

PSYC 273
NEUROECONOMICS
Spring 2020
Tu/Th 3-4:30, Location TBA

Instructor: Joe Kable (kable@psych.upenn.edu), office hours TBA, Richards D505

Course Description: This course will introduce students to neuroeconomics, a field of research that combines economic, psychological, and neuroscientific approaches to study decision-making. The course will focus on our current understanding of how our brains give rise to decisions, and how this knowledge might be used to constrain or advance economic and psychological theories of decision-making. Topics covered will include how individuals make decisions under conditions of uncertainty, how groups of individuals decide to cooperate or compete, and how decisions are shaped by social context, memories, and past experience.

Course Objectives: The main objectives for this course are:

- To familiarize students with the methods and techniques that are used in neuroeconomics
- To survey some of the major questions neuroeconomists have asked and what answers they have found to these questions
- To develop student's ability to think critically about the strengths and weaknesses of research they encounter
- To enable students to think creatively about research, particularly in terms of formulating hypotheses and designing ways to test hypotheses
- To encourage students to apply the concepts from this course to gain a better understanding of themselves and their world

Readings: Readings will be posted on Canvas, and will include tutorial introductions, popular science writing, and primary scientific articles.

Format: This class will use a team-based learning approach, and substantial portion of class time will involve working in teams to answer questions about the readings and solve problems. These activities will be supplemented by lectures, as well as discussion and activities involving the entire class.

Course requirements: Evaluations will be based on individual (25%) and team quizzes (25%), participation in surveys and activities (10%), and a paper that students will work on over the course of the entire semester (10% per assignment x 4 assignments).

Course Outline

1/16 INTRODUCTION

1/21 METHODS

Kable JW (2011). The cognitive neuroscience toolkit for the neuroeconomist: A functional overview. *Journal of Neuroscience, Psychology and Economics*, **4**: 63-84.

1/23 NEUROANATOMY

Chapter 3, "Gross and Functional Anatomy of Cognition" from Gazzaniga MS, Ivry RB, Mangun GR (2002). *Cognitive Neuroscience: The Biology of the Mind*.

1/28 & 1/30 VALUATION & UTILITY

Chib V, Rangel A, Shimojo S, O'Doherty JP (2009). Evidence for a common representation of decision values for dissimilar goods in human ventromedial prefrontal cortex. *Journal of Neuroscience*, **29**, 12315-12320.

Fellows LK & Farah MJ (2007). The role of ventromedial prefrontal cortex in decision making: judgment under uncertainty or judgment per se? *Cerebral Cortex*, **17**, 2669-74.

2/4 & 2/6 RISK & UNCERTAINTY

Chapter from "How Not to Be Wrong"

Hsu M, Bhatt M, Adolphs R, Tranel D, Camerer CF (2005). Neural systems responding to degrees of uncertainty in human decision-making. *Science*, **310**, 1680-1683.

2/11 & 2/13 CHOICE, FROM PERCEPTION TO ACTION

Shadlen MN & Newsome WT (1996). Motion perception: seeing and deciding. *PNAS*, **93**, 628-633.

Krajbich I, Bartling B, Hare T, Fehr E (2015). Rethinking fast and slow based on a critique of reaction-time reverse inference. *Nature Communications*, **6**, 7455.

2/18 & 2/20 DELAY OF GRATIFICATION

Mischel W, "In Stanford University's Surprise Room," *The Marshmallow Test*, Chapter 1
Target article:

Kidd C, Palmeri H, Aslin RN (2013). Rational snacking: young children's decision-making on the marshmallow task is moderated by beliefs about environmental reliability. *Cognition*, **126**, 109-114.

2/25 & 2/27 VALUE LEARNING I

Montague R, "Sharks Don't Go On Hunger Strikes," *Your Brain is (Almost) Perfect*, Chapter 4
Target article:

Waelti P, Dickinson A, Schultz W (2001). Dopamine responses comply with basic assumptions of formal learning theory. *Nature*, **412**, 43-48.

3/3 & 3/5 VALUE LEARNING II

Duhigg C, "The Habit Loop," *The Power of Habit*, Chapter 1

Killcross S & Coutureau E (2003). Coordination of actions and habits in the medial prefrontal cortex of rats. *Cerebral Cortex*, 13, 400-408.

3/17 & 3/19 SOCIAL CONFORMITY

Scientific American article on Solomon Asch

Zaki J, Schirmer J, Mitchell JP (2011). Social influence modulates the neural computation of value. *Psychological Science*, 22, 894-900.

3/24 & 3/26 SOCIAL PREFERENCES

Harbaugh W, Mayr U, Burghart D (2007). Neural responses to taxation and voluntary giving reveal motives for charitable donations. *Science*, **316**, 1622-1625.

Tricomi E, Rangel A, Camerer CF, O'Doherty JP (2010). Neural evidence for inequality-averse social preferences. *Nature*, **463**, 1089-1091.

3/31 & 4/2 COOPERATION

Pinker S, "Revenge," *The Better Angels of Our Nature*, Chapter 8

Crockett M, Clark L, Tabibnia G, Lieberman MD, Robbins TW (2008). Serotonin modulates behavioral reactions to unfairness. *Science*, 320, 1739.

4/7 & 4/9 STRATEGIC CHOICE

Nasar S, "Nash's Rival Idea," *A Beautiful Mind*, Chapter 10

Coricelli G & Nagel R (2009). Neural correlates of depth of strategic reasoning in medial prefrontal cortex. *Proceedings of the National Academy of Sciences*, **106**, 9163-9168.

4/14 & 4/16 CONSUMER NEUROSCIENCE

Wardlaw JM, et al. (2011). Can it read my mind? – What do the public and experts think of the current (mis)uses of neuroimaging? *PLoS ONE*, 6, e25829.

Falk EB, Berkman ET, Lieberman MD (2012). From neural responses to population behavior: neural focus group predicts population-level media effects. *Psychological Science*, 23, 439-445.

4/21 & 4/23 NEUROFINANCE

Background Reading:

Frydman C & Camerer CF (2016). The Psychology and Neuroscience of Financial Decision Making. *Trends in Cognitive Sciences*, **20**, 661–675.

Smith A, Lohrenz T, King J, Montague PR, & Camerer CF (2014). Irrational exuberance and neural crash warning signals during endogenous experimental market bubbles. *Proceedings of the National Academy of Sciences*, **111**, 10503–10508.

4/28 WRAP-UP