PHIL/PSYCH 256 INTRODUCTION TO COGNITIVE SCIENCE
Week 11: Dynamic and social challenges

PLEASE PUT AWAY ALL
ELECTRONIC DEVICES

1

Chaotic Systems

Chaos: Slight differences in initial conditions lead to
strongly diverging results.

Examples:
  Weather: butterfly effect
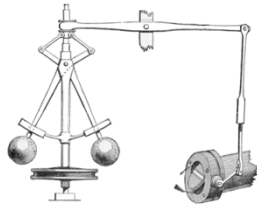 Ecology: predators
  Economics: stock market
  Physics: dripping faucet

2

The Mind as a Dynamic System

- Watt governor as model of mind
- Emotions as chaotic system
- Motor control: learning to walk
- Importance of time to cognitive operations

3

Eliasmith on Dynamic Systems

- Dynamicists claim to have an alternative to symbolic and connectionist approaches, but they do not.
- Connectionist systems are dynamical systems, but with many variables.
- Many dynamicist explanations are metaphorical.
- Cognitive science needs representation.

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Discussion

- How important are chaotic systems for explaining different aspects of human thinking?

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Key Points

- Some systems are chaotic, with small changes producing large effects.
- Mental processes can often be characterized in terms of dynamic systems.
- Dynamic system explanations are compatible with computational/representational ones.

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The Social Challenge

- Social construction of knowledge.
- Social epistemology and philosophy of science.
- Distributed cognition, e.g. Hutchins and science.
- Situated action and education
- Multi-agent systems (distributed AI)

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Durfee: Social skills in DAI

- Share tasks
- Share goals
- Cooperate
- Communicate changes
- Look after shared space
- Avoid conflicts

- Communicate expectations
- Establish conventions
- Evolve organization
- Form commitments dynamically

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Discussion Question

- From your experience, what have been the most important social dimensions of learning and intelligence?

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Culture

- Culture is the way of life of a society, including beliefs and behaviors.

- Examples:
  - Color terms vary across languages.
  - Emotion words vary across cultures.
  - Geography of Thought (Nisbett): Western explanations of behavior differ from East Asian.
  - Whorf hypothesis: language affects thought

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Key points

- Intelligence is largely social: people communicate and collaborate.

- Cognitive science should explain behavior in terms of multiple levels of mechanisms: molecular, neural, psychological, social.

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