

# FUNCTIONALISM

Introduction to Cognitive Science- Session 2

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# History

- ▶ Aristotle (350 BC)
  - FORM = “essential whatness” – fulfilling the function that defines it as the kind of thing it is
    - Form of an axe is whatever enables it to cut
    - Form of an eye is whatever enables it to see...
- ▶ Hobbes (1651 AC)
  - Reasoning = kind of computation
    - Can be performed by systems of various physical types
    - “why may we not say that all automata... have an artificial life? For what is the heart but a spring; and the nerves but so many strings, and the joints but so many wheels...”

# What is functionalism

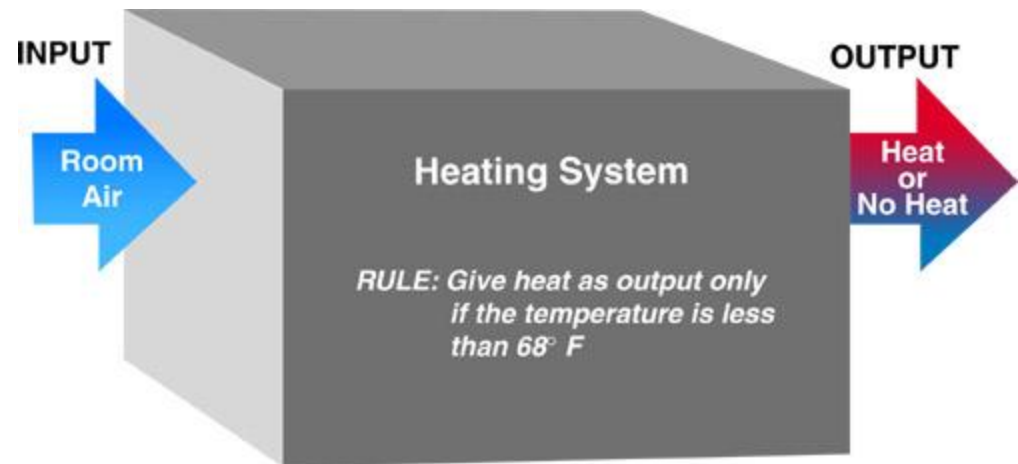
- ▶ Doctrine that what makes something a mental state of a particular type (pain, thought, etc.) **does not depend on its internal constitution, but rather on the way it functions**, or the role it plays, in the cognitive system of which it is a part.
- ▶ E.g. *pain* is a state that tends to be caused by bodily injury, to produce the belief that something is wrong with the body, and the desire to be out of that state, to produce anxiety, etc.
- ▶ Only creatures with internal states that meet these conditions are capable of being in pain

# What is being in pain?

- ▶ Suppose that in humans there is some distinctive kind of neural activity that meets these conditions (like C-fiber stimulation) =>
- ▶ Humans are in pain when C-fibers stimulated (actually not necessarily)
- ▶ However, the theory says, that if some silicon-based Martians could meet these conditions, they too **would be in pain.**
- ▶ Pain can be *realized* by different types of physical states in different kinds of creatures.
  - **Multiple realizability**

# Functional system as a black box

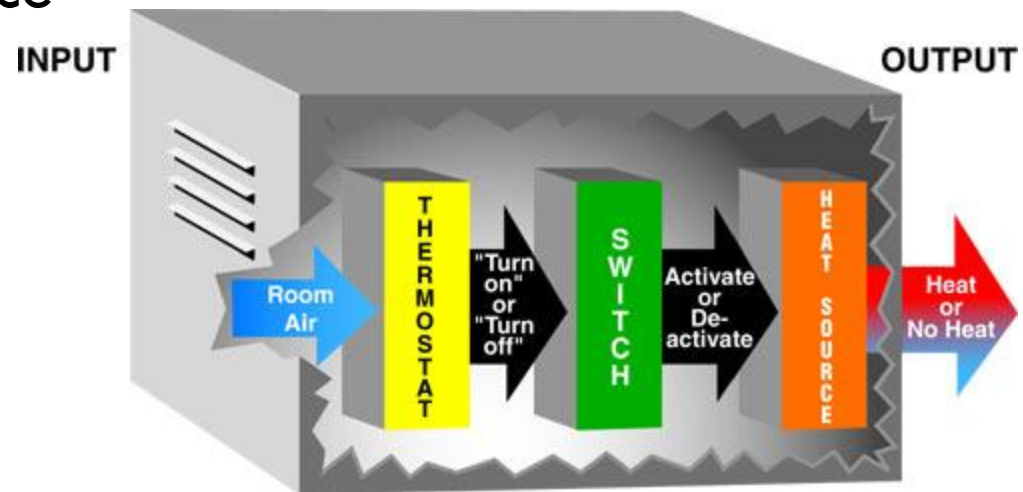
- Function of an automated heating system – to produce heat if air temperature drops below certain level
- Input – air
- Output - heat



