

Course: Philosophy of Cognitive Science

Instructor: Brandon Ashby

1. Textbooks and reading materials

There is no required textbook for this course. All required reading will be made available as PDFs on the course website.

2. Course description

In the first half of this course, we will review a number of foundational issues in cognitive science. In the latter half of the course, we will look at a range of contemporary issues in cognitive science including human rationality, memory, the self, moral cognition, and the Bayesian revolution. At a general level of analysis, this class will revolve around two closely related questions. In what sense, if any, is the brain a computer of some sort or other? And, how can we decompose cognitive tasks like planning, reasoning, and memory, into increasingly more basic tasks until, eventually, we are describing tasks so simple that individual neurons or neural clusters can perform them simply by firing at a given rate as a function of the inhibitory and excitatory signals that they receive. In other words, how do you get simple neurons to perform complex tasks of the sorts that both human and non-human animals do in their daily lives?

3. Assignments

- Micro-exams, worth 40% of your final grade.
- Essays, worth 50% of your final grade.
- Syllabus quiz, worth 2.5% of your final grade.
- Discussion forum questions, worth 7.5% of your final grade.

3.1 Micro-exams:

You will have a micro-exam every week. Micro-exams can cover any course material (lectures, readings, in-class discussions) presented in the last four weeks of the course. You will have two attempts to take each micro-exam. You will receive the highest score of your two attempts. I drop your two lowest micro-exam scores. Micro-exams will be worth 40% of your final grade. Micro-exams will be administered online via the course website. You will be able to see what questions you got wrong on a micro-exam, but you will not be told the answers to the questions.

3.2 Essays:

You will have three essays over the course of the term. Each will be 2500 words in length. You will have the option of submitting a draft of each paper before you submit it for a final grade. The essays are worth 50% of your final grade and are evenly weighted. I do not drop any essay scores. However, if you are satisfied with the grade that you receive on your first two essays, then you have the option of applying your combined score on your first two essays to your third essay. In other words, do well-enough on your first two essays and you don't have to do the third. I do this to encourage you to work hard on your first two essays and polish them.

3.3 Syllabus quiz:

You will have a quiz on the syllabus and the structure of the course at the end of your first week of term. It is worth 2.5% of your final grade.

3.4 Discussion forum questions:

The class will be divided into two groups. You'll get your group number on the first day of class. For every reading, one of the two groups will be required to post or upvote three questions about that reading on the course website. Discussion forum questions will be worth 7.5% of your final grade. Your questions must be uploaded before 11:59PM the day before we discuss that reading in class. Your questions will be listed anonymously. Only I will be able to see your names attached to the questions. So, do not worry about asking "dumb" questions in front of the other students.

4. Course Schedule

Note: readings listed in the footnotes are recommended but not required.

Note: Make sure you download the PDFs of these readings from the course website. In some cases, we will only be covering selected portions of the papers listed below.

Week 1: Reduction¹

- Jaegwon Kim, (1992) 'Multiple Realization and the Metaphysics of Reduction', *Philosophy and Phenomenological Research*, 52(1): 1-26.
- Jerry Fodor (1974) 'Special Sciences (or: The Disunity of Science as a Working Hypothesis)', *Synthese*, 28(2): 97-115.
- Harold Kincaid, (1990) 'Molecular Biology and the Unity of Science,' *Philosophy of Science*, 57(4): 575-593.
- [Micro-exam 1](#)

Week 2: Levels of Explanation, Part 1: Marr's Three Levels

- David Marr, (1982) Ch. 1 of *Vision*, Cambridge, MA: MIT Press, pp. 1-40.
- Chris Peacocke, (1986) 'Explanation in Computational Psychology: Language, Perception and Level 1.5', *Mind and Language*, 1(2): 101-123.
- Selections from Robert Cummins, (2000) 'How Does it Work?' and 'What are the Laws?': Two Conceptions of Psychological Explanation', in F.C. Kiel and R.A. Wilson (eds.), *Explanation and Cognition*, Cambridge, MA: MIT Press, pp. 117-144.
- [Micro-exam 2](#)

Week 3: Modularity

- Jerry Fodor, (1985) 'Precis to *Modularity of Mind*', *Behavioral and Brain Sciences*, 8(1): 1-5.
- Max Coltheart, (1999) 'Modularity and Cognition' *Trends in Cognitive Science*, 3(3): 115-120.
- Robert N. McCauley and Joseph Henrich, (2006) 'Susceptibility to the Muller-Lyer Illusion, Theory Neutral Vision, and the Diachronic Penetrability of the Visual Input System', *Philosophical Psychology*, 19(1): 79-101.

