Cognitive Science

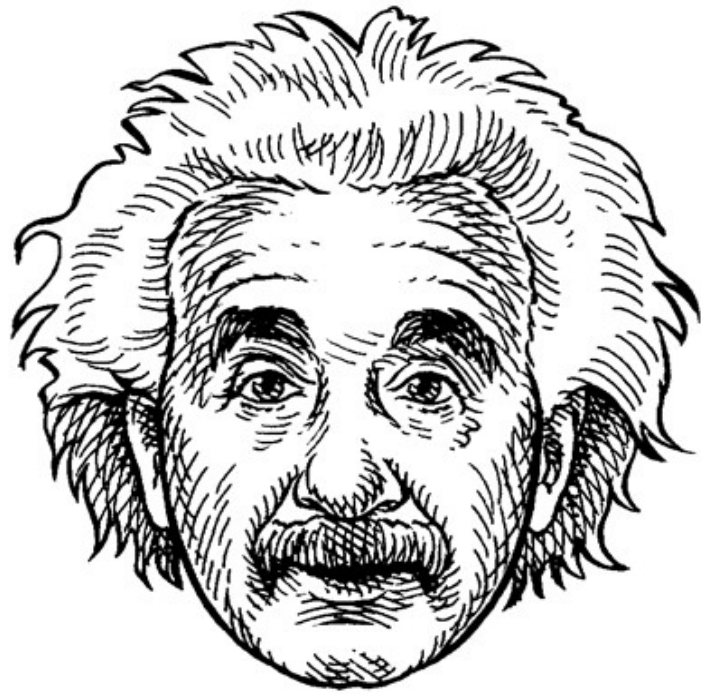EI, EI, Oh!

