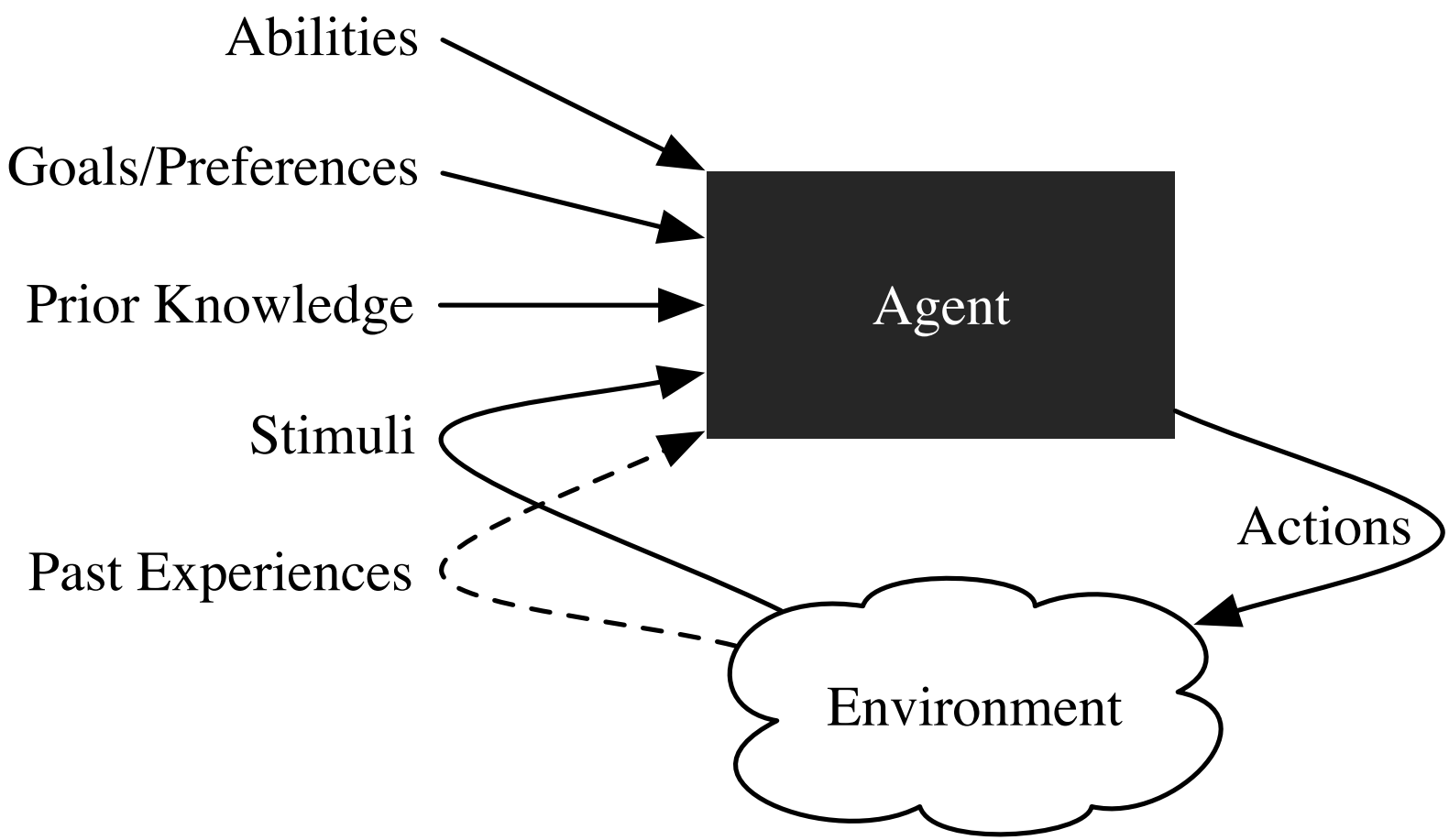
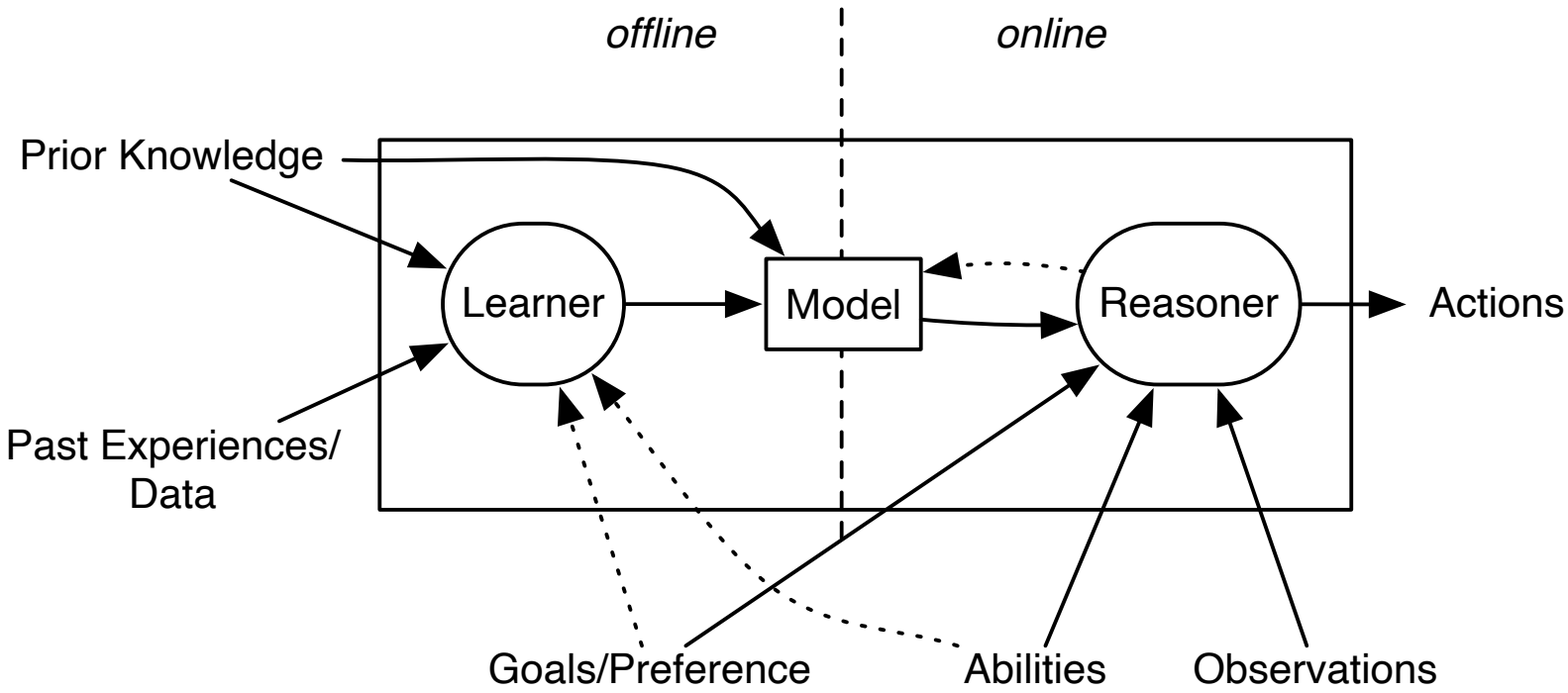
Review: What is Artificial Intelligence?