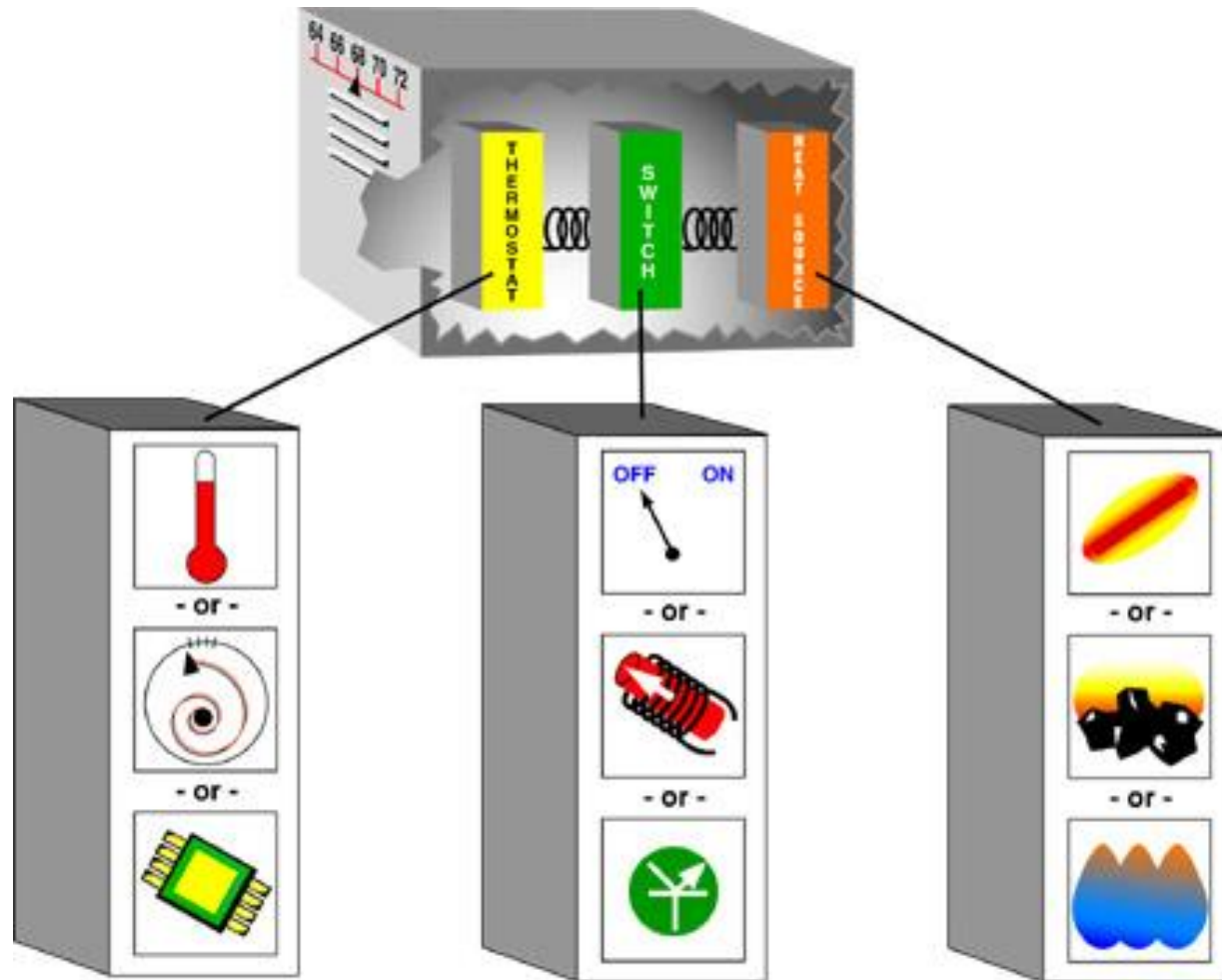
In Anderson, D.L:  
[http://www.mind.ilstu.edu/curriculum/functionalism\\_intro/functionalism\\_intro.php](http://www.mind.ilstu.edu/curriculum/functionalism_intro/functionalism_intro.php)

