

Psychology 458
Spring, 2007
Honours Seminar in Cognition - Neuroeconomics

Time: Wednesday 12:30 - 2:20

Place: PAS 3026

Instructor: Jonathan Fugelsang

Office: PAS 4055

Office Hours: Thursday 12:30 - 2:30, and by appointment.

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Course Summary: Neuroeconomics is an exciting new field that examines how the brain interacts with the environment to enable us to make complex decisions about personal goals, investments, and relationships. We will begin the course by reviewing some of the fundamentals of contemporary cognitive neuroscience research (i.e. brain and behaviour correlates, functional magnetic resonance imaging etc.) and then move into more specific research topics such as cooperation and conflict resolution, financial decision-making, and game theory. Throughout these various topics we will emphasize how the brain represents and processes the synergy between cognition, emotion and the context shaped by the environment.

Class Format: The class will be a seminar format where each student will be responsible for presenting one of the assigned readings. There is no textbook for the course. Readings for the course will consist of primary source material. I made an effort to find what I thought to be influential papers that either contributed to the development of the field of Neuroeconomics, or resulted in significant discoveries within the field. The majority of these papers are brief articles published in general scientific (e.g. *Science*) or neuroscientific journals. As such, they are quite short thus requiring only around 10-20 pages of required reading per week.

Summary of Grading Scheme:

(I)	Presentations	
	1 Scheduled Readings	35%
	1 Research Idea	10%
(II)	Thought Papers (9 @ 5%)	45%
(III)	Class Participation	10%

Explicit Explanation of Grading Scheme:

(I) Presentations

1st Presentation – Topical Paper - (35%)

- Each student will be given approximately 30 minutes to present one of the assigned papers on the scheduled date.
- During the presentation students should cover the paper in depth (i.e. introduction, method, and results) and discuss their thoughts on the papers. Also, I would like you to find 1 other article that has either a consistent or an opposing view of the assigned paper, or develops the ideas of the assigned paper and present their findings as well.
- Following the 30 minute presentation, each student will lead a 15 minute Discussion Session. During this time you will ask your classmates a couple of “Questions” relating to your topic, and engage them in a discussion of possible answers. You can bring in extra materials (newspaper clippings) or prepare demos related to your prepared “Questions”; these will help engage your classmates in the Discussion Session.
- Make your “Questions” provocative, to invite discussion from your classmates, or come prepared to defend your particular “Answers” to your “Questions”, if many different “Answers” are possible. Alternatively, frame your Questions such that students have to pick one side of a debate, and defend it, or have students provide examples from every day life to support their answers.

2nd Presentation – Ideas for Future Research” Presentation – (10%)

- Each student will prepare a short presentation (10 minutes in length) in which a possible future research question, on one of the topics from this course, is proposed. You will present your question, the approach to be taken, and potential implications of the study on the last day of class (July 25).

(II) Thought Papers (9 x 5% - 45%)

- On the weeks in which a student is not presenting, s/he will prepare a brief (max 2 page double spaced) thought paper on the readings assigned for that week. In these papers, I want you to provide a very short synopsis of the findings, and what you think their implications are, and generate one question for discussion.
- Thus, each student will prepare 9 of these ~2-page papers.
- These papers will be due the day of class before we begin.

(III) Participation (10%)

- Since this is a seminar course, I encourage you to participate in class by asking questions and sharing your opinions.
- During the research presentations (except your own), you will be expected to participate in the Discussion Session by providing some of your own “Answers” to “Questions” posed by the presenter.

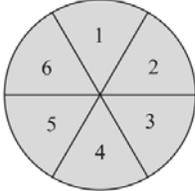
Note for students with disabilities:

The Office for Persons with Disabilities (OPD), located in Needles Hall, Room 1132, collaborates with all academic departments to arrange appropriate accommodations for students with disabilities without compromising the academic integrity of the curriculum. If you require academic accommodations to lessen the impact of your disability, please register with the OPD at the beginning of each academic term.

NOTE: Please be aware of the following university policies

- All students registered in the courses of the Faculty of Arts are expected to know what constitutes an academic offence, to avoid committing academic offences, and to take responsibility for their academic actions. When the commission of an offence is established, disciplinary penalties will be imposed in accord with Policy #71 (Student Academic Discipline). For information on categories of offences and types of penalties, students are directed to consult the summary of Policy #71 which is supplied in the Undergraduate Calendar (section 1; on the Web at http://www.ucalendar.uwaterloo.ca/0405/UW/policy_71.html). If you need help in learning how to avoid offences such as plagiarism, cheating, and double submission, or if you need clarification of aspects of the discipline policy, ask your TA or course instructor for guidance or consult “How to Avoid Plagiarism and Other Written Offences: A Guide for Students and Instructors” (<http://watarts.uwaterloo.ca/~sager/plagiarism.html>). Other resources regarding the discipline policy are your academic advisor and the Undergraduate Associate Dean.
- Students who believe that they have been wrongfully or unjustly penalized have the right to grieve. Please refer to Policy #70 (Student Grievance) at <http://www.adm.uwaterloo.ca/infosec/Policies/policy70.htm>.