- Artificial Intelligence is the synthesis and analysis of computational agents that act intelligently.
- An agent is something that acts in an environment.
- An agent acts intelligently if:
  - its actions are appropriate for its goals and circumstances
  - it is flexible to changing environments and goals
  - it learns from experience
  - it makes appropriate choices given perceptual and computational limitations

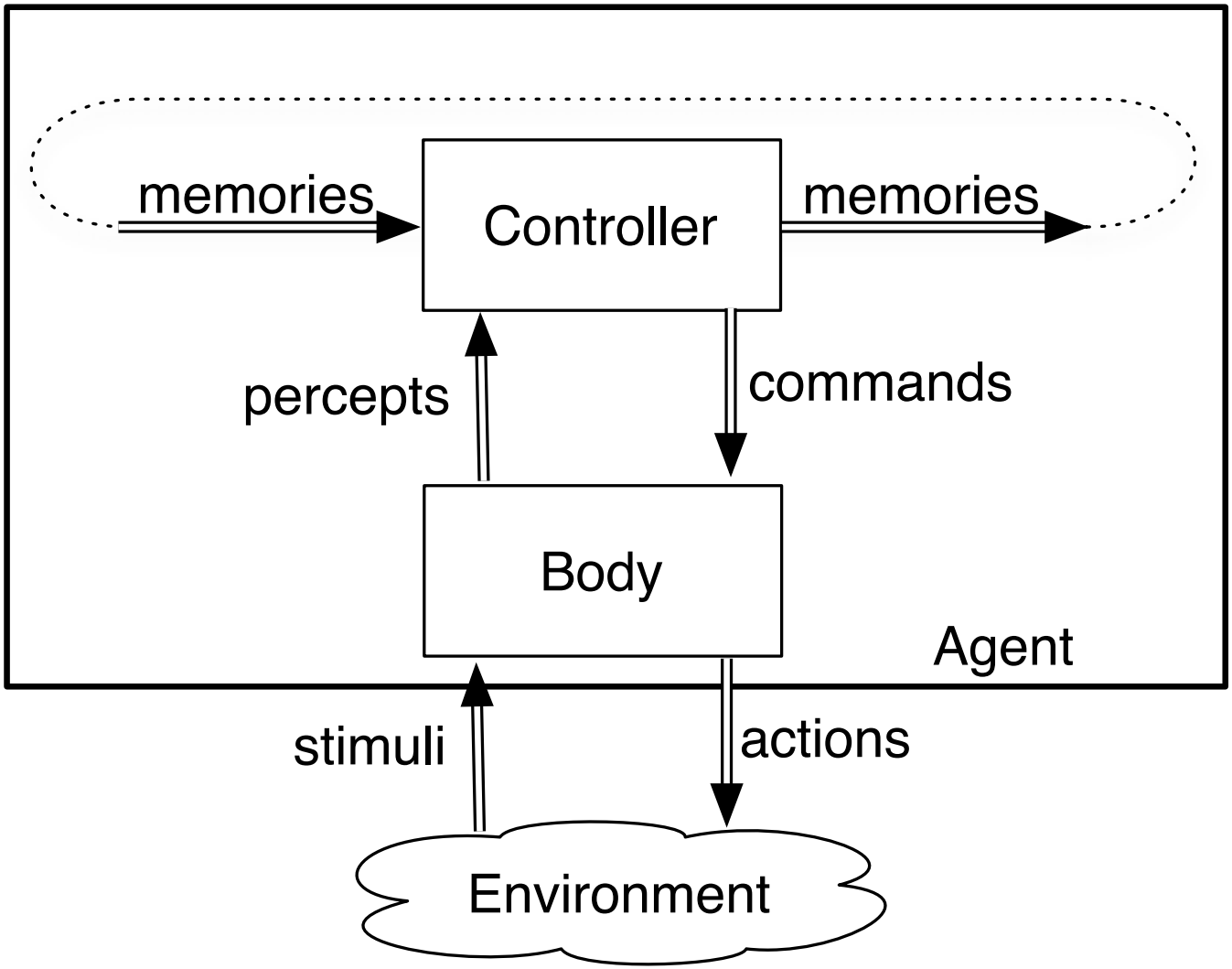
Review: Agents acting in an environment



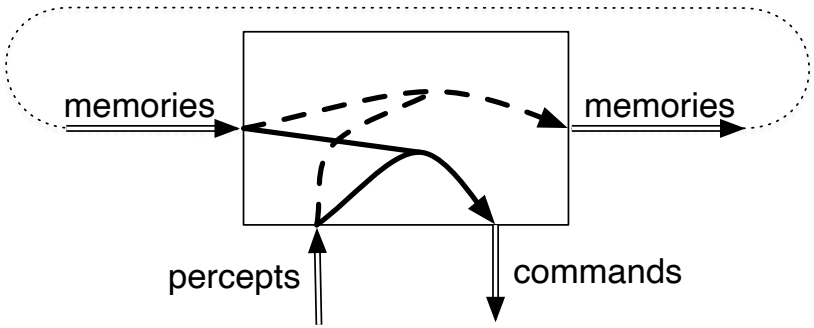
Inside Black Box



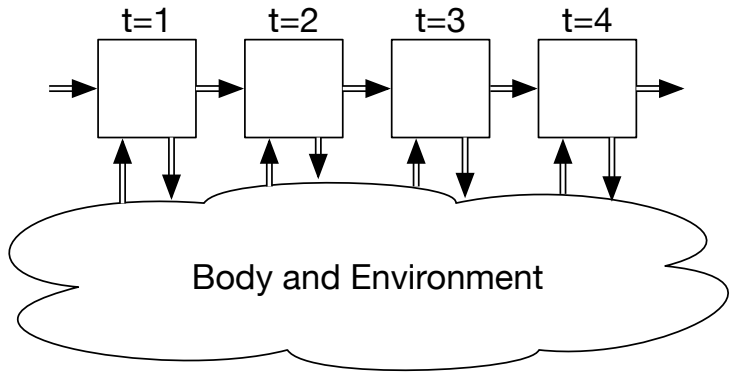
Controller


memories
Controller
memories
percepts
commands
Body
Agent
stimuli
actions
Environment

Functions implemented in a controller



(a)

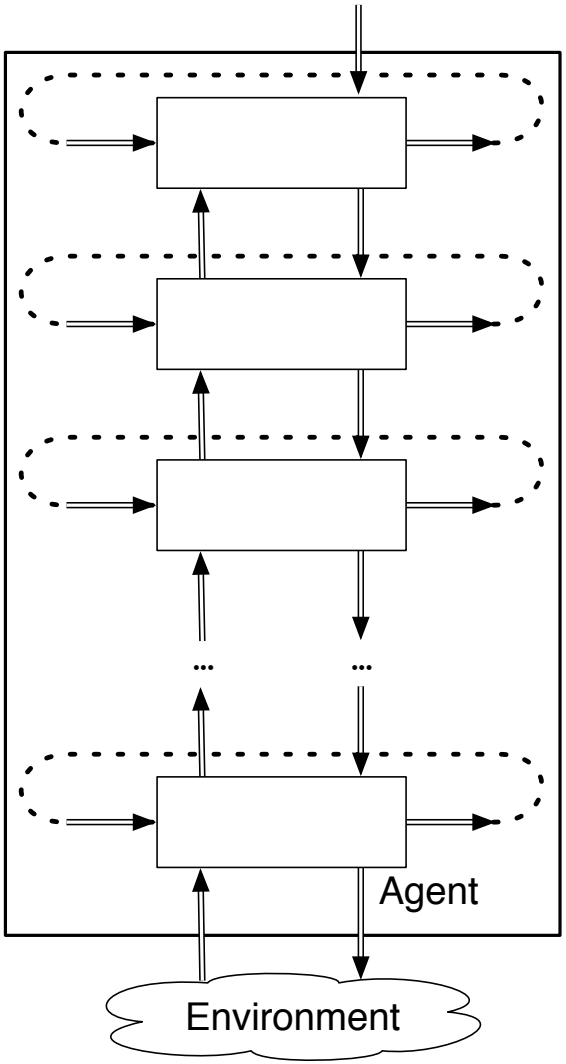


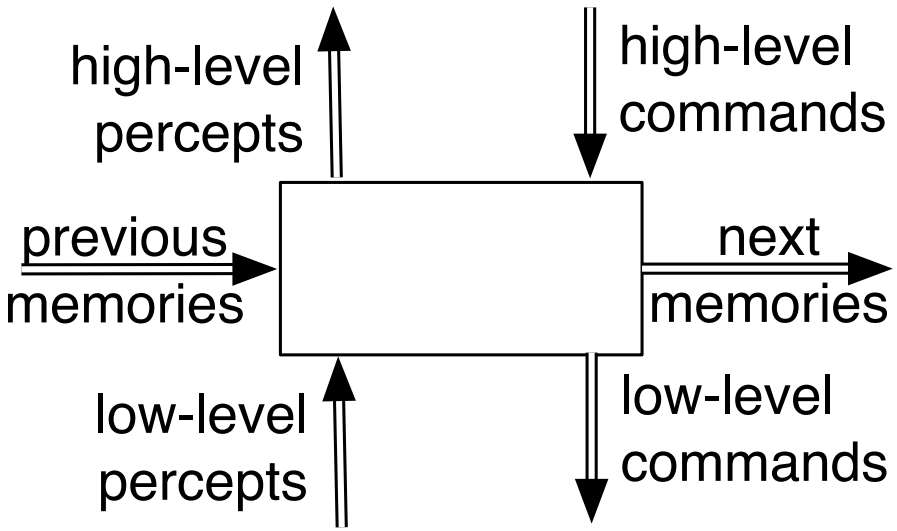
(b)

