Eye Movements and Perception
PSYC 768: Advanced Topics in Cognitive Science

Last updated 8/1/2016

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Office Hours: Wed. 11-11:50

Time: 1:30 – 4:10pm Thursdays

Classroom: David King ArchLab Conference Room (2073a)

Recommended (not required!!) **Text**: Oxford Handbook of Eyemovements (2011) Eds: Liversedge, Gilchrist, & Everling; ISBN 13: 9780199539789

Prerequisites: Psychology 530, 701, or consent of instructor.

Objectives: In this course we will be exploring the neural and cognitive circuits that produce eye movements, as well as well as the use of eye tracking in applied applications. Topics will include

- Neurological development
- Scene perception
- Memory and Eye movements
- Saccade targeting
- Human Factors
- Transportation
- Usability

This course will be taught in a combined lecture and seminar format -- the classes will be largely discussion, with two (or more students) leading a discussion of one of the papers each week. At times, I will lead the discussion or lecture on background topics (e.g. explaining steady-state visual evoked potentials, fMRI, or neuroanatomy). I expect everyone (especially the discussion leaders!) to read the assigned articles before class.

Official Communications via GMU E-mail: Mason uses electronic mail to provide official information to students. Examples include communications from course instructors, notices form the library, notices about academic standing, financial aid information, class materials, assignments, questions, and instructor feedback. Students are responsible for the content of university communication sent to their mason e-mail account, and are required to activate that account and check it regularly. I will communicate only through GMU email accounts.

Attendance Policy: Although I do not grade on attendance, this is a graduate level course and I expect (barring unforeseen circumstances) to see you in class each week. Having said that, I do understand that there are occasionally situations that take precedent over this class (conference presentations, job interviews, illness).

Cancellation Policy: This course follows GMU cancellation policy for inclement weather, and GMU will send an alert to your GMU email account and/or cell phone if any of their facilities are closing for inclement weather. If *I* need to cancel a class meeting, I will email the class about the cancellation.

GMU Honor Code: George Mason University has a code of Honor that each of you accept by enrolling as a student. My expectation is that all of the work you do for me in this class will be the work of one individual. Having said that, I fully encourage you to discuss the readings and topics raised in this class with your fellow students.

Disabilities: If you are a student with a disability and you need academic accommodations, please see me and contact the Disability Resource Center (DRC) at 703-993-2474. All academic accommodations must be arranged through that office."

Exam Make-up Policy: You may take a test after (or before) the scheduled date only if you (a) receive my permission before the day of the test, or (b) have a valid excuse (note from a doctor, judge, sergeant, etc.). Papers will not be accepted beyond the due date. Homework assignments will not be accepted late.

A+	97+			
A	93-96	**Grading**		0
A-	90-92	Discussion Lead	(x1)	30
B+	87-89	Participation		20
B	83-86	Final Presentation		30
B-	80-82	Summaries (2)		20
C	70-79			100 points total
F	0-69			

Discussion Lead and Commentary (30%): 30% of the grade will be based on preparing, leading, presenting, and participating in class discussions. Most classes will follow a format in which the instructor will present information and conduct activities to demonstrate principles and techniques. The remainder of the class will consist of discussing the reading materials, providing feedback on the applicability and value of the techniques and concepts presented in the readings, and developing ideas that can be applied to eye movement research. All students are expected to read the assigned materials before class, and participate in the class discussion. If you miss the class, or fail to read the assigned materials, your class discussion grade will be adjusted accordingly.

To facilitate class discussion, <u>non-presenting students</u> will be responsible for posting, at least 24 hours prior to the date and time of the assigned discussion, a question or comment about the assignment that would be an interesting point for discussion. The presenters, of course, do not have to address each of the questions or comments, but the information from non-presenters can form the basis for some of the discussion of each article. The postings will be on edublogs.com, and the url will be given out in class.

<u>Discussion leaders</u> will prepare presentations to organize the class discussion and ensure that enough time is allotted for each topic. Presentations should cover the following: *summary* of the

material, *research questions* under investigation, experimental *techniques* used, specific *variables* investigated, *eyemovement measures* used, the *analysis approach* to find meaning in the eyemovement measures, *findings* reported, *applicability* of the techniques to the research problem, *additional research questions* that can be investigated, and specific points and questions for class discussion.

Each student will need to lead **1** discussion during the semester.

Participation (20%): Part of the class time will be spent having lively discussions about the papers covered in class. If you do not participate, it *will* affect your grade.

Summaries (20%): Students are required to write a 2-page summary of a week's readings. Two summaries will be due – it is your choice of which weeks you wish to summarize.

Project Presentations (30%): Part of your grade will be based on team projects. Projects provide an opportunity to apply techniques and theories from class to real research questions. Activities include the following: identifying a research question that can be investigated using eye movement measures, conducting a literature review of the relevant research in the area, designing a study to provide answers to the question, [potentially] analyzing the results, identifying shortcomings and research opportunities, and presenting the results to the class.

