>
	motor	propositional
functional	(mirroring)	
representational		(explicit)

Mindreading-R sometimes depends on Mindreading-G (Mindreading-G = identifying motor outcomes)

The primary mechanism of mindreading-G is mirroring motor cognition.

"Go to him!" is not a motor outcome (like "go home!")

Argument.

      1. Mindreading-R exists (Mindreading-R = identifying reasons for action)

      2. Mirroring involves functional attribution

      3. Functional attribution does not presuppose identifying reasons for action

      4 Identifying reasons action depend

      2. Mindreading-R depends on mirroring, motor imagery & more

      analogy: identifying the meanings of an utterance depends on identifying its phonetic constituents

      [double role] the role of mirroring is not simply to provide functional attribution but also to play a role in constraining representational attributions of

reasons (to enable identification of which events are the sort that might have reason explanations).

     3. Mindreading-R involves propositional metarepresentations

     4. motor representations and metarepresentations differ in format

Therefore,

     5. The inferface problem arises here!

grasp* : demonstrative action concept (defers to motor representation)

mug* :

Double role for motor representation: (1) functional attribution (no concepts needed, no metarepresentation); (2) basis for deference by concepts in order to refer to actions, which is necessary for representation of action.

Q3. Not representing means not attributing? No: representational vs. functional attribution (Gallese & Sinigaglia TICS 2011 p. 6)

Rizzolatti & Sinigaglia 2010: distinguish reasons from goals

Sinigaglia & Butterfill 2012: how attributing reasons depends on identifying goals (interrelatedness)

Pacherie 2000? 'The content of intentions'