THE NEUROBIOLOGY OF BIAS AND DISCRIMINATION

NS M187/Psych M166, Spring Quarter 2016

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Meeting Time: Tu/Th 9:30-10:45am; location TBA

Course Overview:

The mammalian brain has evolved to optimize survival in the environment in which it finds itself. Bats for example dedicate much or their brain to auditory processing to effectively navigate and hunt food by echolocation whilst human brains have developed extensive cortical regions to support executive function and planning. The human brain is particularly adept at survival in many different environments and in societies with vastly different values and beliefs. However, our evolutionary history has also biased our brains to preferentially attend to and learn certain types of information at the expense of others, to pursue rewarding stimuli and avoid aversive stimuli, to modify our responses based on prior experiences and anticipated outcomes, and to adopt mental shortcuts (i.e., heuristics) to facilitate quick decision making. Although such biases serve us well in many circumstances, they can occasionally lead us astray. For instance, we are biased to accept evidence that adheres to our preexisting beliefs and ignore evidence that contradicts these beliefs. We are prone to making over-generalizations about the characteristics of groups of people, leading us to develop stereotypes and prejudices. And, whether we realize it or not, we often develop biases to favor members of our in-group and to fear members of other groups. This course aims to explore the aspects of mammalian brain function that generate preference, bias, and discrimination. To do so, we will consider research at multiple levels of analysis, from genetics to neural circuits to behavior. We will also discuss the societal implications of these research findings, including their relevance to public policies and the criminal justice system. The course is designed for junior and senior undergraduate students with a psychology or neuroscience background and will cover broad areas of neuropsychology.

Grading:

Breakdown of your grade:

Midterm Exam	25%	Presentation	20%
Final Exam	35%	i>clicker Quizzes	5%
Essay	10%	Class Participation	5%

By default, the following scale will be used to assign your grade for this course:

Percentage:	Grade:
90+	A-..A+
80..89	B-..B+
70..79	C-..C+
60..69	D-..D+

Plus (+) grades will only be assigned for the top three percentage points in any grade range (e.g., B+ = 87-89), and minus (-) grades for the bottom three percentage points (e.g., A- = 90-92). Your final course percentage grade will be rounded to the nearest integer using standard rounding rules.

Use of i>clickers:

An *i>clicker* remote is required for this course so that you can respond to in-class quizzes (graded), and to other (non-graded) questions that are posed in class. You may use either an original *i>clicker*, *i>clicker+*, or *i>clicker2*. We will not be using the alphanumeric features of the *i>clicker2* in this course, but future courses you take at UCLA might require this newer model, so you may want to consider investing in it now. Please register your clicker on the CCLE course website, where you will find an *i>clicker* "Remote Registration" link.

Responding in class for another person (by using their remote) or having someone attend class and respond for you is academic misconduct and will be treated as such.

Class Participation:

During class, questions will periodically come up that require a clicker response. Responses to these clicker questions are *not graded* and are primarily used to encourage active class participation. Your clicker response rate to these questions (regardless of the accuracy of your responses) will be the primary determinant of the *Class Participation* portion of your course grade (5%). Every student will receive one "freebie" to accommodate an absence or clicker malfunction.

Clicker Quizzes:

Some class sessions will <u>begin</u> with a brief 5-question quiz administered with the *i>clickers*. These are designed to assess your understanding of the topics covered during the previous 2-3 lectures, including the assigned readings associated with those lectures. If you read the assigned articles and pay close attention during the lectures, you should do just fine. Your mean score on these quizzes will constitute 10% of your final course grade. If you forget to bring your clicker to class on a given day or it is out of batteries / not working, unfortunately you will receive 0 points for that day's quiz. However, we allow for these sorts of issues by automatically dropping your lowest quiz score for the quarter.

Extensive research on learning has shown that students consistently perform better on a final test if they take practice tests on a lesson (such as these mini-quizzes), as compared with simply restudying the lesson materials; this phenomenon is known as the "testing effect" (Roediger & Karpicke, 2006).

Exams:

The midterm and final exams will consist of a mixture of multiple-choice, short answer, and essay questions. You are responsible for everything covered in the assigned readings and in the lectures. An attempt will be made to design questions that test your knowledge of general concepts and definitions, underlying principles, and important experimental methods and results. You should study and read for comprehension as opposed to brute memorization. The final exam will assess your cumulative understanding of the course material from the entire quarter. As a matter of policy, the exams will occur as scheduled with no make-up exams. If you have an unavoidable conflict for either exam, please notify the instructors at your soonest convenience. *The TA will hold review sessions before each exam (date/time TBA).*

Essay Assignment:

You will be required to write an essay (1,200 words max) about a hypothetical discrimination case, with an emphasis on describing what brain circuits may be involved. More details about this assignment will be provided to you during the course.