¹ Daniel Dennett, (1991) 'Real Patterns' *The Journal of Philosophy*, 88(1): 27-51.

- Jesse Prinz, (2006) 'Is the Mind Really Modular?', in R.J. Stainton (ed.), *Contemporary Debates in Cognitive Science*, Oxford: Blackwell, pp. 22-36
- [Micro-exam 3](#)

Week 4: What Do Double Dissociations Show Us About Cognitive Architecture?²

- Max Coltheart, (2001) 'Assumptions and Methods in Cognitive Neuropsychology', in B. Rapp (ed.), *Handbook of Cognitive Neuropsychology: What Deficits Reveal About The Human Mind*, New York: Psychology Press, pp. 3-22.
- Kim Plunket and Stephan Bandelow, (2006) 'Stochastic Approaches to Understanding Dissociations in Inflectional Morphology', *Brain and Language*, 98(2): 194-209.
- Selections from Martin Davies, (2010) 'Double Dissociation: Understanding its Role in Cognitive Neuropsychology', *Mind and Language*, 25(5): 500-540.
- [Micro-exam 4](#)

Week 5: Levels of Explanation, Part 2: Personal and Sub-Personal

- Daniel Dennett, (1969) 'Personal and Sub-Personal Levels of Explanation: Pain' in his *Content and Consciousness: An Analysis of Mental Phenomena*, USA: Humanities Press, pp. 90-96.
- José Luis Bermúdez, (2006) 'Introduction', in J.L. Bermúdez (ed.) *Philosophy of Psychology: Contemporary Readings*, London: Routledge, pp. 3-12.
- Zoe Drayson, (2012) 'The Uses and Abuses of the Personal/Subpersonal Distinction', *Philosophical Perspectives*, 26(1): 1-18.
- Jennifer Hornsby, (2000) 'Personal and Sub-Personal: A Defense of Dennett's Early Distinction', *Philosophical Explorations*, 3(1): 6-24.
- [First essay is due.](#)
- [Micro-exam 5](#)

Week 6: Theory of Mind³

- Stephen Stich and Shaun Nichols, (1999) 'How Do Minds Understand Minds? Mental Simulation Versus Tacit Theory', in S. Stich (auth.), *Deconstructing the Mind*, Oxford: Oxford University Press, pp. 136-167.
- Susan C. Johnson, (2002) 'Detecting Agents' *Philosophical Transactions of The Royal Society B Biological Sciences*, 358(1431): 549-559.

² Max Coltheart, (1985) 'Cognitive Neuropsychology and The Study of Reading' in M.I. Posner and G.S.M. Marin (eds.) *Attention and Performance XI*, Hillsdale, NJ: Lawrence Erlbaum Associates.

³ False belief tests in children and infants: Wendy A. Clemens and Joseph Perner, (1994) 'Implicit Understanding of Belief', *Cognitive Development*, 9(4): 377-395

Luca Surian, Stefania Caldi, and Dan Sperber, (2007) 'Attribution of Belief by 13-Month-Old Infants', *Psychological Science*, 18(7): 580-586.

Kristine H. Onishi and Renée Baillargon, (2005) 'Do 15-Month-Old Infants Understand False Beliefs', *Science*, 308(5719): 255-258.

Renée Baillargeon, Rose M. Scott, and Zijong He, (2010) 'False-Belief Understanding in Infants', *Trends in Cognitive Science*, 14(3): 110-118.

F. Abll, F. Happé, and U. Frith, (2000) 'Do Triangles Play Tricks? Attribution of mental states to animated shapes in normal and abnormal development', *Cognitive Development*, 15(1): 1-16.

Alison Gopnik, (1993) 'How We Know Our Minds: The Illusion of First-Person Knowledge of Intentionality', *Behavioral and Brain Sciences*, 16(1): 1-14.

- Heather M. Gray, Kurt Gray, and Daniel M. Wegner, (2007) 'Dimensions of Mind Perception', *Science*, 315(5812): 619.
- Gregory Currie and Kim Sterelny, (2000) 'How to Think About the Modularity of Mind-Reading', *Philosophical Quarterly*, 50(199): 145-160.
- [Micro-exam 6](#)

