COGSCI600 - Introduction to Cognitive Science

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Cognitive Science ... What is it?

- Cognitive Science is **interdisciplinary**:
  - **Philosophy**: undertsand 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
  - **Eonomics**: 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)

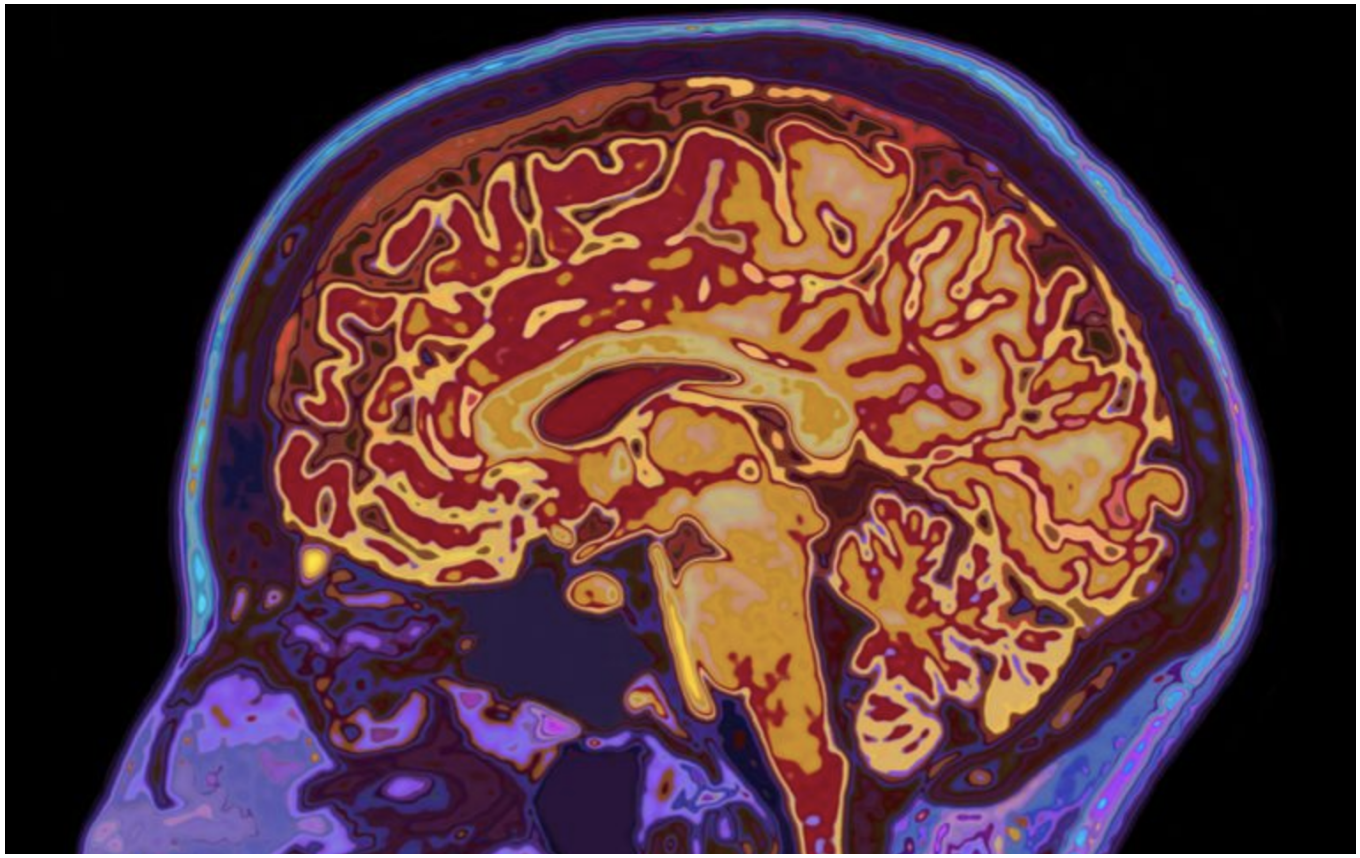
- What "is" the mind?
- How is it related to the body/nervous sytem/brain ?
- What is the "function" of the mind/brain?
- Can we build an artificial mind?
- How are minds connected ?
- What is culture and language ?
- ethics and public policy

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

Cognitive Science ... What is it?

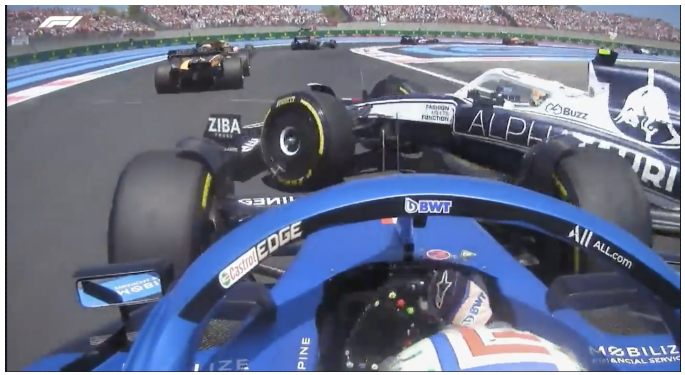
- question: What "is" the mind?
- disciplines: philosphy/neuroscience

Cognitive Science ... What is it?



