

PSYC 385

Mind Reading: Understanding Functional Magnetic Resonance Imaging

Spring 2018

Instructor	Darcy Burgund Office: 330 Olin-Rice Science Center Phone: 651-696-6022 Email: dburgund@macalester.edu Office hours: Wednesday, 2:30 – 4:00 pm, or by appointment
Class	370 Olin-Rice Science Center; Tuesday and Thursday, 1:20 – 2:50 pm
Readings	A mix of book chapters, literature reviews, blogs, popular press articles, and empirical works from neuroscience, cognitive science, and psychology journals. All readings are available on the course Moodle site.

Course Description

Functional magnetic resonance imaging (fMRI) is a non-invasive technique used to provide indirect measures of neural activity in healthy (and unhealthy) humans. Although the technique has been readily available to researchers for about 20 years, its popularity and use has grown tremendously in the last 10, and we now see it influencing aspects of culture and society not traditionally based in biomedical research (e.g., law, politics, economics). This course will cover the mechanics of fMRI, evaluate its strengths and weaknesses, and explore recent applications that have received wide and sometimes controversial coverage. By the end of the course, students will understand essential components of the fMRI technique and be informed consumers of primary and secondary source reports involving brain imaging.

Grading

Grades will be derived from scores on (1) participation in class discussions; (2) commentaries; (3) quizzes; (4) a presentation; and (5) a research paper. An overview of each assessment is provided below; further detail about each will be given in class.

Participation in class discussions (10%)

This course will be conducted as a seminar in which we spend time during class discussing the topic/assigned reading for that day. As such, your attendance in class is essential and your participation in discussions is expected. Please bring your own (printed or electronic) copy of the assigned reading to class each day.

Commentaries (30%)

Students will write a 2-page maximum commentary (double spaced, 12-point font, 1-inch margins) on the reading assigned for each class. The 2-page maximum will be strictly enforced in that the instructor will not read beyond the second page. The first page of the commentary should be devoted to describing the main points of the reading; the second page should be devoted to evaluating the reading. Effective evaluations will relate the reading's topic to another topic, such as one we have discussed in class, a paper referenced in the reading, a news event, popular press article, or some personal experience, and will exhibit thoughtful consideration and clear exposition. Commentaries are due via email by midnight the night before class. Commentaries turned in after that time will be penalized 5% (e.g., 85% becomes 80%) for each 12-hour period they are overdue.

Quizzes (25%)

Unannounced quizzes will be given at the beginning of class at random throughout the semester. Quizzes will be brief, short-answer assessments of your understanding of the present and/or the previous day's topic. They are not intended to be particularly challenging; they are provided as impetus for you to keep

on top of the readings and discussions. Make-up quizzes will not be given; however, your lowest quiz score will be excluded from the calculation of your final score.

Presentation (5%)

During the last several weeks of the semester, each student will give an approximately 25-minute presentation to the class, including time for discussion, in which they describe the contents of their research paper (described below).

Research paper (30%)

Over the course of the semester, students will write a paper describing a hypothetical fMRI study that they motivate, design, and draw conclusions from. The paper will be completed in intermediate steps listed in the schedule below, and will be evaluated using the “Contract for B” method¹. The Contract for B method works like this:

I will provide you with lots of feedback on the intermediate steps leading-up to your complete paper, both in written comments and during scheduled feedback meetings (see schedule below), but I will not grade these steps. The only assignment I will grade is the complete research paper, and students who have fulfilled the requirements listed below are guaranteed to receive at least a B (84%) as their grade on the paper, regardless of the paper’s quality.

Contract for B requirements

- (1) Complete each step and the paper by its due date.
- (2) Follow the guidelines for each step and the complete paper with obvious care and effort, including using the correct format and proofreading/spellchecking your work.
- (3) Attend all feedback meetings ready to talk about your paper and take notes on how to improve it.
- (4) Incorporate instructor and peer feedback into future drafts of your paper.

As stated above, students who fulfill the Contract for B requirements are guaranteed to receive at least a B (84%) on the research paper. Students who fulfill the Contract requirements may receive scores higher than B depending on the quality of their paper. Excellent papers exhibit deep insight to the issue(s) at hand, fully explain all ideas in a clear and convincing manner, and are interesting and pleasurable to read. Excellent papers will receive scores between A+ (100%) and A (96%). Very good papers exhibit some insight to the issue(s) at hand and fully explain all ideas in a clear and convincing manner. Very good papers will receive scores of A- (92%). Good papers exhibit some insight to the issue(s) at hand and mostly explain all ideas in a clear and convincing manner. Good papers will receive scores of B+ (88%). All other papers will receive scores of B (84%), in accordance with the Contract.