Week 7: The Computational Theory of Mind and The Language of Thought Hypothesis⁴

- Jerry Fodor, (1987) 'Appendix: Why There Still Has to be a Language of Thought', in his *Psychosemantics: The Problem of Meaning in the Philosophy of Mind*, Cambridge, MA: MIT Press, pp. 135-154.
- Daniel Dennett's (1981) 'True Believers: The Intentional strategy and Why It Works', reprinted in his (1987) *The Intentional Stance*, Cambridge, MA: MIT Press, pp. 13-36.⁵
- Ned Block, (1981) 'Psychologism and Behaviorism', *Philosophical Review*, 90(1): 5-43.
- [Micro-exam 7](#)

Week 8: Connectionism versus The Computational Theory of Mind⁶

- William Ramsey, Stephen Stich, and Joseph Garon, (1990) 'Connectionism, Eliminativism and the Future of Folk Psychology', *Philosophical Perspectives*, 4: 499-533.
- Terence Horgan and John Tienson, (1989) Representations Without Rules in Philosophy of Mind', *Philosophical Topics*, 17(1): 147-174.
- Gareth Evans, (1982) §4.3 'The Generality Constraint' of his *The Varieties of Reference*, Oxford: Oxford University Press, pp. 100-105.
- Martin Davies, (1987) 'Tacit Knowledge and Semantic Theory: Can a Five Percent Difference Matter?', *Mind*, 96(384): 441-462.
- [Micro-exam 8](#)

Week 9: Rationality⁷

- Amos Tversky and Daniel Kahneman (1974). 'Judgment Under Uncertainty: Heuristics and Biases', *Science*, 185(4157): 1124–1131.
- Richard Samuels & Stephen Stich (2004). 'Rationality and Psychology', in A. Mele & P. Rawling (eds.), *The Oxford Handbook of Rationality*, Oxford: Oxford University Press: 279-300.
- Gerd Gigerenzer, (1991) 'How to Make Cognitive Illusions Disappear', In W. Stroebe & M. Hewstone (eds.), *European review of social psychology*, Volume 2, Chichester: Wiley, pp. 83-115.
- [Micro-exam 9](#)

⁴ James L. McClelland, David Rumelhart, D. E. Hinton, (1987) 'The appeal of Parallel Distributed Processing', reprinted in A. Collins and E. E. Smith (eds.), *Readings in Cognitive Science: A Perspective From Psychology and Artificial Intelligence*, USA: Morgan Kaufman Publishers, pp. 52-72.

Jerry Fodor's (1978) 'Propositional Attitudes', *The Monist*, 61(October): 501-23.

⁵ Ch. 2 of Tadeusz Zawidzki's (2007) *Dennett*, Oxford: Oneworld Publications.

⁶ Gareth Evans, (1982) §7.1 'Introductory' of his *The Varieties of Reference*, Oxford: Oxford University Press, pp. 205-215.

⁷ Stephen Stich, (1985) 'Could Man Be an Irrational Animal?' *Synthese*, 64(1): 115-34.

Week 10: Bayesian Learning⁸

- Amy Perfors, Joshua B. Tenenbaum, Thomas L. Griffiths, Fei Xu, (2011) 'A Tutorial Introduction to Bayesian Models of Cognitive Development', *Cognition*, 120: 302-321.
- Stephanie Denison, Elizabeth Bonawitz, Alison Gopnik, Thomas L. Griffiths, (2013) 'Rational Variability in Children's Causal Inferences: The Sampling Hypothesis', *Cognition*, 126: 285-300.
- Shaun Nichols and Richard Samuels, (2017) 'Bayesian Psychology and Human Rationality', in T. W. Hung and T. J. Lane (eds.), *Rationality: Constraints and Contexts*, London: Academic Press, pp. 17-35.
- [Second essay is due.](#)
- [Micro-exam 10](#)

Week 10: Bayesian Perception⁹

- Marc O. Ernst & Heinrich H. Bülthoff, (2004) 'Merging the Senses into a Robust Percept', *Trends in Cognitive Science*, 8(4): 162-9.
- Adams, W. J., Graf, E. W., & Ernst, M. O. (2004). Experience can change the 'light-from-above' prior, *Nature Neuroscience*, 7: 1057-1058.
- Bresciani, J. P., & Ernst, M. O. (2007). Signal reliability modulates auditory-tactile integration for event counting, *Neuroreport*, 18: 1157-1161.
- Alais, D., & Burr, D. (2004). The ventriloquist effect results from near-optimal bimodal integration. *Current Biology*, 14: 257-262
- Cheng, K., Shettelworth, S. J., Huttenlocher, J., & Rieser, J. J. (2007). Bayesian Integration of Spatial Information, *Psychological Bulletin*, 133:625-637.
- Kersten, D., Mamassian, P., & Yuille, A. (2004). Object Perception as Bayesian Inference, *Annual Review of Psychology*, 55: 271-304.
- [Micro-exam 11](#)

Week 12: Introspection and The Self

- Jesse Prinz, (2011) 'Wittgenstein and the Neuroscience of the Self', *Philosophical Quarterly*, 48(2): 147-160.
- Kathleen D. Vohs, Roy F. Baumeister, Brandon J. Schmeichel, Jean M. Twenge, Dianne M. Tice, (2014), 'Making Choices Impairs Subsequent Self-Control: A Limited Resource Account of Decision Making, Self-Regulation, and Active Initiative', *Motivation Science*, 1(S): 19-42.

