

# Introduction to Robotics for cognitive science

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# Web page of the subject

[www.agentspace.org/kv](http://www.agentspace.org/kv)



# Cognition and adaptation

- to have acquired knowledge
- off-line training
- on-line use
- useful cognitive-like robot

- to be able to acquire knowledge
- on-line training
- on-line use
- true cognitive robot

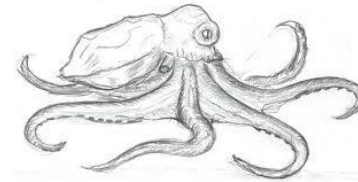
# Knowledge acquisition

Kinds of minds (Dennett):

- Darwinian  $\infty$



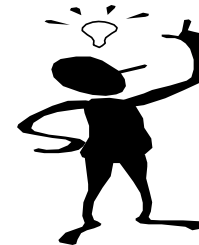
- Skinnerian n

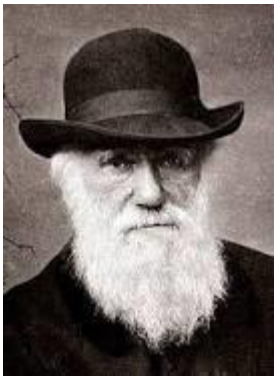


- Popperian 1



- Gregorian 0

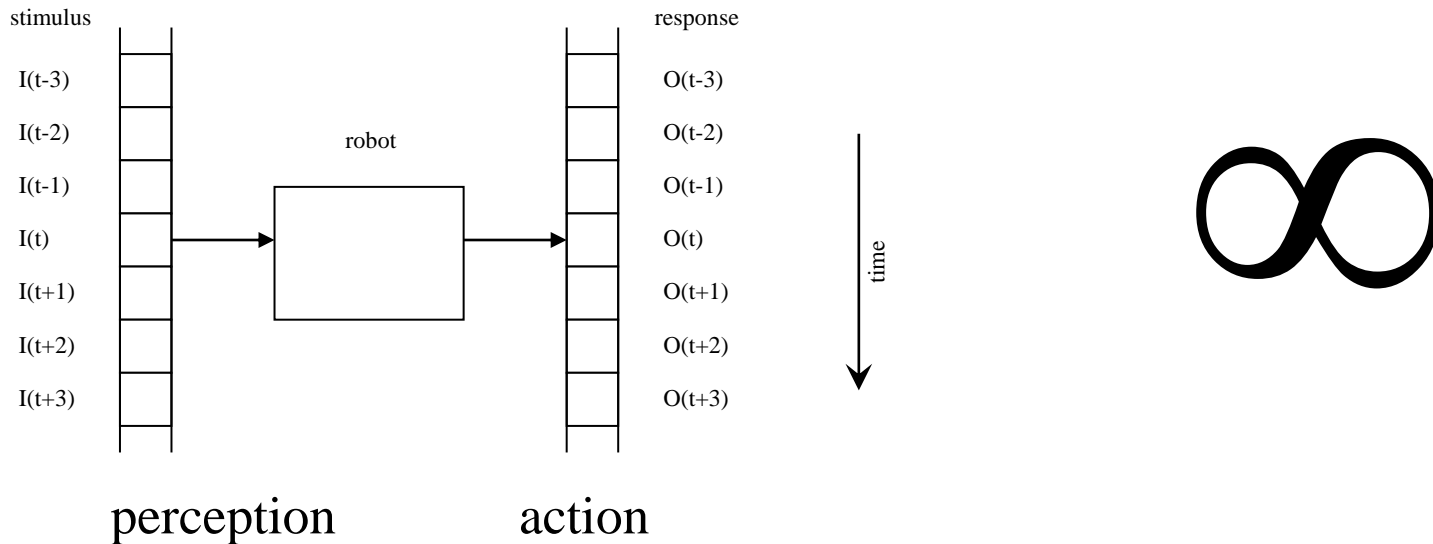


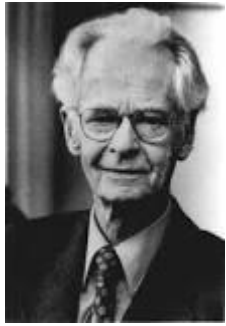


*Charles Darwin*

# Darwinian mind

- no knowledge acquisition
- stimulus – response

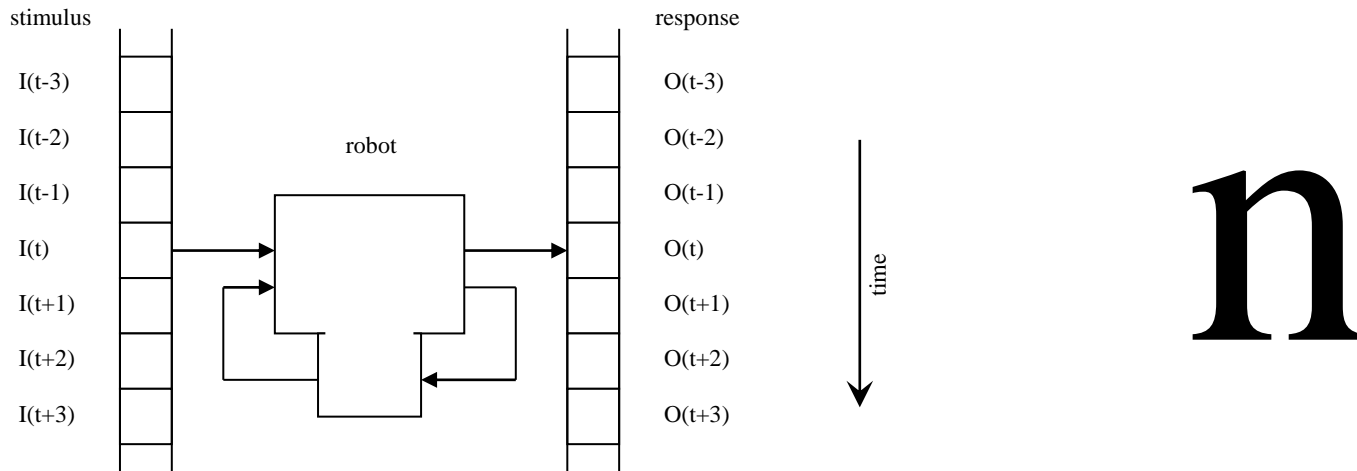
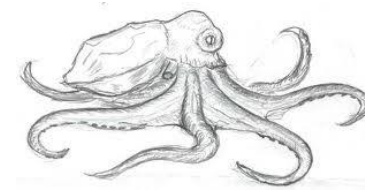