- question: How does the body/nervous system work and how is it related to the mind?
- disciplines: neuroscience/pscyhology

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

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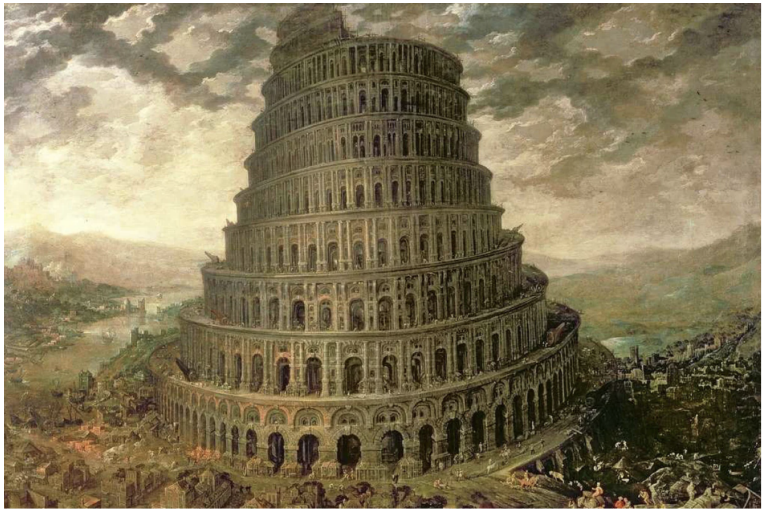
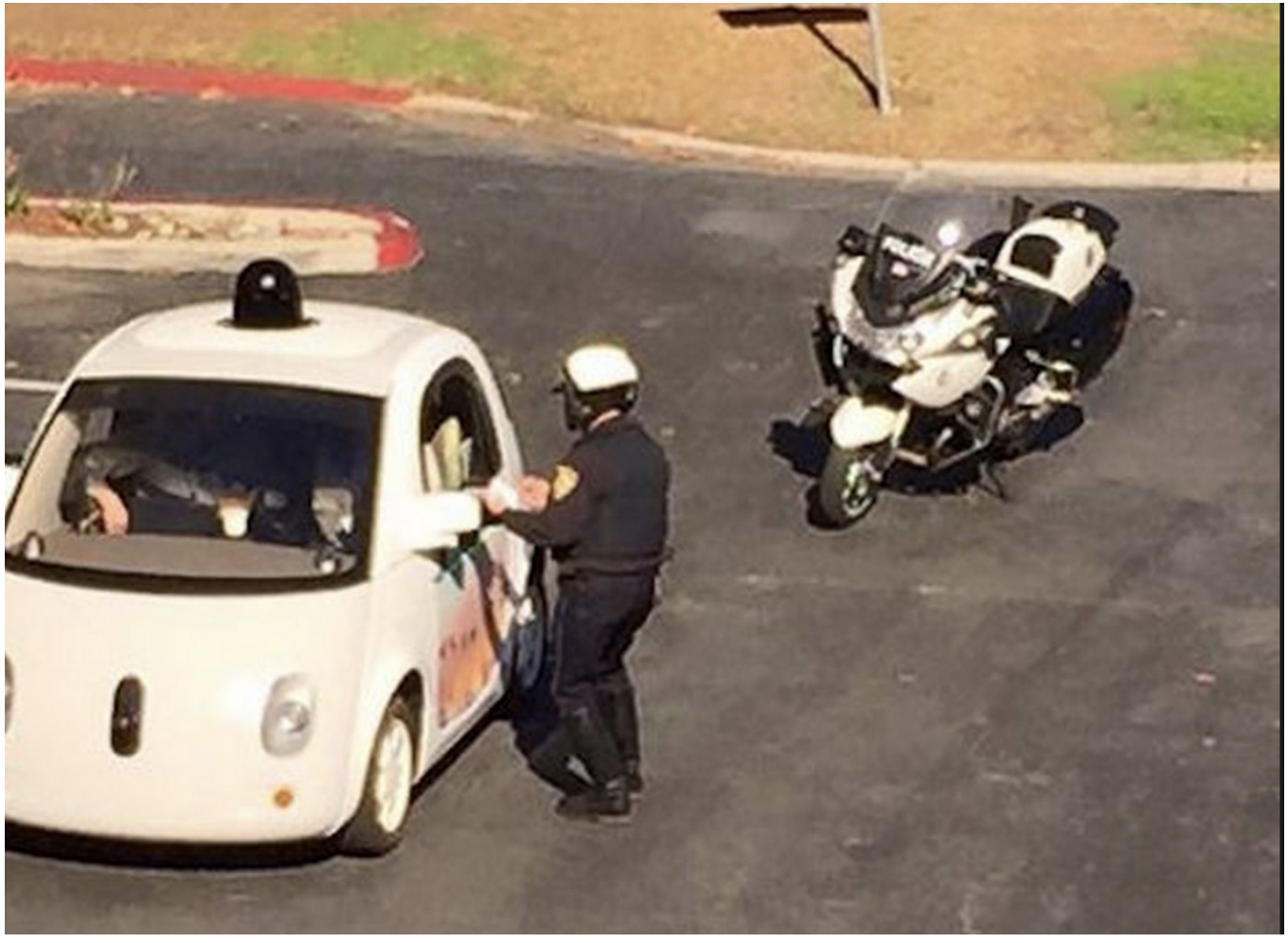


- question: What is culture?
- question: What is language?
- disciplines:
  anthropology/sociology/linguistics/neuroscience/AI

Cognitive Science ... What is it?



- 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

Communication

- 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