Topic Schedule

Date	Topic	Random Picture
May 2	Introduction to course	
May 9	The Brain and Methods of Neuroeconomic Research	
May 16	Estimating Probabilities	
	<p>Wolford, GL., Miller, MB. & Gazzaniga, M. (2000) The left hemisphere's role in hypothesis formation. <i>Journal of Neuroscience</i>, 20, 1-4.</p> <p>Miller, MB., Valsangkar-Smyth, M., Newman, S., Dumont, H., Wolford, G. (2005). Brain activations associated with probability matching. <i>Neuropsychologia</i>, 43, 1598-1608.</p>	
May 23	Conflict I – Cognition	
	<p>Carter, CS, Braver, TS., Barch, DM., Botvinick, MM., Noll, D., & Cohen, JD. (1998). Anterior cingulate cortex, error detection, and online monitoring of performance. <i>Science</i>, 280, 747-749</p> <p>Kerns, JG., Cohen, JD., MacDonald, AW., Cho. RY., Stenger, A., & Carter, CS. (2004). Anterior cingulate conflict monitoring and adjustment in control. <i>Science</i>, 303, 1023-1026.</p>	
May 30	Conflict II – Emotion	
	<p>Damasio, AR. (1996) The somatic marker hypothesis and the possible functions of the prefrontal cortex. <i>Philosophical Transactions of the Royal Society London B: Biological Sciences</i>, 351, 1413-1420.</p> <p>Whalen, PJ., Bush, G., McNally, RJ., Wilhelm, S., McInerney, SC., Jenike, MA., & Rauch, SL. (1998). The emotional counting Stroop paradigm: a functional magnetic resonance imaging probe of the anterior cingulate affective division. <i>Biological Psychiatry</i>. 1998, 44, 1219-1228.</p>	
June 6	Decisions Under Uncertainty	
	<p>Hsu, M., Bhatt, M., Adolphs, R., Tranel, D., & Camerer, CF. (2005). Neural systems responding to degrees of uncertainty in human decision-making. <i>Science</i>, 310, 1680-1683.</p> <p>Yoshida W., & Ishii S. (2006). Resolution of uncertainty in prefrontal cortex. <i>Neuron</i>, 50, 781-789.</p>	
June 13	Cooperation/Trust I	
	<p>Sanfey, AG., Rilling, JK., Aronson, JA., Nystrom, LE., and Cohen, JD. (2003). The neural basis of economic decision-making in the ultimatum game. <i>Science</i>, 300, 1755–1758.</p> <p>Rilling, JK., Glenn, AL., Jairam, MR., Pagnoni, G., Goldsmith, DR., Elfenbein, HA., Liliensfeld, SO. (In press). Neural Correlates of Social Cooperation and Non-Cooperation as a Function of Psychopathy. <i>Biological Psychiatry</i>.</p>	

<p>June 20</p>	<p>Cooperation/Trust II</p> <p>King-Casas, B., Tomlin, D., Anen, C., Camerer, CF., Quartz, SR., Montague, PR. (2005). Getting to know you: reputation and trust in a two-person economic exchange. <i>Science</i>, 308, 78-83.</p> <p>Delgado, MR., Frank, RH., Phelps, EA. (2005). Perceptions of moral character modulate the neural systems of reward during the trust game. <i>Nature Neuroscience</i>. 8, 1611-1618.</p>	
<p>June 27</p>	<p>Morality</p> <p>Greene, J., Nystrom, L., Engell, A., Darley, J., & Cohen, J. (2004). The neural bases of cognitive conflict and control in moral judgment. <i>Neuron</i>, 44, 389-400.</p> <p>Schaich Borg, J., Hynes, C., Van Horn, J., Grafton, S., & Sinnott-Armstrong, W. (2006). Consequences, actions and intention as factors in moral judgments: An fMRI investigation. <i>Journal of Cognitive Neuroscience</i>, 18, 803-817.</p>	
<p>July 5</p>	<p>Application – Law/Development</p> <p>Phan, KA., Magalhaes, A., Ziemlewicz, TJ., Fitzgerald, DA., Green, C., & Smith, W. (2005). Neural correlates of telling lies: a functional magnetic resonance imaging study at 4 Tesla. <i>Academic Radiology</i>, 12, 164-172.</p> <p>Galvan, A., Hare, T., Voos, H., Golver, G., & Casey, BJ. (2007). Risk-taking and the adolescent brain: who is at risk? <i>Developmental Science</i>, 10, 8-14.</p>	
<p>July 12</p>	<p>Application – Gambling</p> <p>Gehring, W. & Willoughby, AR. (2002). The medial prefrontal cortex and the rapid processing of monetary gains and losses. <i>Science</i>, 295, 2279 – 2282.</p> <p>Tom, SM., Fox, CR., Trepel, C., & Poldrack, RA. (2007). The neural basis of loss aversion in decision-making under risk. <i>Science</i>, 315, 515-518.</p>	
<p>July 19</p>	<p>Application – Marketing</p> <p>McClure, SM., Li, J., Tomlin, D., Cypert, KS., Montague, LM., & Montague, PR. (2004). Neural correlates of behavioral preference for culturally familiar drinks. <i>Neuron</i>, 44, 379-387.</p> <p>Knutson, B., Rick, S., Wimmer, G. E., Prelec, D., & Loewenstein, G. (2007). Neural predictors of purchases. <i>Neuron</i>, 53, 147-156.</p>	
<p>July 25</p>	<p>Final Day - Research Proposal Presentations</p>	