

SE367

UNDERSTANDING UNDERSTANDING

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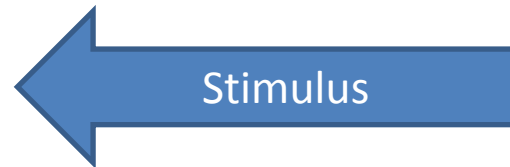
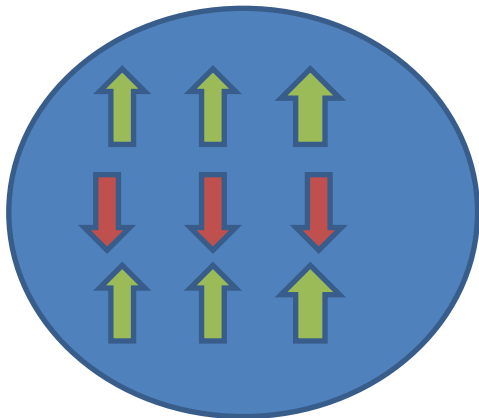
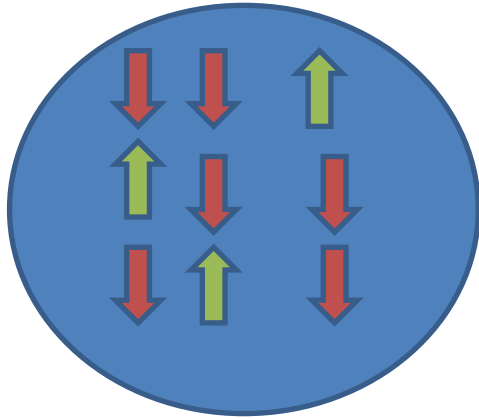
Sashank Pisupati

Symbol grounding

- Symbols by themselves are meaningless, they must be “grounded” in order to be meaningful (Cangelosi, Harnad)
- In humans, the symbols of language are grounded in our sensorimotor experience, the most fundamental of mental states, which are indicative of external stimuli

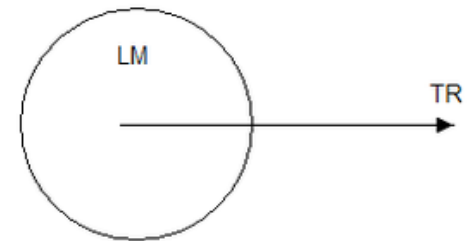
- Perception itself consists of **internal mental states** (meaningless by themselves) being **reliably** manipulated by external stimuli
- This manipulation lets us make inferences about the external world
- Eg: Hallucinations are internal mental states ungrounded in external stimuli, but the same states (or experience) as vision.

Internal states

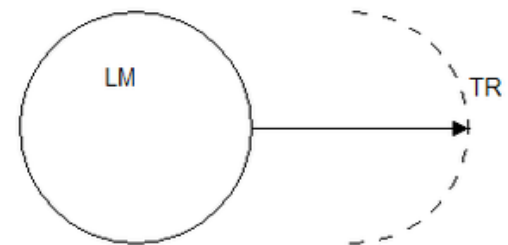


- Examples of language grounded in sensorimotor states:

- Image schema:
Prepositions like “out” being grounded in spatial
- Mirror neurons (Rizzolati et. al): Possible grounding of action verbs in one’s own motor action representation



OUT₁ schema



OUT₂ schema

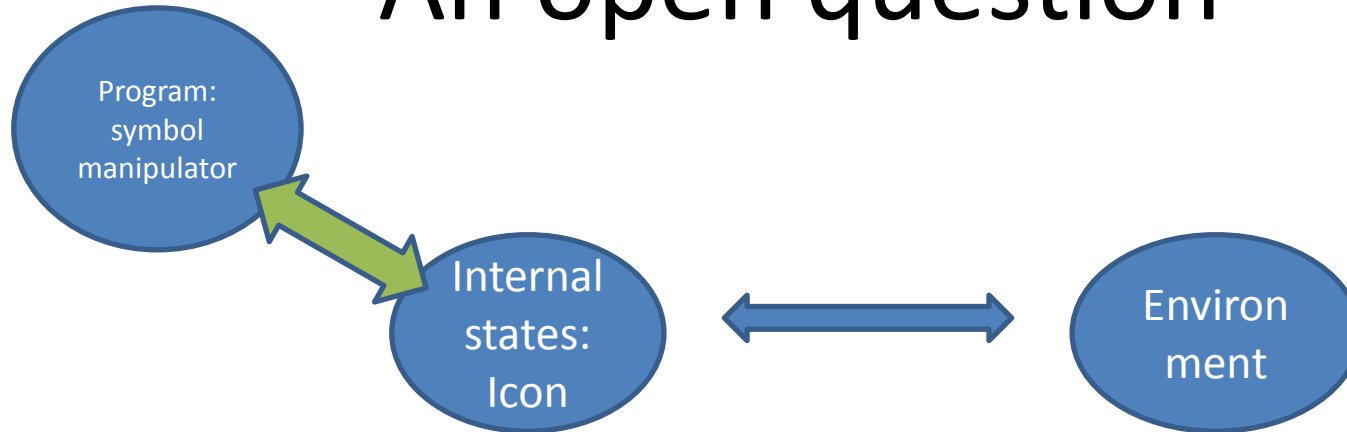


OUT₃ schema

(Johnson, *The Body in the Mind*, p. 32)

- If a robot, has its own internal states grounded in experience in a similar way to humans, and grounds its linguistic symbols in these states, then it **can** understand language in the same way as we do.
- Can one ever confirm the existence/grounding of the internal states of such a robot? (The other minds problem)

An open question



- Then what about biologically “programmed” machines whose internal states are **chemical**?