

Lecture TR 9:30 - 10:45
Rm. 519 Psychology

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We are faced every day with economic decisions that involve some degree of uncertainty. Should I risk buying this stock today when there is some likelihood that it will plummet in price tomorrow? Where in the brain are measures of risk and likelihood computed? This is a fundamental question posed in Neuroeconomics. Neuroeconomics is a new field whose goal is to bridge brain neuroscience with behavioral economics and decision-making. Neuroeconomics is, by its very definition, multidisciplinary, standing at the intersection of economics, neuroscience, mathematics, computer science and social and cognitive psychology. Neuroeconomics promises not only to inform and constrain behavioral models by observed physiological processes, but also offers new perspectives on modeling neural circuitry of value-based decision-making.

COURSE REQUIREMENTS AND GRADE PERCENTAGES

1. Each week prepare 2 discussion questions based on the assigned readings. Place in learn@UW dropbox the Monday prior to each Tuesday meeting. (30%)
2. Actively participate. (30%)
3. Write a 6-8 page paper proposing a research project in Neuroeconomics. Provide an introduction motivating the topic along with the relevant literature. Discuss the methods for how you would go about studying the research question, and briefly discuss the expected outcome. This will be due at the end of the semester. (40%)

**REQUIRED TEXTS: Neuroeconomics: Decision Making and the Brain
Glimcher, Camerer, Fehr and Poldrack (GCFP)**

CLASS SCHEDULE (flexible)

Week 1: September 6
Introduction to Neuroeconomics

GCFP: chapters 1, 2

Weeks 2 & 3: September 13

Introduction to Neuroscience (Anatomy and Physiology)

Sejnowski and Churchland. Brain and Cognition. From M. Posner (Ed.), *Fundamentals of Cognitive Science*. MIT Press

Fellows, LK. The cognitive neuroscience of human decision making: a review and conceptual framework. *Behav Cogn Neurosci Rev*. 2004 Sep;3(3):159-72.

Gaidos, S. (2011). "Cerebral Delights." *Science News*: 22-25.

Salzman, C. D. and S. Fusi (2010). Emotion, Cognition, and Mental State Representation in Amygdala and Prefrontal Cortex. *Annual Review of Neuroscience, Vol 33*. Palo Alto, Annual Reviews. **33**: 173-202.

Wallis JD (2007) Orbitofrontal cortex and its contribution to decision-making. *Annual Review of Neuroscience* 30:31-56.

Week 4: September 27

Behavioral Economics

GCFP: chapters 4, 11

Week 5: October 4

Value-based Decision-making

GCFP: chapters 28, 30

Rangel A, Camerer C, Montague PR (2008) A framework for studying the neurobiology of value-based decision making. *Nature Reviews Neuroscience* 9:545-556.

Week 6: October 11

Value-based Decision-making

GCFP: chapters 26, 29

Class Cancelled: October 11

Week 7: October 18

Uncertainty – Risk and ambiguity

GCFP: chapters 10, 23

Week 8: October 25

Temporal Discounting

Kable JW, Glimcher PW (2007) The neural correlates of subjective value during intertemporal choice. *Nature Neuroscience* 10:1625-1633.

Roesch MR, Taylor AR, Schoenbaum G (2006) Encoding of time-discounted rewards in orbitofrontal cortex is independent of value representation. *Neuron* 51:509-520

Week 9: November 1

Learning and Reward

GCFP: chapters 21. 22

Week 10: November 8

Social Decision-making

GCFP: chapters 15. 19

Week 11: November 15

Theory of Mind

GCFP: chapters 17. 20

Week 12: November 22

Game Theory

GCFP: chapter 5

Week 13: November 29

Behavioral Game Theory

GCFP: chapters 6. 13

Week 14: December 6

Neurofinance

Bossaerts, P. (2009). "What Decision Neuroscience Teaches Us About Financial Decision Making." *Annual Review of Financial Economics* 1: 383-4

Lohrenz T, McCabe K, Camerer CF, and Montague PR. Neural signature of fictive learning signals in a sequential investment task. *Proceedings of the National Academy of Sciences of the United States of America* 104: 9493-9498, 2007

Week 15: December 13

Behavioral Genetics

Roiser JP, de Martino B, Tan GCY, Kumaran D, Seymour B, Wood NW, Dolan RJ (2009) A Genetically Mediated Bias in Decision Making Driven by Failure of Amygdala Control. *Journal of Neuroscience* 29:5985-5991.

Frank, M. J., B. B. Doll, et al. (2009). "Prefrontal and striatal dopaminergic genes predict individual differences in exploration and exploitation." *Nature Neuroscience* 12(8): 1062-U1145.

Where to take complaints about a Teaching Assistant or Course Instructor:

Occasionally, a student may have a complaint about a TA or course instructor. If that happens, you should feel free to discuss the matter directly with the TA or instructor. If the complaint is about the TA and you do not feel comfortable discussing it with him or her, you should discuss it with the course instructor. If you do not want to approach the instructor, make an appointment to speak to the Department Chair, Professor Patricia Devine, by emailing: chair@psych.wisc.edu. If your complaint has to do with sexual harassment, you may also take your complaint to Vicky Lenzlinger, Undergraduate Program Coordinator, phone 262-0512 or email her at vlenzlinger@psych.wisc.edu. Her office is located on the second floor of the Psychology building, room 222. If you believe the TA or course instructor has discriminated against you because of your religion, race, gender, sexual orientation, or ethnic background, you also may take your complaint to the Office of Equity and Diversity, room 179-A Bascom Hall, or go to: <http://www.oed.wisc.edu/>