Hacking representations: If you could spray them, they'd be real

Matej Kohar

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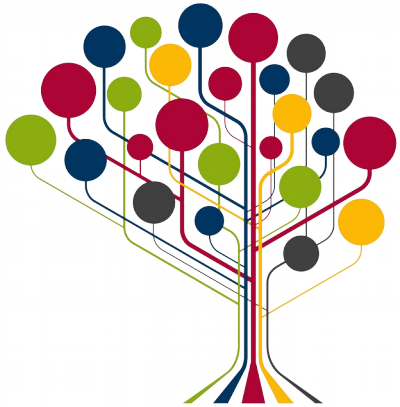
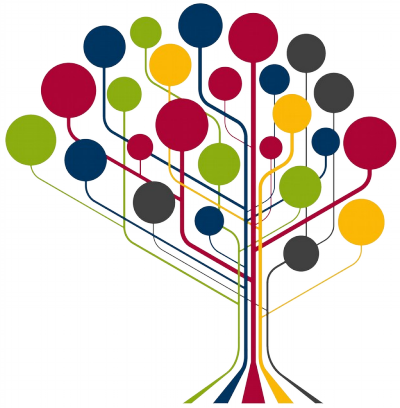
Outline



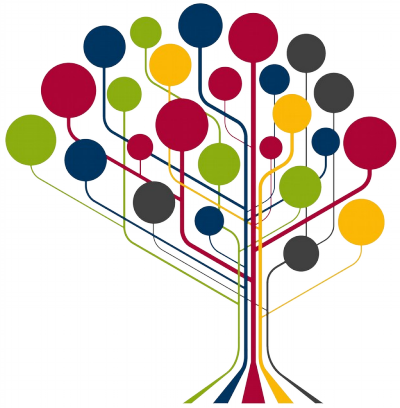
- 1. Introduction
- 2. Hacking-style arguments
- 3. Thomson and Piccinini (2018)
- 4. Evaluation

1. Introduction



- Thomson and Piccinini offer a Hacking-style argument for realism about neural representations
- Representations have been “observed and manipulated” by experimental neuroscientists for years
- 25 pages of examples from leading experts in neuroscientific research

1. Introduction



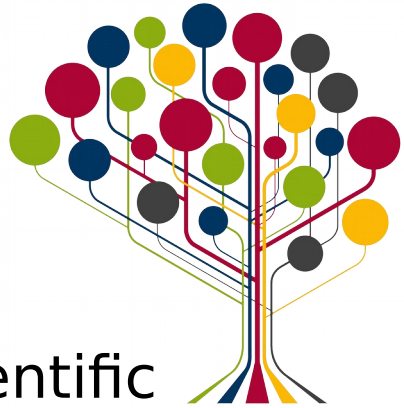
- I argue: not so fast

1. Hacking style arguments cannot decide between representationalism and non-representationalism
2. The evidence of T&P not sufficient for a Hacking style argument
3. The criteria T&P use to identify neural representations not adequate

2. Hacking-style arguments

- Experimental practice moves forward without regard to theoretical squabbles
- The existence of theoretical entities cannot be doubted if they are routinely used as instruments in experimental settings

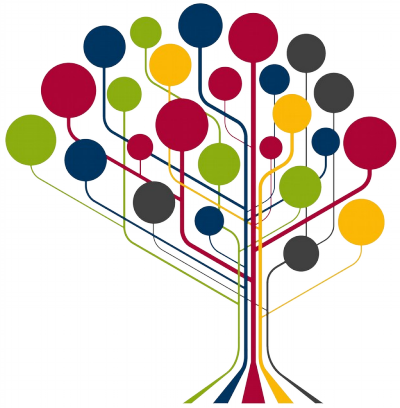
2. Hacking-style arguments



For my part I never thought twice about scientific realism until a friend told me about an ongoing experiment to detect the existence of fractional electric charges. These are called quarks. Now it is not the quarks that made me a realist, but rather electrons.

Now how does one alter the charge on the niobium ball? 'Well, at that stage,' said my friend,' we spray it with positrons to increase the charge or with electrons to decrease the charge.' From that day forth I've been a scientific realist. So far as I'm concerned, if you can spray them then they are real.

2. Hacking-style arguments

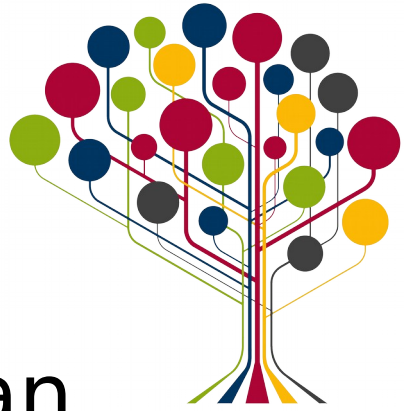


- NB: argument aims to establish wholesale scientific realism contra van Fraassen and others
- NB: argument does not aim to establish any particular theory about electrons, only their existence
- NB: argument aims to establish the existence of instrumentally useful entities

3. Thomson & Piccinini (2018)

- Neural representations: functional role (standing in for) + semantic content
- Semantic contents fixed teleosemantically
- Definition of representation differs between indicative (sensory) and imperative (motor) representations

3. Thomson & Piccinini (2018)



(SR) A state (or signal) S within an agent's representational system R indicatively represents that P =def

A function of R is to produce S, such that S carries natural semantic information that P and S can guide the agent's behavior with respect to the fact that P. (2018: 5)

3. Thomson & Piccinini (2018)

(MR) A state (or signal) S within an agent's representational system R imperatively represents that P =def

A function of R is to produce S, such that S causes that P. (ibid.)

