**Cognitive Science 102A**

**Distributed Cognition**

Professor Edwin Hutchins

http://hci.ucsd.edu/102a

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**What the course is about**

- The BIG questions of Cognitive Science
- How shall we explain or understand processes like thinking, reasoning, speaking, decision making, planning, and so on?
- How did cognitive science get where it is?
- Where can cognitive science go from here?

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**Cognitive science as a slice of scientific cake**

**What is mind?**

- What is special about minds (even your cat’s mind) as opposed to inanimate objects?
- And what is special about human minds compared to other animal minds?
- Mindfulness is just matter… nicely orchestrated

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**Where is the mind?**

- Many cognitive scientists say that the mind is in the brain. Or they say that the mind is what the brain does.
- Is this right?
- Is it the best approach?

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**The mind in the brain**

Understanding cognition is largely understanding the **dynamic flow of information** through the system.

(from a talk by Jochen Triesch 2003)
Disembodied Cognition?

Is the mind in the nervous system?

- A brain in a vat is a very poor model of the human cognitive system.
- The brain gets input from and sends output to other parts of the nervous system.

http://www.csus.edu/indiv/m/mccormickm/BrainsInAVat.html

Perhaps we need to add the body to explain the mind

Consider two example situations

Situation 1: driving your car while having a conversation
Situation 2: reading out aloud while tapping your feet to the rhythm of some music

Same input/output modules, yet different information flow!

From a WA talk by Jochen Triesch 2003

The mind in the interaction of the body with the world

- The body is in a physical world, and the structure of that world interacts with the body and the nervous system and the brain to shape what we think and how we think.

Photo: Ron Church, The Surfer's Journal Volume 9, No. 4

Mind in the interaction of the brain and body with a culturally constructed world

- Human life is lived in complex social environments that are filled with cultural artifacts.
- Our cognition and our mindfulness emerge from the interactions of our brains and bodies with this socio-cultural world.

The ingredients of a new kind of scientific investigation

- Theory:
  - Distributed Cognition
- Method:
  - Cognitive Ethnography (COGS 102B)
- Human activity systems:
  - Ship Navigation (CitW)
  - Science Laboratories
  - Commercial Aviation
  - … any other activity you can think of
Distributed Cognition

- Fundamental premise: Cognition, in all its forms, emerges from the interactions among the elements of complex systems.
- Specific hypothesis:
  - High-level human cognition depends on interactions with the material and social world.
  - Weak Dcog: Cognition is affected by or shaped by interactions with the material and social world.
  - Strong Dcog: Some forms of human cognition are constituted in interactions of brain and body with material and social world.

Cognition in the Wild (1995)
- An extended case study of distributed cognition
  - Examples from ship navigation
  - How institutions think
  - Where is computation/cognition/mind?
  - Embodied cognition in cultural context
  - Cognitive properties of groups
  - Individual and institutional learning
  - The costs of ignoring culture when studying cognition

Mindware (2001)
- Andy Clark’s combination history and critical reflection.
- Mindfulness as (some sort of) computation.
- Recent wrinkles
  - Embodiment
  - Robotics
  - Dynamics
  - Interaction with the material world
How to Succeed in this Course

http://hci.ucsd.edu/102a/

Basis of your Grade

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Essay writing exercise topics

1. Meaning and space
2. Relations in a cognitive ecosystem
3. Cultural practices as cognitive enzymes
4. Movement in a cultural world
5. Perceiving and "seeing as"

The thinking/writing process

- Careful reading
- Additional research
- Note taking
- Drawing diagrams and sketches
- Outlining
- Writing/reflecting/re-writing
- Getting and giving constructive critical advice
Evaluation and self-evaluation

- Engage the ideas
- Staying on topic
- Successful expression
- Clarity
- Reflection on your own writing/thinking process
- Suggest and justify a letter grade for your own paper

Do the Readings

- Keep up with the reading schedule
  - http://hci.ucsd.edu/102a/schedule.html
- Read carefully and critically
- Use the guidance provided on the class website
- THINK ABOUT WHAT YOU ARE READING!

Get a good Dictionary and use it

- Meanings
- Word choice
- Usage conventions
- Spelling
- Language is a social tool. Knowledge is power. Workout and get strong

Spend some Time on the Course

- The registrar expects you to work 12 hours per week for a 4 unit course!
## Come to Lecture Sessions
- Clean, sober, and awake
- Do NOT sleep in class
- Cell phones OFF!
- Be here. No IM or web surfing in class
- If you don’t understand something, ASK for clarification.
- You may take notes if you like. Remember, the lectures will be podcast and the slides will be posted on the course website.

## Go to Section
- Discuss the readings and lectures
- Clarify issues
- Work on your essays
- Prepare for the final exam

## Do the Assigned Work
- Start ahead of time
- Be sure you understand each assignment
- Make your essays easy to read and understand (consult the HowToEssay page of the course website).
- PROOFREAD! Check spelling and grammar
- Turn projects in ON TIME

## Visit Office Hours
- We are here to help you
- You (or your parents) are paying for our time
- Explore ideas
- Clarify assignments

## Do NOT attempt to CHEAT!
- Do your own work. You are encouraged to talk to other students about ideas, but do not “borrow” material from other students.
- Understand the concepts in the plagiarism tutorial.
- Do NOT look at your neighbor’s paper during the final exam.

## Be Creative
- Learning can be fun.
- This course is about ideas, not the memorization of facts.
- Ideas never stand alone. They are always related to other ideas. Explore the world of ideas.
Appreciate the Challenge of Cognitive Science

- Many of the central questions in this field are still unanswered.
- Most of them relate directly to your daily life in some way. Be alert for connections to your own experience.

For Tuesday

- Buy *Cognition in the Wild* and *Supersizing the Mind* (both available at the bookstore)
- Review the material on the course web site: http://hci.ucsd.edu/102a/
- In particular, consult reading guidance for Tuesday’s assignment on website schedule page
- Read these two papers (available on the website)
  - Mitch Resnick “Learning about life”
  - Edwin Hutchins, “Cognition, Distributed”

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