# What is in the black box?

- 3 functional components:
  - A thermostat
  - A switch
  - A heating source



# Multiple realizability



# Alternative thesis - Identity thesis

- What Putnam calls “brain state theory”
  - ▣ Each type of mental state is identical with a particular type of *neural* state.
- No creature with brains unlike ours can share our sensations, beliefs, and desires, no matter how similar its behavior or internal organization is to ours.



# Turing test (A. Turing, 1950)

- Test of a machine's intelligence

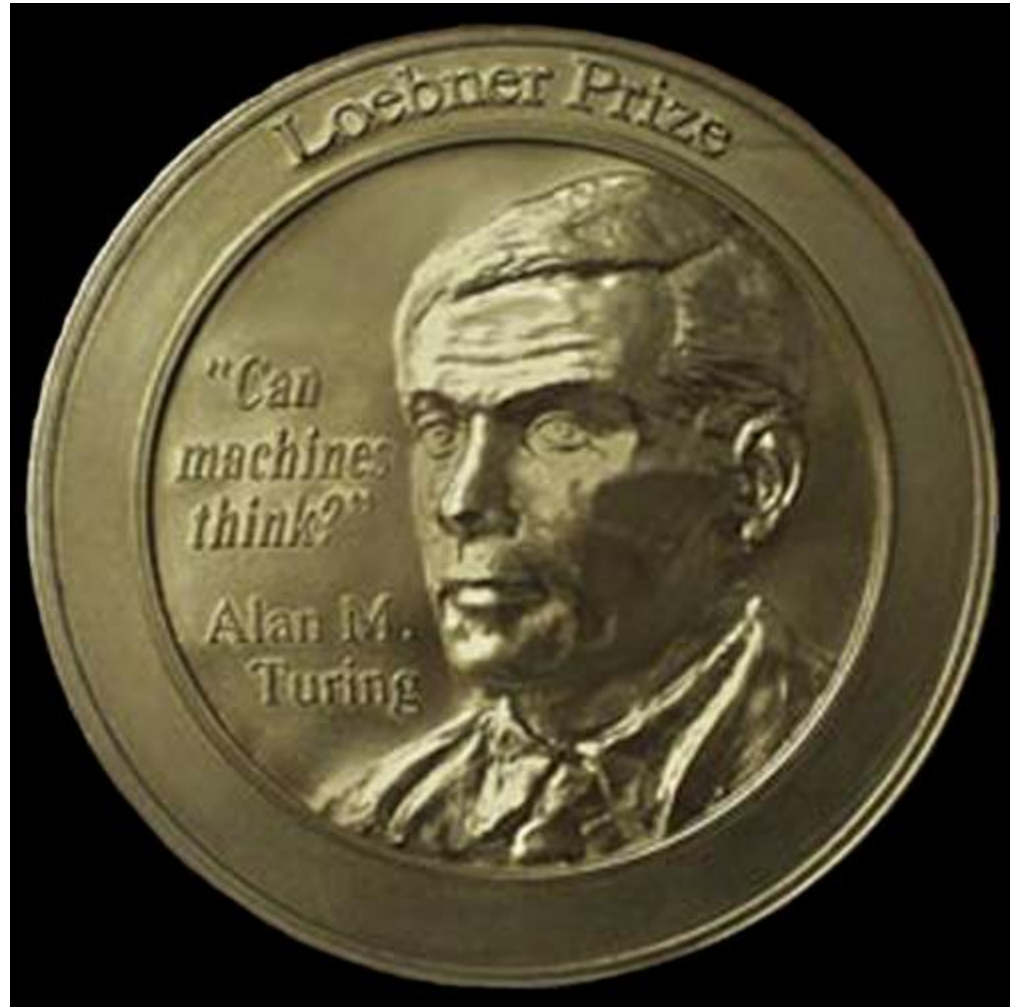


# Passing the Turing test

- ELIZA (J. Weizenbaum, 1966)
- PARRY (K. Colby, 1972)
- <http://www.stanford.edu/group/SHR/4-2/text/dialogues.html>