3. Thomson & Piccinini (2018)

- NB: A function in teleosemantics means selected effect

3. Thomson & Piccinini (2018)

For sensory representations, the criteria are that

(1) the signal carries information about some state external to the system,

(2) there is a systematic mapping between a range of similar signals and a range of similar external states, and

(3) the system uses these internal states to guide behavior. (2018: 5)

3. Thomson & Piccinini (2018)

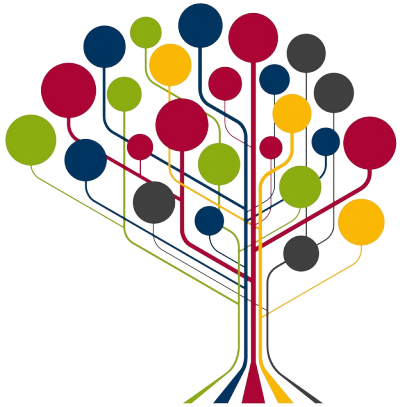
For motor representations, the criteria are that

(4) the signal correlates with a future state of the environment (where the environment includes the body),

(5) there is a systematic mapping between a range of similar signals and a range of similar future states of the environment, and

(6) such signals actually cause movements that bring about the future states of the environment.

3. Thomson & Piccinini (2018)



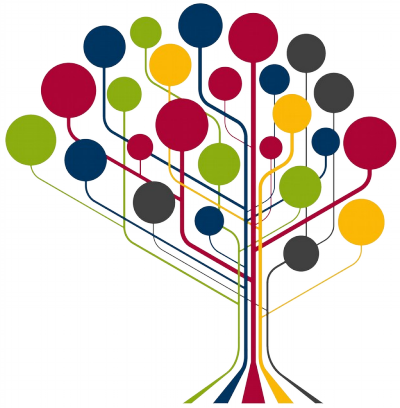
- Some examples:
  - Visual maps in V1
  - Motion representations in MT
  - Working memory
  - Birdsong learning
  - Motor maps
  - Efference copies

4. Evaluation

1. Can Hacking-style arguments decide the representation debate?

- The anti-representationalist usually does not contend that “neural representation” does not refer
- Both agree about the existence of entities, but disagree about the properties
- Adjudicating merits of theories beyond the scope of Hacking-style arguments

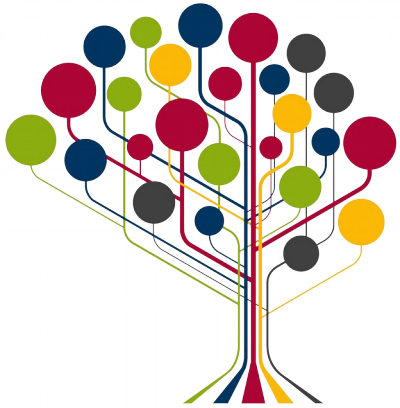
4. Evaluation



2. Does the evidence point to an instrumental role of neural representation?

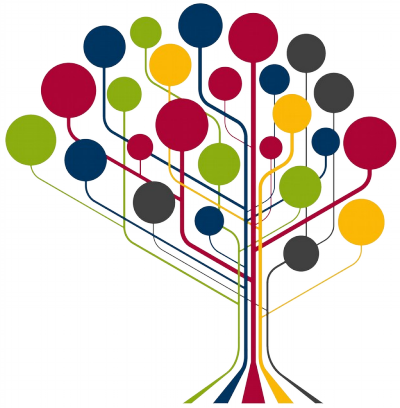
- Use as instrument requires isolation, or on-demand availability
- Instrumental use in unrelated investigations carries more weight
- Not like electrons, but like phlogiston

4. Evaluation



- Properties of phlogiston were relatively well understood – mass, concentration in various substances
- Pages of experimental reports claiming observation of phlogiston's effects can be found e.g. in Priestley
- Samples of phlogiston could not be obtained, and it could not be used in investigating unrelated phenomena

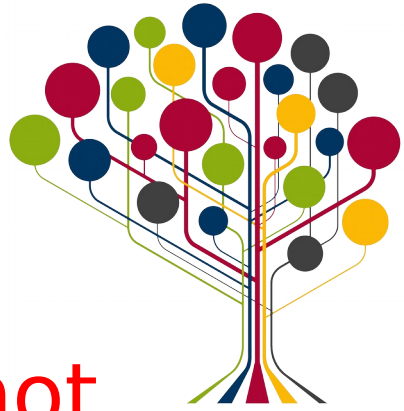
4. Evaluation



3. Are the criteria T&P use for identifying representations adequate?

- Dependence on (a specific form of) teleosemantics weakens the experimentalist thrust of the argument
- Actual criteria used (1)-(6) do not refer to functions as selected effects required by definitions (SR) and (MR)
- It is unclear how functions in this sense (and hence semantic contents) could ever be observed in an experimental setting

Conclusion



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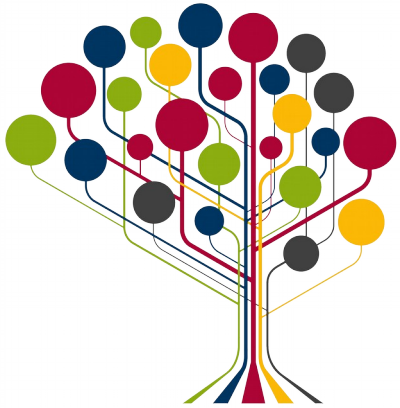

Thanks for your attention

References

- Hacking, I. (1983). *Representing and Intervening.* Cambridge: Cambridge University Press.
- Thomson, E & Piccinini, G. (2018). Neural Representations Observed. *Minds & Machines 28*(1), 191-235.