

Syllabus for COMP 47230: Introduction to Cognitive Science (Graduate Module)

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September 11, 2020

This module will be taught using a variety of online means in 2020. There are 12 teaching weeks, but we lose one to the bank holiday on Oct 26th. There are thus effectively 11 weeks. For each week, you are asked to prepare by watching specific videos and doing required reading. This must be done before class.

1 Classes

Class will take place from 11:00 to 13:00 on Mondays. Class will consist of a zoom session in which the material you have watched and read will be discussed. Because of this flipped classroom arrangement, it is imperative that you do the required preparation before class. You will need a functioning laptop and a good internet connection in order to participate in class. This syllabus only lists required reading and viewing. Further optional resources are provided at the course webpage.

During class, you are free to bring any questions or topics to the discussion. If you have specific questions or topics you would like to raise, you may also email those concerns to me before class and I will ensure that they get discussed.

A link to the zoom session is available each week on the Brightspace platform for the module. The link is the same from week to week.

Teaching in this manner is relatively new, and we may improvise a bit as we go along. Please feel free to give me feedback at any time about how the module is going for you.

2 Office hours

I will be on campus on Tuesdays during teaching term. I am happy to meet for face to face discussions in my office, which is Room A1.17 on the first floor of the Computer Science building. To avoid waiting, it is best to schedule a meeting, but you are welcome to drop by on the fly if you like. To schedule a zoom chat at any other time, please email me.

3 Required viewing and reading, by week

All videos and reading may be accessed through this website:

https://cogsci.ucd.ie/wordpress/?page_id=345

You should bookmark this website. We will use Brightspace only for administrative purposes (zoom links), assignment submission, and announcements.

- **Week 1, Sept. 21st**

- History of Cognitive Science, 1/2**

- Video 1: The contested territory of cognition
 - Video 2: Looking back to ancient Greece: Heraclitus and Parmenides
 - Additional material:
 - * Watch the short video on Heraclitus and Parmenides (3 minutes)
 - Video 3: Descartes and the mechanistic worldview
 - Video 4: The mental/physical opposition
 - Video 5: The British empiricists

- **Week 2, Sept 28th**

- History of Cognitive Science, 2/2**

- Video 6: The origins of scientific psychology
 - Video 7: Early approaches, including psychophysics
 - Video 8: Introspection, psychoanalysis
 - Video 9: Behaviourism
 - Additional material:
 - * Read the paper on Skinner's superstitious pigeons (7 pages)
 - * Watch the video about John Watson's form of behaviourism (6 minutes)
 - Video 10: The cognitive turn
 - Additional material:
 - * Watch the video about how brains and computers came to be associated (48 minutes)
 - Video 11: Connectionism, embodiment
 - Additional material:
 - * Read the self-description of the 4E cognition group (webpage)
 - * Watch the introduction to 4E concepts by Shaun Gallagher (12 minutes)

- **Week 3: Oct 5th**

- Language and languaging, 1/2**

- Video 1: Early days: philology and structuralism
 - Video 2: Generative linguistics
 - Video 3: Pragmatics, semantics

- Video 4: Syntax, morphology
- Additional material:
 - * Read the article by Theodore Dalrymple on The Gift of Language (5 pages)

• **Week 4: Oct 12th**

Language and languaging, 2/2

- Video 5: Phonology and phonetics
- Video 6: The language of thought hypothesis
- Video 7: Evolution/emergence of language
- Video 8: Animal communication
- Additional material:
 - * Watch the video of a talk on language and languaging (49 minutes)
- Video 9: Joint speech and chant
- Additional material:
 - * Read the article by me on Joint Speech: The missing link between speech and music? (12 pages)

• **Week 5: Oct 19th**

Development and learning

- Video 1: The fallacy of nature vs. nurture
- Additional material:
 - * Read the blog posts on “Developmental Plasticity and the “Hard-Wired” Problem” (web page)
- Video 2: The altricial/precocial distinction
- Additional material:
 - * Read the Scientific American article on the advantages of being helpless (3 pages)
- Video 3: Jean Piaget
- Video 4: Lev Vygotsky
- Video 5: Studying sociality in the young infant
- Additional material:
 - * Read the article by Reddy and Trevarthen on “What We Learn about Babies from Engaging with their Emotions” (12 pages)
- Video 6: The human speechome project
- Additional material:
 - * Read the article about the birth of a word (Human Speechome Project) (6 pages)

Week 6: Oct 26th, Bank holiday, no class

- **Week 7: Nov 2nd**

Perception, 1/2

- Video 1: The five(?) senses, and the box jellyfish larva
- Video 2: The retina and the visual cortex
- Video 3: The basilar membrane and the auditory cortex
- Video 4: The skin and the somatosensory cortex
- Video 5: The notion of “representation”
- Additional material:
 - * Read a representational approach to vision: Cavanagh, P. (2011). Visual cognition. *Vision research*, 51(13), 1538-1551. (13 pages)

- **Week 8: Nov 9th**

Perception, 2/2

- Video 6: Hubel and Wiesel, Milner and Goodale
- Video 7: Computational vision
- Video 8: Relational approaches to perception
- Video 9: Change and vision; Eye movements
- Video 10: Ecological approaches to vision
- Video 11: Fun with illusions
- Video 12: Static monocular viewing and photography
- Additional material:
 - * Read a non-representational approach to vision: Goldstein, E. B. (1981). The Ecology of JJ Gibson’s Perception. *Leonardo*, 191-195. (5 pages)