To ensure that all group members contribute equally to the project, each member will submit a confidential evaluation of each team member's contribution. If there is a clear trend that an individual did not contribute equally, then the portion of the group grade for that individual will be adjusted accordingly.

Calendar:
Note: The schedule below is tentative, and though I will try to follow it as closely as possible changes may occasionally be necessary.

Note that September 6th is the last day to add this class and September 30th is the last day to drop this class.

Date	Topic	Assignment due
9/1/16	Introduction, History, + anatomy	sign-ups
9/8/16	Low-level development, eyetracking technology, advanced analysis	
9/15/16	Neural Control	
9/22/16	HFES	No Class
9/29/16	Attention & memory	
10/6/16	Scene Perception	
10/13/16	Problem Solving	
10/20/16	Usability 1	
10/27/16	Usability 2	
11/3/16	Aviation and Driving	

11/10/16	Clinical Populations & Developmental Disorders	
11/17/16	Presentations	Presentations
11/24/16	Thanksgiving	No Class
12/1/16	Presentations	Presentations
12/8/16	Presentations	Presentations
12/15/15	Presentations	Presentations

Most of these can be found through scholar.google.com
The Oxford Handbook of Eye Movements (OHEM) will be available on Blackboard.

Date	Topic	Authors	Citation	Lead	Summarizers
9/1/16	Introduction, History	Wade & Tatler	OHEM – "Origins and applications of eye movement research"	MSP	
9/8/16	Development of EM	Luna & Velanova	OHEM – "Development from Reflexive to Controlled Eye Movements"	TBA	TBA
	Advanced Eyetracking	Matt	-	TBA	
9/15/16	Neuro-targetting	Schall	OHEM – "THE NEURAL BASIS OF SACCADE TARGET SELECTION"		TBA
	PPC Eye movements	Pare & Dorris	OHEM – "The role of posterior parietal cortex in the regulation of saccadic eye movements"		
9/22/16	HFES – no class	HFES	No class		
9/29/16	Memory	Peterson & Beck	OHEM – "Eye movements and memory"		
	Covert-Overt	Kristjansson	OHEM – "The intriguing interactive relationship between visual attention and saccadic eye movements."		
10/6/16	Change Detection	Brockmole	OHEM – "Eye movements and change detection"		

	Scene Perception	Henderson	OHEM – "Eye movemens and scene perception"		
10/13/16	Problem Solving	Spivey	OHEM – "Eye movements both reveal and influence problem solving"		
	Expertise	Rheingold	OHEM – "Eye movements and visual expertise in both chess and medicine"		
10/20/16	Cued think-aloud	Eger	Eger, N., Ball, L. J., Stevens, R., & Dodd, J. (2007, September). Cueing retrospective verbal reports in usability testing through eye-movement replay. In *Proceedings of the 21st British HCI Group Annual Conference on People and Computers: HCI... but not as we know it-Volume 1* (pp. 129-137). British Computer Society.		
	How to – web usability	Pernice	http://media.nngroup.com/media/reports/free/How_to_Conduct_Eyetracking_Studies.pdf		
10/27/16	Web forms	Bojko 1	Bojko, A., & Schumacher, R. (2008). Eye tracking and usability testing in form layout evaluation. In *Proceedings of the 38th international symposium of business forms management association (BFMA) Las Vegas, NV*.		
	Heat Maps	Bojko 2	Bojko, A. A. (2009). Informative or misleading? Heatmaps deconstructed. In *Human-Computer Interaction. New Trends* (pp. 30-39). Springer Berlin Heidelberg.		
11/3/16	Aviation	van De Merwe	van de Merwe, K., van Dijk, H., & Zon, R. (2012). Eye movements as an indicator of situation awareness in a flight simulator experiment. *The International Journal of Aviation Psychology*, *22*(1), 78-95.		
	Driving	Palinko	Palinko, O., Kun, A. L., Shyrokov, A., & Heeman, P. (2010, March). Estimating cognitive load using remote eye tracking in a driving simulator. In Proceedings of the 2010 symposium on eye-tracking research & applications (pp. 141-144). ACM.		
11/10/16	Schizophrenia	Spering	Spering, M., Dias, E. C., Sanchez, J. L., Schütz, A. C., & Javitt, D. C. (2013). Efference copy failure during smooth pursuit eye movements in schizophrenia. The Journal of Neuroscience, 33(29), 11779-11787.		

	ADHD	Fried	Fried, M., Tsitsiashvili, E., Bonneh, Y. S., Sterkin, A., Wygnanski-Jaffe, T., Epstein, T., & Polat, U. (2014). ADHD subjects fail to suppress eye blinks and microsaccades while anticipating visual stimuli but recover with medication. Vision research, 101, 62-72.		
	Autism Spectrum	Annaz	Annaz, D., Campbell, R., Coleman, M., Milne, E., & Swettenham, J. (2012). Young children with autism spectrum disorder do not preferentially attend to biological motion. Journal of autism and developmental disorders, 42(3), 401-408.		