Doug Blank, Fall 2010
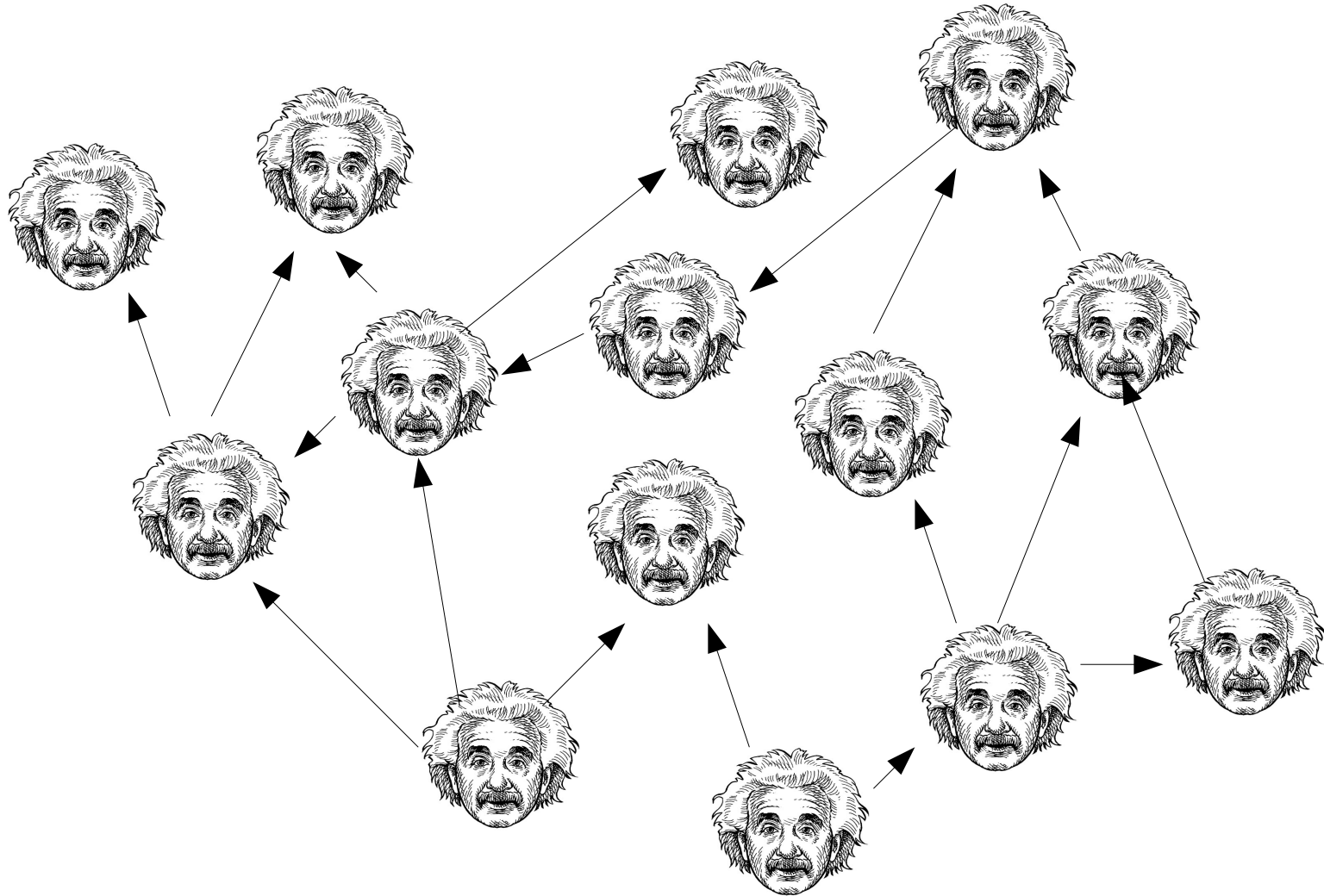
Cognitive Science

- Towards a theory of Emergent Intelligence
- Towards Freewill
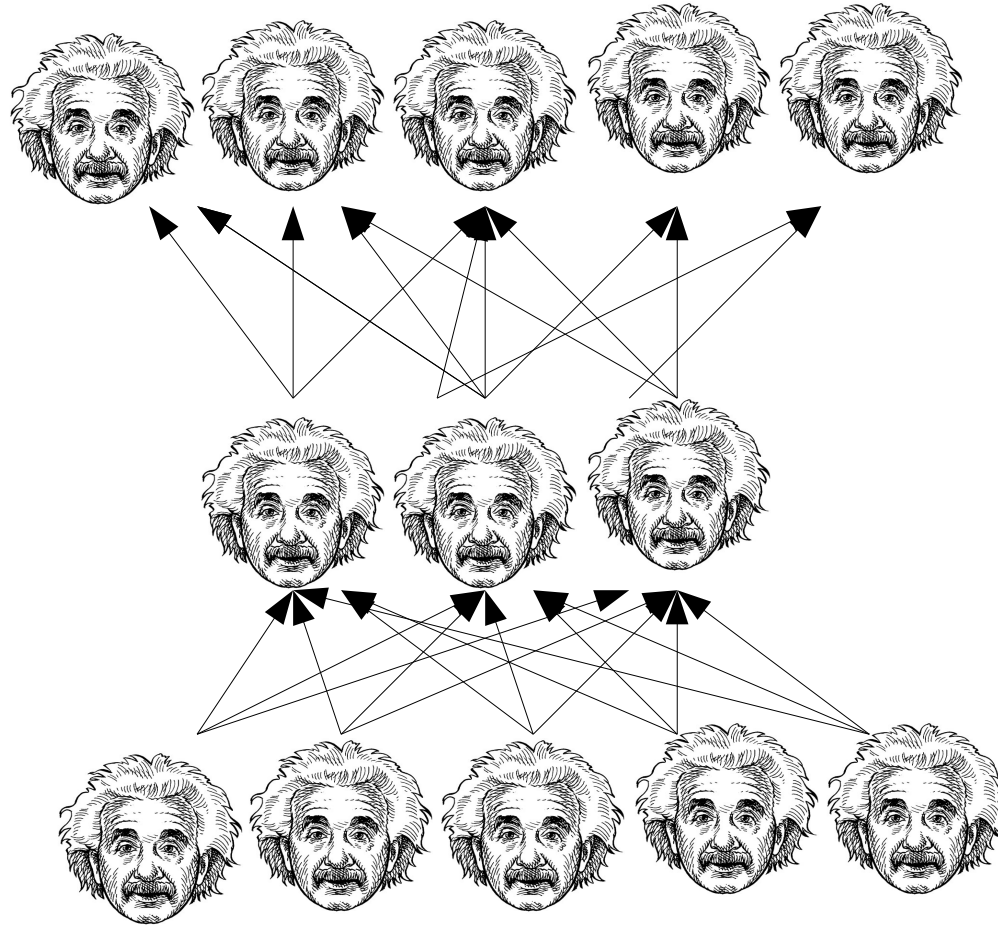
Einstein