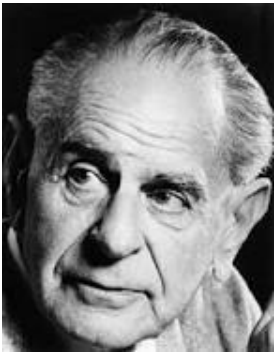


*Burrhus Skinner*

# Skinnerian mind

- conditioning
- gradual knowledge acquisition

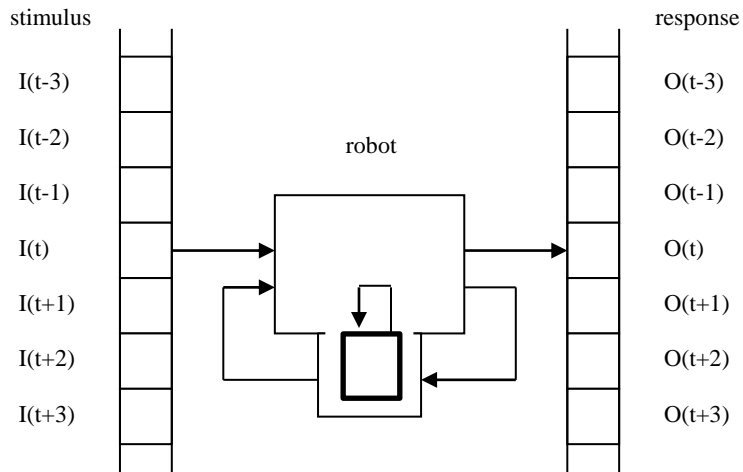




*Karl Popper*

# Popperian mind

- modelling
- knowledge acquisition by examples

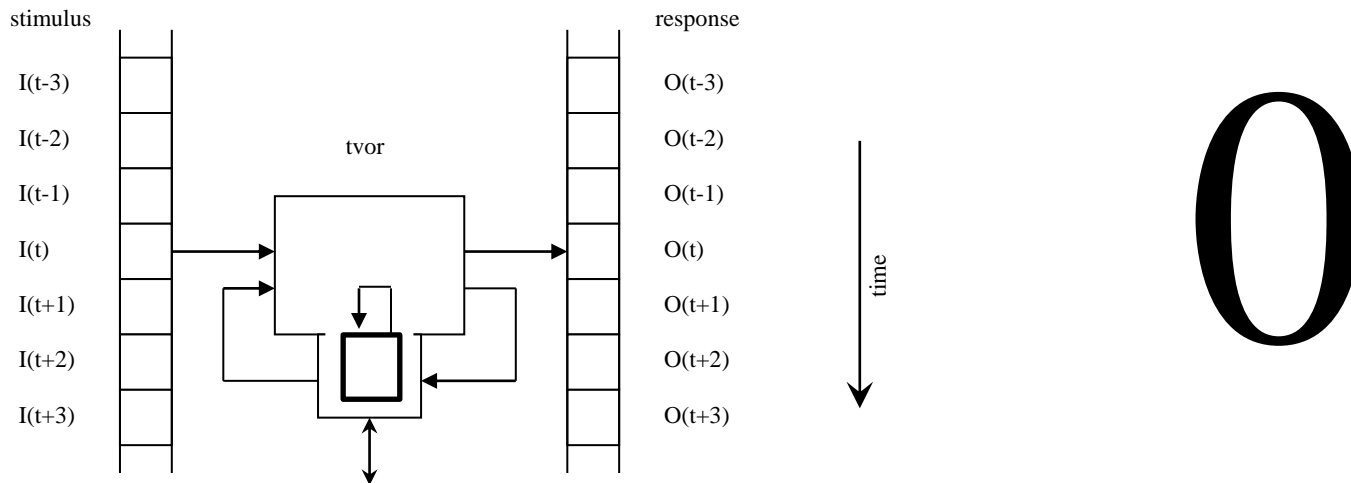


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*Robert Gregory*

# Gregorian mind

- Language
- Knowledge acquisition by communication