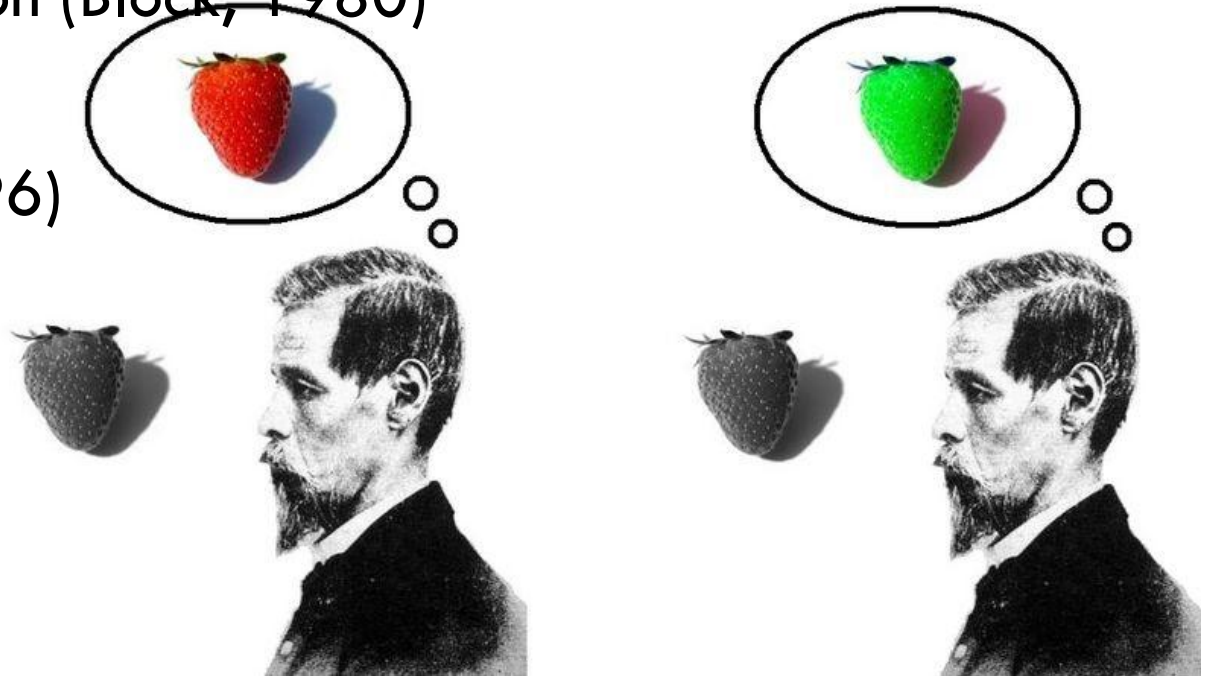
# Loebner prize

- Since 1990
- \$3,000
  - ▣ Best chatbot
- \$25,000
  - ▣ Pass the TT



# Objections

- What about qualia (experience)?
  - ▣ Inverted spectrum (Block, Fodor, 1972)
  - ▣ Chinese nation (Block, 1980)
  - ▣ Zombies (Chalmers, 1996)



- how about inverted vision? (Straton 1980)
- <http://video.google.com/videoplay?docid=2048269788799603527#>

# Next week

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- Chinese room argument
- Physical symbol system hypothesis
- Turing machine
- Symbolic paradigm

# Questions?



# Discussion

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- Do you think we can realize pain/intelligence/language in media other than brain?
- Do you think Turing test is sufficient for testing intelligence?
- What are its weaknesses?
- What would be a good test for intelligence?