- **Week 9: Nov 16th**

Social cognition

- Video 1: The psychological/social divide
- Video 2: Intersubjectivity
- Additional material:
 - * Read Cummins, F. (2014). Voice,(Inter-) Subjectivity, and Real Time Recurrent Interaction. *Frontiers in Psychology*, 5(760). (10 pages)
- Video 3: Theory theory and simulation theory
- Video 4: Participatory sense-making
- Additional material:
 - * Read Schilbach, L., Timmermans, B., Reddy, V., Costall, A., Bente, G., Schlicht, T., & Voegeley, K. (2013). Toward a second-person neuroscience. *Behavioral and Brain Sciences*, 36(04), 393-414. (57 pages! Don’t feel you have to ingest everything. Get the main argument.)

- Video 5: Harry Harlow
- Video 6: Stanley Milgram
- Additional material:
 - * Read about the famous Milgram Obedience experiment in the blog post: “Milgram’s Experiments and the Perils of Obedience”
 - * Read either the Scientific American article (How Nazi’s Defense of “Just Following Orders” Plays Out in the Mind) or the Nature article (Modern Milgram experiment sheds light on power of authority). Keep your critical thinking cap on!
- Video 7: The Stanford Prison Experiment (not an experiment)
- Video 8 (optional): Dunbar’s number
- Video 9: Collective dynamics

- **Week 10, Nov 23**

- **Cognitive neuroscience, 1/2**

- Video 1: The puzzle of the brain
- Video 2: What does the word “function” mean?
- Video 3: The neuron doctrine
- Additional material:
 - * The argument about the neuron doctrine seemed to be settled 100 years ago. Now we are not so sure. Fields, R. D. (2006). Beyond the neuron doctrine. Scientific American Mind, 17(3), 20-27. (7 pages)
- Video 4: McCulloch and Pitts
- Video 5: Phrenology and the localisation of function
- Additional material:
 - * Read the blog post by Neurocritic on “A comparison of modern and older phrenology” (short webpage)

- **Week 11, Nov 30**

- **Cognitive neuroscience, 2/2**

- Video 6: Pathology and animal studies
- Video 7: Anatomical imaging
- Video 8: EEG and NIRS
- Video 9: functional Magnetic Resonance Imaging (fMRI)
- Video 10: Mirror neurons
- Additional material:
 - * Read the blogpost by John Mark Taylor: “Mirror Neurons After a Quarter Century: New light, new cracks”
- Video 11: Von Economo or Spindle Cell neurons

- Additional material:
 - * Read Chen, Ingfei (2009): Brain Cells for Socializing: Does an obscure nerve cell help explain what gorillas, elephants, whales—and people—have in common? Smithsonian Magazine

- **Week 12, Dec 7th**

Movement science

- Video 1: Movement and behaviour
- Video 2: What do brains do?
- Additional material:
 - * Watch the Ted talk by Rolf Pfeiffer (19 minutes)
 - * In the spirit of the pioneering work of Eadward Muybridge, please enjoy the short video of the movement of a vampire bat. (7 seconds!)
- Video 3: The role of goals
- Video 4: Movement and the brain

4 Assessment

Students in this course are required to write two essays, each limited to 3,000 words. You should trawl the primary literature (Google Scholar is your friend) and expose yourself to novel work. The essays carry equal weight.

Essay 1: Methodological variation

In the broad field of cognitive science, very many different methods are used to understand diverse topics. We find everything from neural imaging and single unit recording to vague questionnaires, from the registration of 3D movements to performance in highly artificial experimental tasks, from analysis of self-report to expletive infixation. Your task in this first essay is to describe a variety of methods that are brought to bear in studying a single topic. You should pick a topic that can be studied in more than one way (so not too specific, and not too general). You are asked to describe the methods that are brought to bear: do they provide converging information?

This is the easier of the two essays. You need to find a topic that is interpreted more or less similarly by different researchers (unlike Essay 2). Then you just need to describe the different methods employed: what kind of data do they generate? What insights may be gained from each? How do they combine?

The first essay is to be submitted by 5 pm on Friday Nov 27th. Submit through Brightspace.

Essay 2: Theoretical divergence

In this course, you encounter many approaches to studying persons. They do not all share a common understanding of what is to be explained, what an explanation should be, or even what a person is. In this second essay, you are asked to pick a single empirical topic and identify at least two approaches that adopt different *theoretical* positions with respect to the topic. Your job is *not*

to decide who is right or wrong. Your job is to draw out and make clear the different theoretical assumptions made by the two or more groups. How do they each characterise the problem? What assumptions do they rely upon? How do they differ in their mode of questioning? Do they differ in the consequences one might draw from their work.

There is no right answer here. You are being asked to think critically, and to assume a position that is independent of the researchers whose work you read. This is the more difficult of the two essays, because it asks you to think critically.

I want you to make your own choices here. Pick a topic. It may be quite general (e.g. development and learning in the young) or quite specific (e.g. a specific visual illusion). We have encountered very many such oppositions, e.g. between computational and embodied approaches, individualistic and collective approaches, contrasting notions of control and coordination, language vs. languaging, and more. In each case, you are faced with different frameworks within which scientific work is pursued under specific assumptions. Your task in this essay is to illuminate such divergence.

The second essay is to be submitted by 5 pm on Friday December 18th. Submit through Brightspace.