For discrete time, a controller implements:

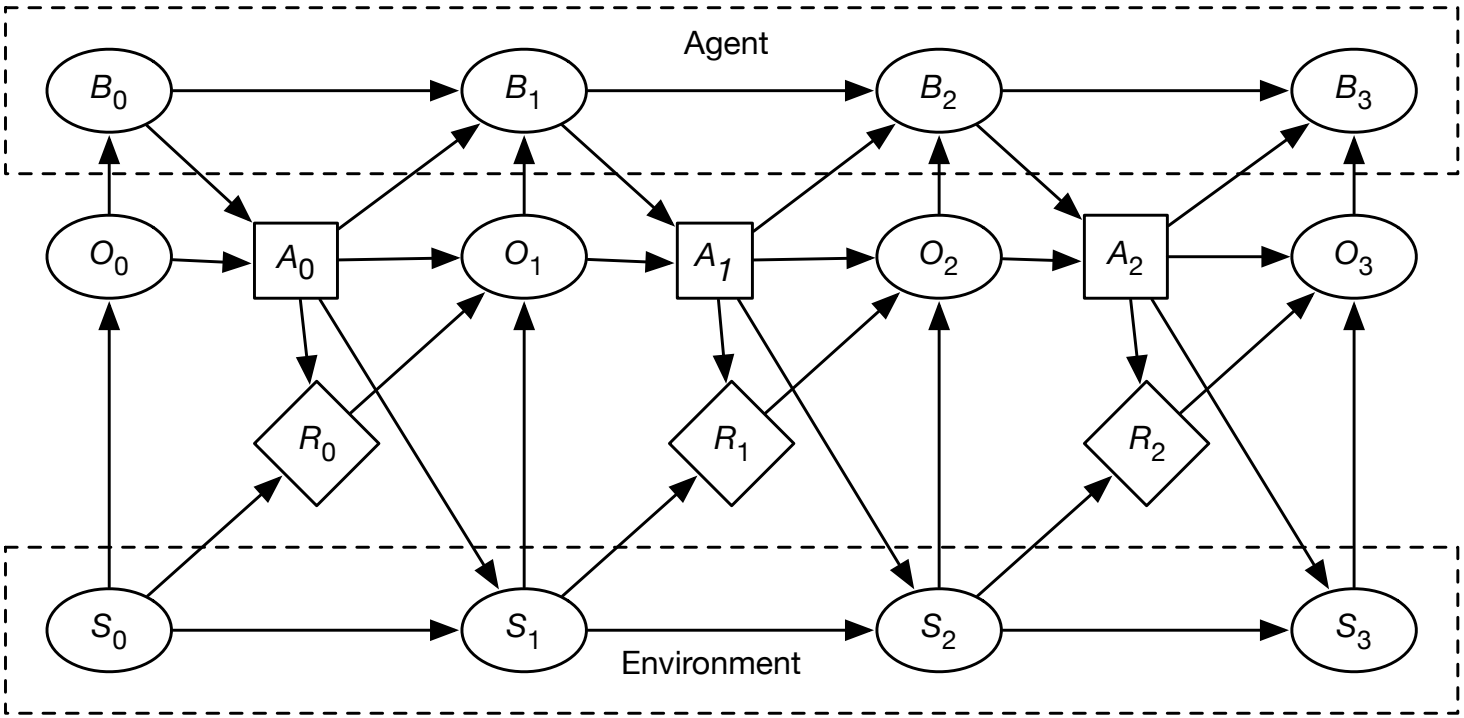
- belief state function returns next belief state / memory.
  What should it remember?
- command function returns commands to body.
  What should it do?

Hierarchical Robotic System Architecture





Partial Observability



B_i agent's belief state at time i.

A_i agent's action.

O_i is what the agent observes.

R_i is the reward.

S_i is the world state.