A Brain of Einsteins

A Brain of Einsteins

Emergent Intelligence

Intelligence in an Emergent System requires the interaction of many stupid components.

If the components are too smart, then you won't get anything interesting to emerge.

System vs. Component

The more information that is processed by the components, the less information is available for the system.

To be a good component in an intelligent system means that you have to do things that you don't understand.

The more that a component does that it doesn't understand, the better for the system.

Freewill

- What is it?

- What is it good for?

- How do you get it?

An Emergent Framework for Self-Motivation in Developmental Robotics

This paper explores a philosophy and connectionist algorithm for creating a long-term, self-motivated developmental robot control system. Self-motivation is viewed as an emergent property arising from two competing pressures: the need to accurately predict the environment while simultaneously wanting to seek out novelty in the environment. These competing internal pressures are designed to drive the system in a manner reminiscent of a co-evolutionary arms race.

Marshall, Blank, and Meeden (2004)

Governor

- Self-regulating system

- The faster it goes, it closes a valve to slow down the system

- The slower it goes, it opens a valve to speed up the system

Babybot

- Green robot is Babybot

- Fixed to center of room

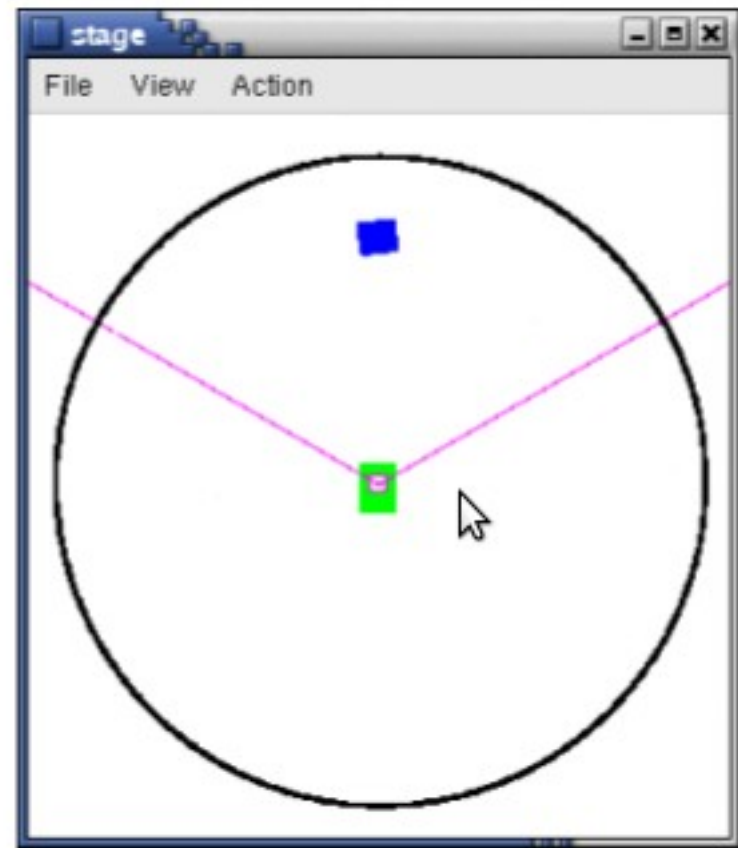- Can rotate and "see"
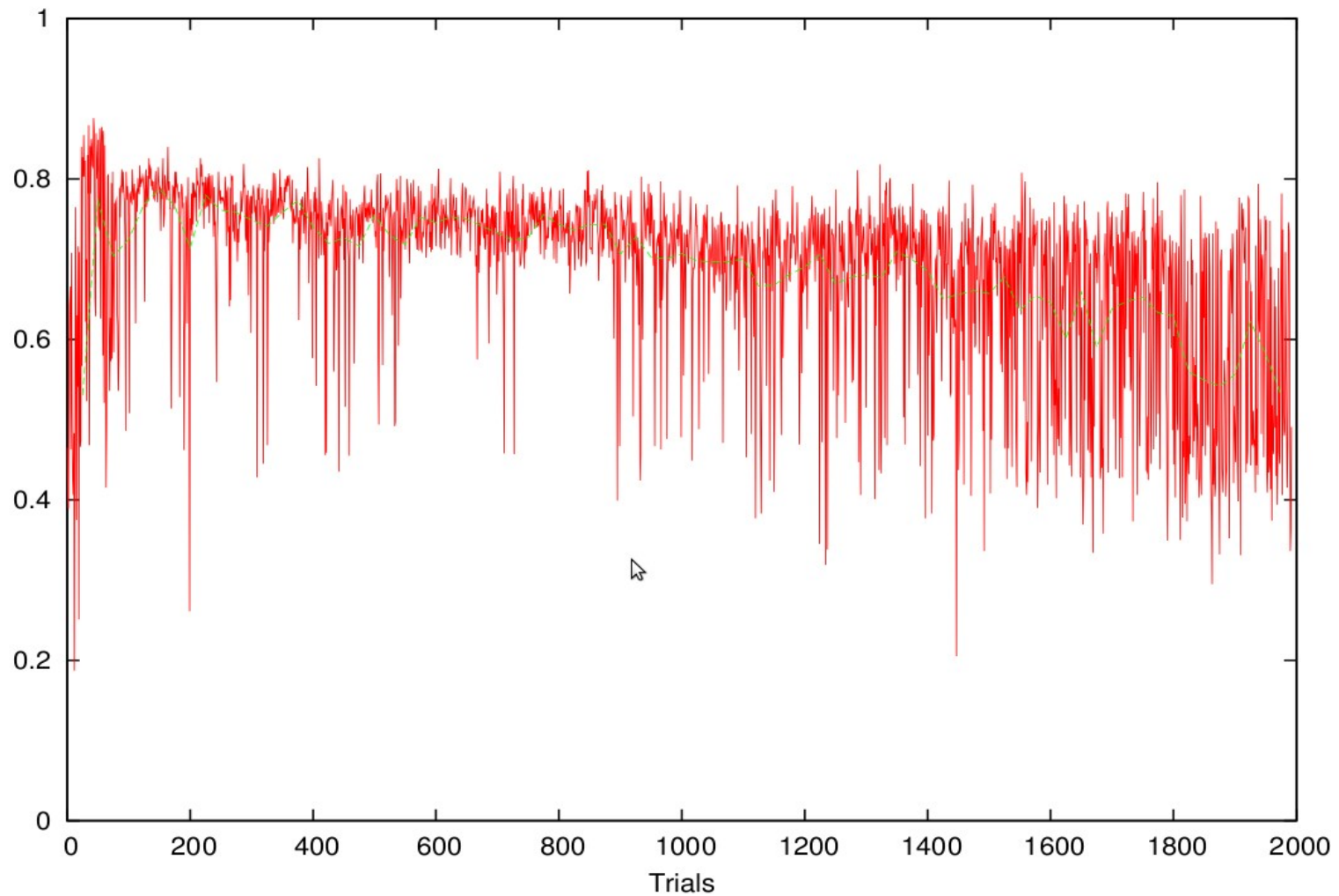
- Blue decoy robot provides interest

Figure 2. View of the training arena

Performance over 2000 Trials

What's missing?

- Can't "plan ahead" more than a single step

- If it could, and "have in mind" a "plan" for satisfying its goals, would it have free will?