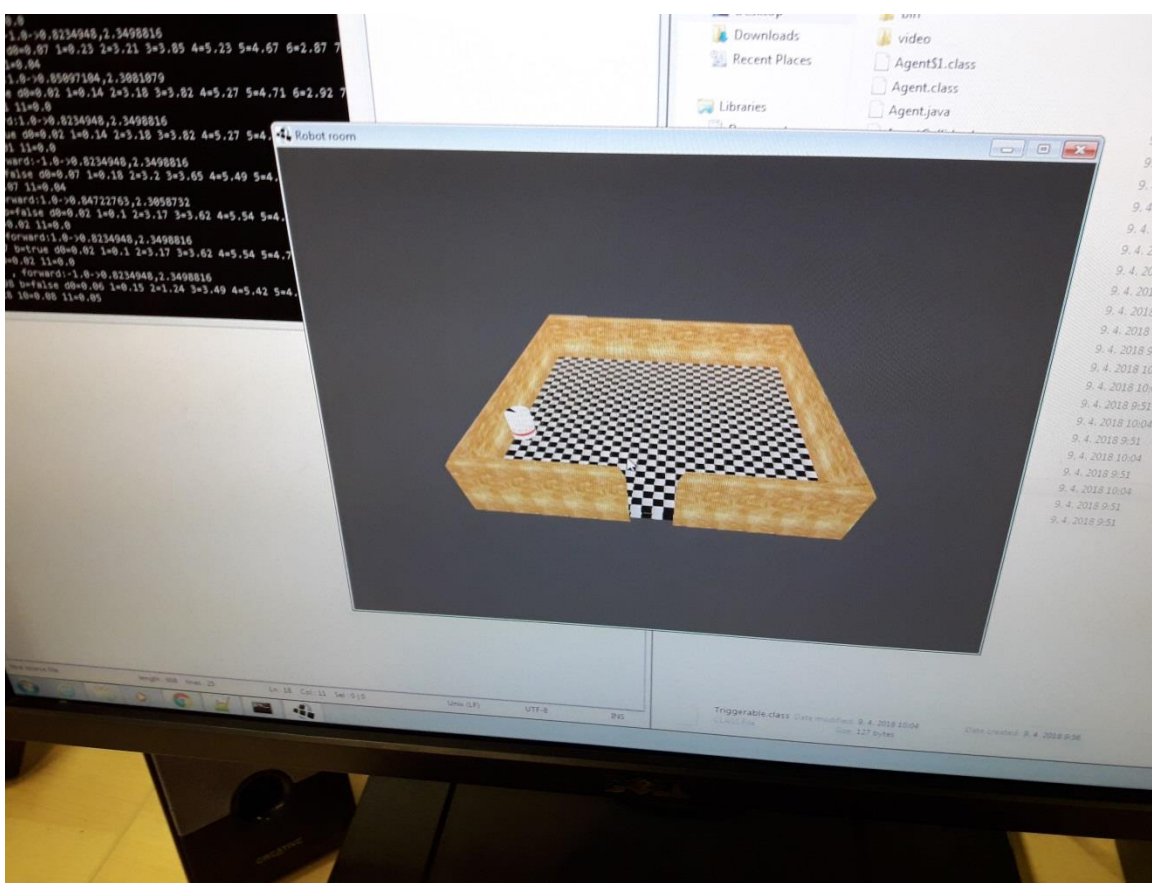


# Dennet's kinds of minds



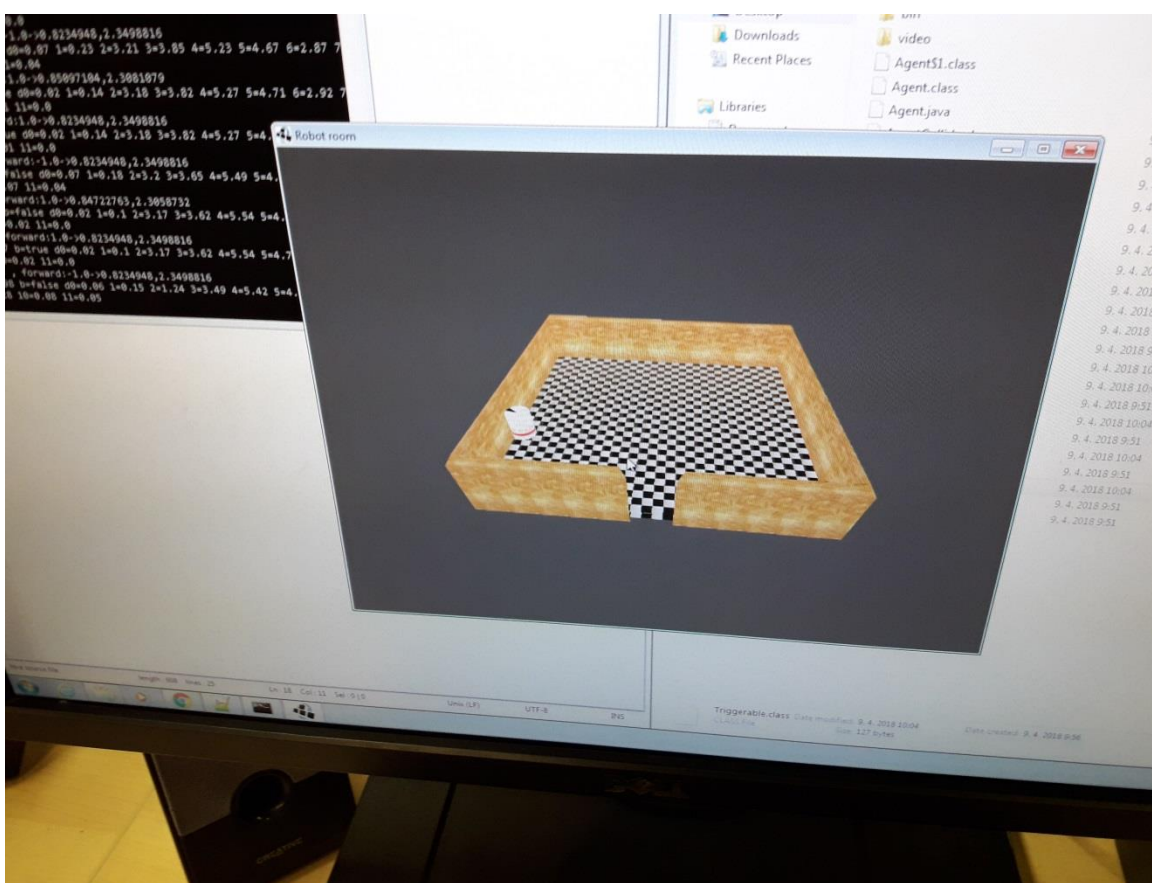
*Daniel Dennet*

## Examples



- Cambrian UI
- “the world is its own best representation” (R. Brooks)

- Robot is able to get out of the room
- No improvement with more trials
- Robot has no idea what is door



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- **Darwinian mind**



<https://youtu.be/5k90vg4cok0>

- (Delayed) supervised learning



- Robot equipped with curved walking learn how to walk straightforward



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- (Delayed) supervised learning



- Robot equipped with curved walking learn how to walk straightforward

- Skinnerian mind



- iCub which mimics body movements
- The robot has model of face and body

- The model enables the robot to comprehend what is face, but was not acquired by its experience.