Students who do not fulfill the Contract for B requirements will not receive scores higher than B on the paper, and the particular score they receive will depend on their paper’s quality. Excellent papers will receive scores between B (84%) and B- (80%); very good papers will receive scores of C+ (77%); and good papers will receive scores of C (74%). Papers that do not exhibit insight to the issue(s) at hand or explain ideas in a clear and convincing manner will receive scores of C- (70%) or below.

Even though I will not grade your paper until you turn in the complete version, I will give you frequent feedback regarding where you stand in terms of the Contract for B. That is, you will know whether you are meeting the Contract requirements, exceeding the Contract requirements, barely meeting the requirements, and thus, in danger of breaking the Contract, or off the Contract. I will also grant one “forgiveness” for a minor lapse in the Contract requirements. However, multiple lapses in Contract requirements will break the Contract and leave you exposed to grades lower than B on the paper portion of the course.

¹ Hafer, G. R. (2014). *Embracing writing: Ways to teach reluctant writers in any college course*. San Francisco, CA: Jossey-Bass.

Course Policies

Assignments

Except for commentaries which are due at midnight (see above), assignments are due via email by the beginning of class on the day they are due. Turning in assignments on time is a Contract for B requirement.

Academic integrity

Academic integrity is a serious issue, and Macalester College has established guidelines for defining and reporting cases of cheating and plagiarism. These guidelines are stated in the Student Handbook (www.macalester.edu/internal/studentaffairs/studenthandbook/03academicpolicies/03-05academicintegrity.html), and all students are expected to follow them. Cases of suspected academic dishonesty will be reported to the Director of Academic Programs immediately.

Accommodations

I am committed to ensuring access to course content for all students and reasonable accommodations will be made for students with documented disabilities. If you have a disability that will impact your work in this class, please contact Disability Services (www.macalester.edu/studentaffairs/disabilityservices/accommodations/; disabilityservices@macalester.edu; 651-696-6874) to discuss your needs. The office will contact me, and we will work together to arrange the appropriate accommodations.

Incompletes

Macalester College strongly discourages assignment of incomplete grades, and no incompletes will be given except under dire circumstances and after consultation with the Director of Academic Programs.

Course Schedule, Readings, and Assignments

1/18/18	Introduction		
1/23/18	Overview of fMRI	Huettel et al. (2014) [Chapter 1, pages 1-16]	
1/25/18	BOLD signal Idea workshop	Huettel et al. (2014) [Chapter 7, pages 223-225; 238-240; 243-250; 255-264]	Annotated references
1/30/18	Experimental design	Huettel et al. (2014) [Chapter 8, Box 8.1; Chapter 9]	
2/1/18	Statistical analysis Outline workshop	Huettel et al. (2014) [Chapter 10, pages 363-374; 388-400; 404-408] Bennett et al. (2009, 2010) Neuroskeptic (2016)	Introduction outline
2/6/18	Reverse inference I: Politics and iPhones	Poldrack (2006) Iacoboni et al. (2007) Aron et al. (2007) Iacoboni (2008) Poldrack (2008) Lindstrom (2011) Poldrack et al. (2011a, 2011b)	
2/8/18	Reverse inference II: Ultimate mind reading	Poldrack (2011) Norman et al. (2006)	Introduction draft

2/13/18	Reverse inference III: Brain in pain	Lieberman and Eisenberger (2015) Wager et al. (2016)	
2/15/18	Feedback meetings		
2/20/18	Lie detection	Farah et al. (2014) Yang et al. (2014)	
2/22/18	Human Connectome Project Method workshop	Glasser et al. (2016)	Method outline
2/27/18	My connectome	Cima (2015) Poldrack et al. (2015)	
3/1/18	Other connectomes	Gordon et al. (2017)	Introduction and Method draft
3/6/18	Neuroprediction	Poldrack et al. (in press)	
3/8/18	Feedback meetings		
3/10/18 – 3/18/18	<i>Spring break</i>		
3/20/18	Psychopathy	Philippi et al. (2015)	
3/22/18	Suicide Results and Discussion workshop	Just et al. (2017) Horwitz (2017)	Results and Discussion outline
3/27/18	Vegetative states	Owen et al. (2006) Nachev and Husain (2007) Monti et al. (2010) Cyranoski (2012) Naci et al. (2014) Owen (2017)	
3/29/18	CMRR visit I		Introduction, Method, Results, Discussion draft
4/3/18	CMRR visit II		
4/5/18	Future of fMRI	Poldrack et al. (2017)	
4/10/18	Feedback meetings		
4/12/18 – 4/24/18	Student presentations		
4/26/18	Student presentations		Complete research paper

Complete References

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