COGSCI600 - Introduction to Cognitive Science

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Cognitive Science ... What is it?

- Cognitive Science is **interdisciplinary**:
  - **Philosophy**: understand mind and process
  - **Anthropology**: thought across cultures
  - **Psychology**: study human mind
  - **Neuroscience**: study human brain
  - **Artificial Intelligence**: build intelligence as proof of concept
  - **Linguistics**: study of language as a fundamental piece of mind

- Some other relevant fields:
  - **Sociology**: understand group behaviour
  - **Economics**: human decision making

- Key early players: George Miller, John McCarthy, Marvin Minsky, Allen Newell, Herbert Simon, Noam Chomsky
Cognitive Science ... What is it?

Broad definition: Study of the human mind
More precisely, it is an attempt to answer these questions: (most closely related fields)

▶ What “is” the mind?
▶ How is it related to the body/nervous system/brain?
▶ What is the “function” of the mind/brain?
▶ Can we build an artificial mind?
▶ How are minds connected?
▶ What is culture and language?
▶ ethics and public policy

The field is vast and growing e.g. sustainability, Connect new domains: geology? oceanography?
Cognitive Science ... What is it?

- question: What “is” the mind?
- disciplines: philosophy/neuroscience
Cognitive Science ... What is it?

- question: How does the body/nervous system work and how is it related to the mind?
- disciplines: neuroscience/psychology
Cognitive Science ... What is it?

drive racecars? robot race cars?

▶ question: What is the “function” of the mind?
▶ question: Can we build an artificial mind?
▶ disciplines:
sociology/economics/psychology/neuroscience/AI
Cognitive Science ... What is it?

▶ question: How are minds connected?
▶ disciplines: sociology/neuroscience/complexity/AI
Cognitive Science ... What is it?

(question: How are minds connected?)

(disciplines: sociology/neuroscience/complexity/AI)
Cognitive Science ... What is it?

- question: What is **culture**?
- question: What is **language**?
- disciplines: anthropology/sociology/linguistics/neuroscience/AI
question: What impact does the mind and theories about the mind have on ethics and public policy?

disciplines:
sociology/economics/anthropology/political science
Theoretical Approaches

- Formal logic
- Rules
- Concepts
- Analogies
- Information theory
- Game theory
- Artificial Intelligence
- Neural networks, biological
- Neural networks, computational
Critique of Cognitive Science

Progress needed in

- emotions
- consciousness
- physical environment
- embodiment
- dynamical systems
- social intelligence
- mathematical argument
Course Structure

- 3 hours/week
- Invited lectures by professors across disciplines
- Weekly readings and discussions
- Written summaries of readings before lecture
- Project (and proposal)
- Student presentation

Assessment:
- Weekly summaries (20%)
- Presentation (includes draft report) (10%)
- Two summaries of other student presentations (10%)
- Participation not including presentation summaries (5%)
- Project Proposal (10%)
- Project (45%)

- No prerequisites - all welcome!
- CS grad students: counts as an 800-level course in the “Artificial Intelligence” area
Weekly Summaries

- submit before 3am on the day of the lecture
- **300-400** words
- summaries will be graded **pass** (full credit: 1) or **fail** (no credit: 0).
- A serious, good-faith effort will pass.
Participation

- In-class discussion (during and after invited talks)
- Online discussion (Slack group, between talks)
- Attending every session: 3 points
- + participating regularly: 5 points.
- 3 unexcused absences = fail the course
Project

- **Individual** (special cases for groups)
- no descriptive literature reviews
- **Proposal**:
  - research question in cognitive science (purpose and motivation)
  - provisional thesis and methodology (approach to gathering and evaluating evidence),
  - explanation of interdisciplinarity
  - initial bibliography (5-10 references)
- **Draft report**
- **Presentation**
- **Final report**

Course webpage:
cs.uwaterloo.ca/~jhoey/teaching/cogsci600/index.html
Project Evaluation

Project out of 100:

- **Completeness** (50%)
- **Clarity and proper formatting** (30%)
- **References** (10%)
- **Originality** (10%)

Citations:

- **Must be** properly formatted

**DO NOT**:

- cite Wikipedia
- use any work that is not your own

- If you have to use something from another work, **clearly** indicate anything from another work **immediately** and clearly.

READ THE **ACADEMIC INTEGRITY** SECTION ON THE WEBPAGE
All communication should take place using the Slack group.
https://cogsci600-fall2022.slack.com/

- **Public** Slack posts: questions about material, course organization, general discussion
- **Channel** for each week’s topic (for discussion)
- Students can create further channels as needed.
- For communication with the instructor, including submission of deliverables, use the direct message channel to me (jhoey) on Slack