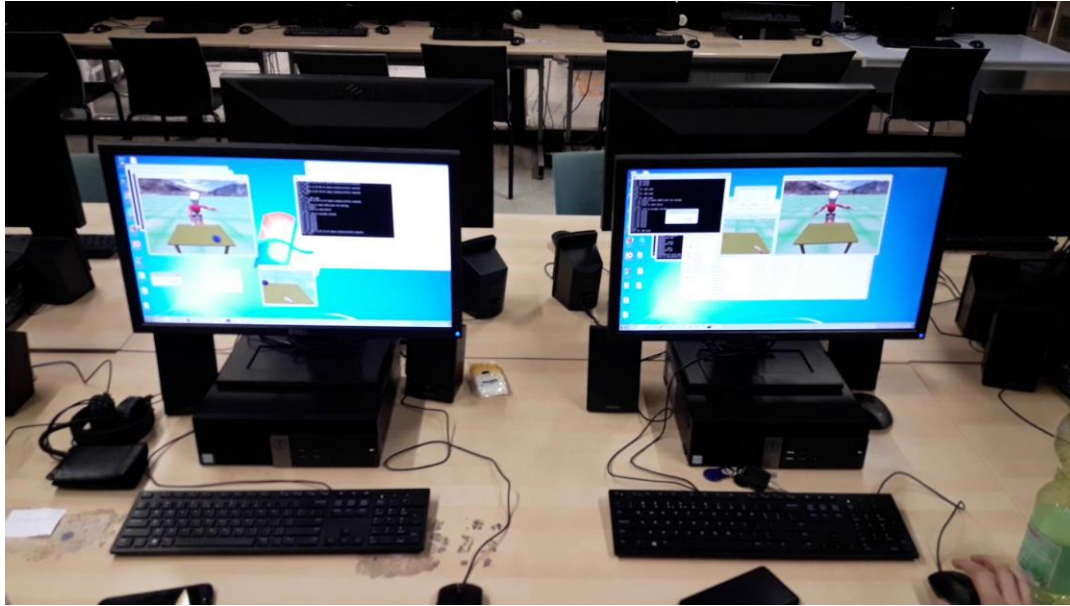
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- The model enables the robot to comprehend what is face, but was not acquired by its experience.
- Popperian-like mind
- not true cognitive



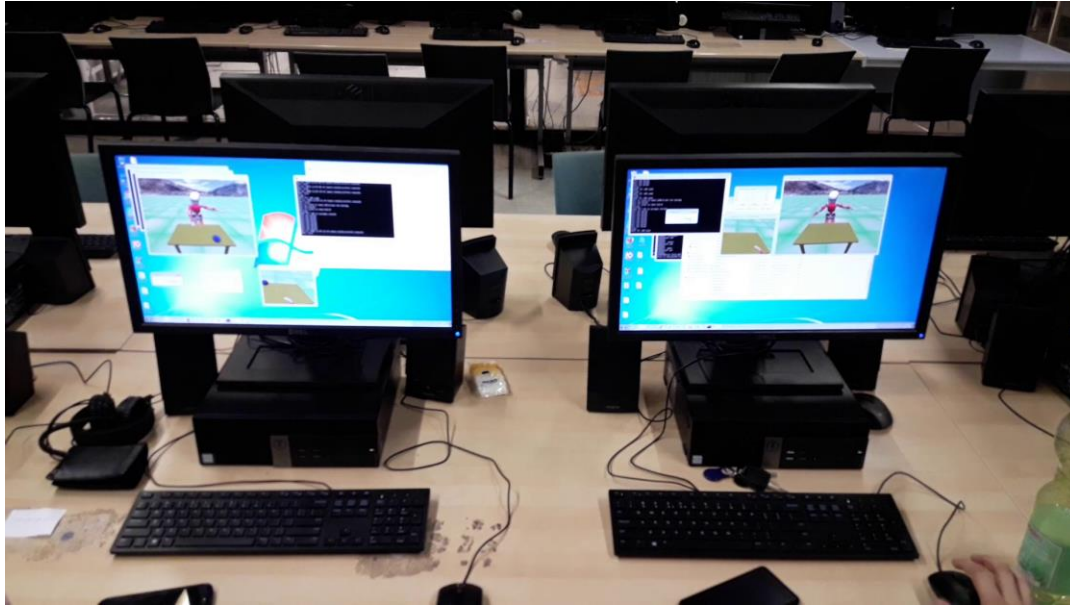






- One robot tells to other robots what invention it has made

- The robot is equipped by the language communication
- The model is expressed and transferred by the language



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- Gregorian mind

- Human is one of few or even the only one creature with Gregorian mind
- However, some aspects of human mind is Popperian, some Skinnerian and some Darwinian
- When we try to build all the kinds into one system:  
Universal AI

