

Consciousness & Attention

Fall 2011 - PSYC G4225

W 2:10pm-4pm - 200C Schermerhorn

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Bulletin description

Prerequisite: The instructor's permission. Typically the student should have completed an introductory course in cognitive neuroscience, or otherwise be ready for a seminar at the graduate level.

Discussion of current issues in the scientific studies of consciousness, including the search for the neural correlates of visual awareness, volition, and the various kinds of impairments of consciousness and attention as described in clinical cases. Specific topics may vary from year to year; may be repeated for credit.

The rationale for giving the course

PSYC G4225 is an advanced seminar, designed particularly for undergraduates who are majoring in Psychology or in Neuroscience and Behavior, for students participating in the Post-bac Psychology Program, and for Psychology Graduate Students. Students with a background in the computational sciences and philosophy are also welcome to apply. In covering the cognitive and neural bases of consciousness and attention, the course provides an integrated perspective on topics of current interest in the fields of psychology and cognitive neuroscience. The course is intended to explore the ideas of interest in the broader context of liberal arts education, such as how contemporary philosophical ideas affect our understanding of ourselves as well as the development of science.

The seminar fulfills the following degree requirements:

- For Psychology Graduate Students, PSYC G4225 will apply toward the “two seriously graded seminars” requirement of the Master’s degree.
- For the Psychology major or concentration in the College and in G. S., for the Psychology minor in Engineering, and for the Psychology Post-bac certificate, PSYC G4225 will meet the Group I (Perception and Cognition) distribution requirement.
- For the Neuroscience and Behavior joint major, G4225 will fulfill the 5th Psychology requirement: “one advanced psychology seminar from a list approved by the Psychology Department advisor to the program.”
- For the Psychology post-bac certificate, PSYC G4225 will fulfill the 7th (advanced seminar) requirement
- For the science requirements of the College and GS, G4225 is numbered among the group of courses (3200s, 4200s, 3400s, 4400s) that are not designed for non-science majors but that do fulfill one term of the requirement. Graduate students, and students who are majoring in Psychology or in Neuroscience and Behavior, will have priority over students who wish to take the course for the science requirement, and we anticipate that it will rarely be used for that purpose.
- For the Barnard Psychology major, PSYC G4225 will fulfill the senior seminar requirement.

A full description of the content of the course

Modern theories attempt to characterize the human mind in terms of information processing. But machines that process information do not seem to *feel* anything; a computer may for instance receive inputs from a video camera, yet it would be hard to imagine that it *sees* or experiences the vividness of colors like we do. Nobody has yet provided a convincing theory as to how to explain the subjective nature of our mental lives in objective physical terms. This is called the problem of consciousness, and is generally considered to be one of the last unsolved puzzles in science. Philosophers even debate whether there could be a solution to this problem at all.

In this class we review the latest developments in the fields of cognitive neuroscience and psychophysics that are related to these important questions (though often the current research does not directly address them). We focus on the latest articles on attention, vision psychophysics, subjective perception and confidence ratings, etc.

A crucial aspect of this seminar is to help students develop their ability to critically read and evaluate the latest published research in this field.

Description of Course Requirements

In this graduate level seminar, we will discuss two journal articles per week. The articles will be selected from the recent literature on consciousness and attention, focusing mostly on cognitive neuroscience and vision psychophysics. Because we will try to discuss the most up-to-date papers, the articles for each upcoming (Wednesday) class will be announced on the Friday before. The students will have to decide which of the two papers is stronger and explain their choices in two short essays on why the weaker paper is weak (<500 words) and why the stronger paper is strong (<200 words). These should be sent to the instructor by email (to hakwan@gmail.com) by Tuesday midnight, i.e. at least 14 hours before class. Late assignments will be penalized; 2 weeks worth of late assignments will result in one half-grade lowering (e.g. A- becomes B+) of your overall final grade. Essays that are not sent before class will be counted as missing. One missing assignment is equivalent to 3 late assignments.