Class Presentations:

Weeks 8-10 will consist of individual presentations. Each student will give a talk on a topic associated with bias. Seniors will present first and then juniors. Each presentation will be 10 mins with 5 mins of questions (5-6 presentations/session). Presentations should include:

a) history of the presentation area
b) neurobiology of the neurotransmitters, circuits and/or brain areas involved in creating bias
c) examples of bias
d) references of the sources

Students are expected to meld the course didactic material with material from scholarly viable sources such as PubMed, books, and articles, but additional internet material can be used as well. All sources should be documented and accurately referenced in the presentation (PowerPoint or Prezi presentations are acceptable and should be uploaded at least 24h before the day of the presentation).

The final exam will combine testing on the didactic material as well as subject material covered in the student presentations.

Honors students must give a version of the presentation that they prepared for class to a group of high-school students in the greater Los Angeles area or to a UCLA student group. These presentations should be 15 minutes in length, and the content should be adapted as needed for the target audience.

Example presentation topics include:

- Advertising of tobacco products
- Advertising of alcoholic beverages
- Advertising of junk food
- Cannabinoid legislation and bias
- Opium laws during the ages and societal bias
- Methamphetamine and cocaine legislation in creating racial bias
- Drug legislation and poverty in creating racial bias
- How films like Ratatouille create bias against animal research
- Sex differences and bias in decision-making
- PTSD in soldiers returning from Iraq/Afghanistan and subsequent bias
- Alcohol, impulsivity, and loosing inhibitory control in bias-insensitive behavior
- Peer influences on judgment and decision-making
- Bias in favor of the opposite sex
- Bias against the opposite sex
- Priming and subsequent bias in decision-making
- Racial bias as a result of film priming
- Religious bias
- Phobias in shaping bias
- Fashion modeling in creating image bias
- Mental disorders and bias
- Neural mechanisms of stereotype threat
- How drug addiction compromises free will

Policy on Incompletes:

To receive an Incomplete, you must have completed more than half the course, including the midterm exam, with passing scores. Be sure to check with the Undergraduate Advising Office and instructors if you are planning to take an Incomplete.

Academic integrity:

Academic dishonesty, including, but not limited to, cheating or plagiarism, is a serious violation of UCLA's code of student conduct. Any act of academic dishonesty will be reported to the Dean of Students' Office for adjudication.

Accommodations for Disabilities:

If you wish to request an accommodation due to a disability, please contact the Office for Students with Disabilities as soon as possible at A255 Murphy Hall, (310) 825-1501, (310) 206-6083 (telephone device for the deaf). Website: www.osd.ucla.edu.

COURSE SCHEDULE (*TENTATIVE*)

Week 1

3/29 & 3/30: **General course overview (Rissman/Evans/Kang)**

- What are some of the biases that individuals have and what might neuroscience have to offer?

Week 2

4/5: **The mammalian brain – structure and functions (Evans)**

- Comparative vertebrate neurobiology, specialization of brain function, motivational/sensory/planning systems, overview of structures involved and how different species have accentuated different aspects

4/7: **Brain circuitry involved in reward (Evans)**

- Creating subsequent bias, place preference, prairie voles, etc.

Week 3

4/12: **Goal-directed and habit learning (Evans)**

- How the brain after repetitive learning goes to habit mode; relevance to addiction

4/14: **The development of biases (Galván)**

- The adolescent brain, impulsivity, peer-influences, and the interplay between frontal lobe and striatal circuits

Week 4

4/19: **Biases in perceptual processing (Rissman)**

- How the brain actively constructs subjective interpretations of the objective sensory world that are biased by heuristics, assumptions, past experiences, and context

4/21: **Biases in memory formation and retrieval (Rissman)**

- How our memories for past events are often grossly inaccurate and biased by a host of factors; understanding implicit memory and priming effects

Week 5

4/26: **Midterm Exam**

4/28: **Neural mechanisms of fear/aversion learning (Rissman)**

- How the brain develops aversive reactions to certain stimuli and/or environmental; emotional memories; PTSD; the role of reconsolidation

Week 6

5/3: **Behavioral and neural correlates of racial bias (Rissman)**

- The implicit associations test (IAT); neuroimaging studies of racial bias

5/5: **Biases in judgment and decision-making (Rissman)**

- How the mind adopts mental shortcuts (heuristics) that can often lead to irrational choices, preferences, and behaviors

Week 7

5/10: **Emotionally biased decision-making, morality, and altruism (Izquierdo)**

- Neural correlates of fairness, cooperation, punishment aversion, and retribution-seeking behavior in humans and nonhumans

5/12: **Intersection of Science and Society in the Study of Sex Differences: Equity or Equality? (Arnold)**

- Biological factors that make males and females different, and the biases that these create

Weeks 8-10

Student Presentations (NOTE: content from these presentations will be included in the final exam)

READING LIST (*TENTATIVE*)

Pezzella, F. S., & Fetzer, M. D. (2015). The Likelihood of Injury Among Bias Crimes: An Analysis of General and Specific Bias Types. *Journal of Interpersonal Violence*. 1-27.