⁸ Fei Xu, Joshua B. Tenenbaum, (2007) 'Word Learning as Bayesian Inference', *Psychological Review*, 114(2): 245-272.

Kathryn M. Dewar and Fei Xu, (2010) 'Induction, Overhypothesis, and the Origin of Abstract Knowledge: Evidence From 9-Month-Old Infants', *Psychological Science*, XX(X): 1-7.

Fei Xu and Vashti Garcia (2008), 'Intuitive Statistics by 8-month-old Infants', *PNAS*, 105(13): 5012-5015.

LouAnn Gerken, (2010) 'Infants use Rational Decision Criteria for Choosing Among Models of Their Input', *Cognition*, 115: 362-366.

⁹ Ernst, M. O., & Banks, M. S. (2002). Humans Integrate Visual and Haptic Information in a Statistically Optimal Fashion, *Nature*, **415**: 429-433.

Helbig, H. B., Ernst, M. O., Richard, E., Pietrini, E., Theilscher, A., Mayer, K. M., Schultz, J., & Noppeney, U. (2012). The neural mechanisms of reliability weighted integration of shape information from vision and touch, *Neuroimage*, **60**: 1063-1072.

- Veronika Job, Carol S. Dweck, Gregory M. Walton, (2010) ‘Ego Depletion—Is It All In Your Head?: Implicit Theories About Willpower Affect Self-Regulation’, *Psychological Science*, 21(11): 1686-1693.

- [Micro-exam 12](#)

Week 13: Memory

- Stanley B. Klein and Shaun Nichols, (2012) ‘Memory and the Sense of Personal Identity’, *Mind*, 121(483): 677-702.
- Lynn Nadel and Oliver Hardt, (2011) ‘Update on Memory and Learning’, *Neuropsychopharmacology*, 36: 251-273.
- Priyali Rajagopal and Nicole Votolato Montgomery, (2011) ‘I Imagine, I experience, I Like: The False Experience Effect’, *Journal of Consumer Research*, 38(3): 578-594.

- [Micro-exam 13](#)

Week 14: Agency and Free Will¹⁰

- Benjamin Libet, (1999) ‘Do We Have Free Will?’ *Journal of Consciousness Studies*, 6(8-9): 47-57.
- Alfred Mele, (2006) ‘Free Will: Theories, Analysis, and Data’, in S. Pocket, W. Banks, and S. Gallagher (eds.), *Does Consciousness Cause Behavior*, Cambridge, MA: MIT Press, pp. 187-206.
- Shaun Nichols, (2015) ‘Folk Intuitions about Free Will’, in his *Bound: Essays on Free Will and Responsibility*, Oxford: Oxford University Press: pp. 17-33.

- [Micro-exam 14](#)

Week 15: Morality, Cooperation, Punishment, and Emotion

- Fiery Cushman, (2013) ‘Action, Outcome, and Value: A Dual-System Framework for Morality’, *Personality and Social Psychology Review*, 17(3): 272-292.
- Ernst Fehr & Simon Gächter (February 2002) ‘Altruistic Punishment in Humans’, *Nature*, 415(6868): 137-140.
- Benedikt Herrmann, Christian Thöni, & Simon Gächter, (March 2008) ‘Anti-Social Punishment Across Societies’, *Science*, 319(5868): 1362-1367.
- Ernst Fehr & Urs Fischbacher, (2004) ‘Social Norms and Human Cooperation’, *Trends in Cognitive Science*, 8(4): 185-190.

- [Third essay is due.](#)

- [Micro-exam 15](#)

Week 16: Fall/Spring Break [MOVE TO APPROPRIATE LOCATION]

- No new material

¹⁰ Adina L. Roskies, (2011) ‘Why Libet’s Studies Don’t Pose a Threat to Free Will’, in W. Sinnott-Armstrong, L. Nadel (eds.) *Conscious Will and Responsibility: A Tribute to Benjamin Libet*, Oxford: Oxford University Press, pp. 11-22.