Preferably, the essays should be contained inside the body of the email instead of sent as attachments. This will also help you avoid “forgotten attachments,” which is not an acceptable excuse.

For the critical essay on the “weaker” paper, students should focus on the methodological flaws of the study / argument. The strongest arguments are those that don’t just focus on minor imperfections, but highlight how the methodological choices could have critically undermined the plausibility of the conclusions. One can also comment on problems in the interpretation of the data, such as failures to consider alternative explanations or failures to relate the results to other key theoretical issues. Less important but also valid points include those that note what is being shown or tested is already known / trivial, or that a cheaper (e.g. less labor intensive) method exists to allow an equivalent experiment to be done. Points that will not help much in achieving a high grade include subjective/personal statements about how the paper is not interesting (e.g. “I find this uninteresting because it does not touch on X which is what I really care about.”) or complaints that the authors did not spend extra resources to go beyond the scope of the experiment (e.g. “I’m disappointed that they did not also try to use fMRI and do these studies on XX patients.”). A paper is mainly to be judged on whether its conclusions are justified and on whether it brings anything new and informative to the literature. Researchers’ resources are often limited, and it is unfair to demand them to do everything *you* would have liked them to do.

For the commentary on the “stronger” paper, students should explain why they think the paper is interesting, for instance by pointing out something innovative in the experimental design or how the results open up new and exciting possibilities for future research.

One also need to write 2 term papers (<2000 words in total for both papers, i.e. one can write a longer one and and shorter one), which are to be commentaries on some guest lectures given by researchers mostly based in NYC, that are to be delivered on the weekend of the 19th and 20th of November. Attendance to these is not compulsory, and some of the talks will be videoed and put online.

In general, word limits are hard upper limits. You do not have to reach them and certainly should never go beyond them (assignments over the word limits will be penalized in the same way as late assignments). If you can make good points by only using a fraction of the space allowed, all the better. Concision is always a good quality, second only to clarity (i.e. ease of comprehension) and critical thinking (i.e. tight, solid reasoning).

In all assignments, you should list the word count.

There is no final exam.

The weekly essays count for 60% of the final grade. The 2 term papers together count for 30%. The remaining 10% is for class discussions & attendance. Attendance to the guest lectures on the 19th and 20th is not compulsory, but good, meaningful participation can earn you a bonus of up to 10%.

Readings

As explained above, the weekly readings (2 articles) will be announced by email a few days before class. An example list for a certain week would be:

- Suchow JW, Alvarez GA. Motion Silences Awareness of Visual Change. Curr Biol. 2011 Jan 5. 21, 1-4

- Stephanie McMains, Sabine Kastner. Interactions of Top-Down and Bottom-Up Mechanisms in Human Visual Cortex. Journal of Neuroscience January 12, 2011, 31(2):587-597

Often, the students may have to look for background materials and relevant studies to properly evaluate the two assigned papers. One should be aware that this is a 4-credit graduate level course and should dedicate an appropriate level of time and effort in preparing for class.

Some background readings are important, and students should finish them by the 3rd week of class the latest:

- David Heeger's notes on signal detection theory.
<http://www.cns.nyu.edu/~david/handouts/sdt/sdt.html>

*** *Absolutely essential*

- Galvin SJ, Podd JV, Drga V, Whitmore J. Type 2 tasks in the theory of signal detectability:

discrimination between correct and incorrect decisions. Psychon Bull Rev. 2003 Dec;10(4):843-76.

*** *can skip the mathematical details*

- Reynolds JH, Heeger DJ. The normalization model of attention. Neuron. 2009 Jan 29;61(2):168-85. Review.

- Carrasco M. Visual attention: The past 25 years. Vision Res. 2011 Jul 1;51(13):1484-525.

- Lau H, Rosenthal D. Empirical support for higher-order theories of conscious awareness. Trends Cogn Sci. 2011 Aug;15(8):365-73.