

Six views of embodiment

The six claims

- Cognition is situated
- Cognition is time pressured
- We off-load cognitive work onto the environment
- ~~The environment is part of the cognitive system~~
- Cognition is for action
- Off-line cognition is body based

Situated cognition defined

- “Situated cognition is cognition that takes place in the context of task-relevant inputs and outputs.”

How are task-relevant inputs identified?



Wilbur Wright fidgets with an inner tube box



<http://www.pbs.org/wgbh/nova/wright/images/flye-lotech.gif>

Situated cognition defined (again)

- “By definition, situated cognition involves interaction with the things that the cognitive activity is about.”

A deep problem in offloading

- What is the relation of situated cognition to the things that cognition is **about**?
 - “In short, our ability to form mental representations about things that are remote in time and space, which is arguably the sine qua non of human thought, in principle cannot yield to a situated cognition analysis.”

Some things that cognition is NOT about?

- Counting on the fingers
- Place value arithmetic
- Cave painting
- Venn diagrams

- Symbol processing in general?
 - As in symbolic offloading

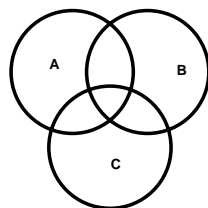
Where is the cognition when we reason with Venn diagrams?

- Inferences happen on the internal representations of the external diagrams.
- Internal representations are like copies of the things in the world.
- Mental representations are accurate when they correspond exactly to the things in the world.
 - In that case, the material world may influence cognition, but it is not where cognition happens.

Venn diagrams again...

- If however, we have the enaction view that representation is not a copy of things in the world, but an activity in which those things are brought forth,
 - then there is no need for an internal representation/copy on which the inference takes place.
 - The inference takes place in the rendering present of the diagrams as representations of logical relations.

Is there a region that is in both A and B, but not in C?



What's at stake?

- “Our science of cognition should explain the fundamental principles of organization and function.”
- If the enaction view is correct, then the basic principles of cognition are located in the unit of analysis permitted by the distributed cognition framework.
- Those principles are not located in the cognitive architecture of the brain.

- “In short, our ability to form mental representations about things that are remote in time and space, which is arguably the sine qua non of human thought, in principle cannot yield to a situated cognition analysis.”

How should we think about the mind/brain

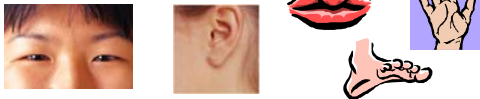
- Facultative system?
 - Temporary, organized for a particular occasion and disbanded readily
- Obligate system?
 - More or less permanent parts and relations among the parts.

Mind as facultative system?

Consider two example situations

Situation 1: driving your car while having a conversation

Situation 2: reading out aloud while tapping your feet to the rhythm of some music



Same input/output modules, yet different information flow!

From a WA talk by Jochen Triesch 2003

A challenge

- While the environment may surely have causal effects on cognition, it and the interactions of the mind (which she identifies as the brain) with the environment do not contain the underlying principles out of which a science of cognition can be made.

How about these underlying principles?

- Human minds are facultative systems.
- Mental representation is an activity rather than a structure.
- Simultaneous seeing a thing and “seeing it as” something that it is not is a key human ability.

A general response

- THE underlying principle of human cognition, as opposed to other kinds of cognition, is that it is culturally organized.
- That’s it!
- But working out the implications of that will require years of effort.

Cognition is for action

- Yes, we know.
- Memory as “the encoding of patterns of possible physical interaction with the world.” Glenberg (1997).
- Short-term memory... is seen not as a distinct memory “system” but as the deployment of particular action skills.

Off-line cognition is body based

- So true.
- Too bad she didn't put this point first.

The six claims, revisited

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