Arias-Carrión, O., Stamelou, M., Murillo-Rodríguez, E., Menéndez-González, M., & Pöppel, E. (2010). Dopaminergic reward system: a short integrative review. *International Archives of Medicine*, *3*, 24.

Gasbarri, A., Pompili, A., Packard, M. G., & Tomaz, C. (2014). Habit learning and memory in mammals: behavioral and neural characteristics. *Neurobiology of Learning and Memory*, *114*, 198–208.

Morein-Zamir, S., & Robbins, T. W. (2015). Fronto-striatal circuits in response-inhibition: Relevance to addiction. *Brain Research*, *1628*(Pt A), 117–129.

Davidson, L. L., Grigorenko, E. L., Boivin, M. J., Rapa, E., & Stein, A. (2015). A focus on adolescence to reduce neurological, mental health and substance-use disability. *Nature*, *527*(7578), S161–6.

Galván, A. (2014). Insights about adolescent behavior, plasticity, and policy from neuroscience research. *Neuron*, *83*(2), 262–265.

Summerfield, C., & de Lange, F. P. (2014). Expectation in perceptual decision making: neural and computational mechanisms. *Nature Reviews Neuroscience*, *15*(11), 745–756.

Schacter, D. L., Guerin, S. A., & St Jacques, P. L. (2011). Memory distortion: an adaptive perspective. *Trends Cogn Sci*, *15*(10), 467–474.

Wimmer, G. E., & Shohamy, D. (2012). Preference by association: how memory mechanisms in the hippocampus bias decisions. *Science*, *338*(6104), 270-273.

Trapp, S., Shenhav, A., Bitzer, S., & Bar, M. (2015). Human preferences are biased towards associative information. *Cognition & Emotion*, *29*(6), 1054–1068.

Maren, S., Phan, K. L., & Liberzon, I. (2013). The contextual brain: implications for fear conditioning, extinction and psychopathology. *Nature Reviews Neuroscience*, *14*(6), 417–428.

Dunsmoor, J. E., & Paz, R. (2015). Fear Generalization and Anxiety: Behavioral and Neural Mechanisms. *Biological Psychiatry*, *78*(5), 336–343.

Kubota, J. T., Banaji, M. R., & Phelps, E. A. (2012). The neuroscience of race. *Nature Neuroscience*, *15*(7), 940–948.

Chekroud, A. M., Everett, J. A. C., Bridge, H., & Hewstone, M. (2014). A review of neuroimaging studies of race-related prejudice: does amygdala response reflect threat? *Frontiers in Human Neuroscience*, *8*, 179.

Enge, L. R., Lupo, A. K., & Zárate, M. A. (2015). Neurocognitive Mechanisms of Prejudice Formation: The Role of Time-Dependent Memory Consolidation. *Psychological Science*, *26*(7), 964–971.

Hu, X., Antony, J. W., Creery, J. D., Vargas, I. M., Bodenhausen, G. V., & Paller, K. A. (2015). Unlearning implicit social biases during sleep. *Science*, *348*(6238), 1013–1015.

Orsini, C. A., Moorman, D. E., Young, J. W., Setlow, B., & Floresco, S. B. (2015). Neural mechanisms regulating different forms of risk-related decision-making: Insights from animal models. *Neuroscience and Biobehavioral Reviews*, *58*, 147–167.

Pessiglione, M., & Delgado, M. R. (2015). The good, the bad and the brain: neural correlates of appetitive and aversive values underlying decision making. *Current Opinion in Behavioral Sciences*, *5*, 78–84.

Kahneman, D. (2003). A perspective on judgment and choice: mapping bounded rationality. *The American Psychologist*, *58*(9), 697–720.

Edelson, M. G., Dudai, Y., Dolan, R. J., & Sharot, T. (2014). Brain substrates of recovery from misleading influence. *The Journal of Neuroscience*, *34*(23), 7744–7753.

Haroush, K., & Williams, Z. M. (2015). Neuronal prediction of opponent's behavior during cooperative social interchange in primates. *Cell*, *160*(6), 1233–1245.