

University of Waterloo, Fall 2009

Psychology 461

Honours Seminar in Behavioural Neuroscience

Location: HH 334

Time: Friday 9:30-12:20

Instructor: Professor Mike Dixon office: PAS 4035

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Course Content

This course involves advanced investigations of some of the higher order processes involved in cognition. The first part of the course will look in detail at how we can use cognitive models that have been developed to understand healthy adults in order to learn about the processes that have gone awry in brain damaged individuals. In particular we will be studying how brain damage can affect the processes that contribute to the agnosias: (abnormalities in identifying colours, digits, faces and objects). We will also look in detail at how these paradigms can help us better understand the nature of people with synaesthesia, a very unusual form of perception. A theme running throughout this course involves how meaning can influence perception.

The latter part of the course will deal with a wide range of cognitive neuroscience topics. Students will be asked to select a specific topic, write a brief paper (15 pages-double spaced) and give a 1/2 half hour presentation on this topic. Topics to be covered can include: blindsight, covert face-recognition, hyperpriming in Alzheimer's disease, aprosody, amusia, surface dyslexia, deep dyslexia, pure alexia, neglect, lateralization of a specific cognitive function, the role of emotion on thinking, multisensory processing, phantom limb, alien limb syndrome, or the role of caricatures in face recognition.

Course Requirements and Evaluation

The primary responsibility of the student in this course is to learn and understand the material covered both in the lectures and in the readings. Therefore, it is essential that students attend classes and read all the assigned material.

Lectures: It is important to note that the lectures will include materials that are not presented in the required readings. Also I will often be making use of powerpoint to illustrate certain object recognition paradigms that are much easier to understand when seen during lectures than when read about at home.

Readings: Students in this course will be expected to have understood the material covered in any given reading, even if each and every topic in it was not explicitly discussed in the class lectures.

Required Readings, All of the required readings for each week will be downloadable from UW-ACE.

Essay, Presentation and Take Home Assignment

For the successful completion of this course, a student must write one brief paper (15 pages double spaced, with one inch margins all around - not including figures and references). Students will also be required to give an oral (approximately 1/2 hr) presentation to the class, summarizing their selected research topic. The length of the presentation will depend on enrolment. The contributions of these components to your final grade are:

65% Paper
20% Presentation
5% Participation
10% Assignment

The assignment will involve calculating ALCOVE equations - these are designed to demonstrate how the notion of similarity can account for visual confusions and object confusions in memory.

WORKING SCHEDULE OF TOPICS AND READINGS

Sep 18th: Overview of the Course.

Secrets of the mind – Web Video

Sep 25th: Colour Agnosia and the Continuum of Automaticity

Dunbar, K., & MacLeod, C.M. (1984). A horse race of a different color: Stroop interference patterns with transformed words. *Journal of Experimental Psychology: Human Perception and Performance*, 10, 622-635.

MacLeod, C.M. & Dunbar, K. (1988). Training and Stroop-like interference: evidence for a continuum of automaticity. *Journal of Experimental Psychology: Learning, Memory and Cognition*, 14, 126-135.

Wingfield, A., Goodglass, H. & Lindfield, K.C. (1997). Separating Speed from automaticity in a patient with focal brain atrophy. *Psychological Science*, 8, 247-249.

Oct 2nd: Grapheme Colour Synaesthesia

Dixon, M.J., Smilek, D., Cudahy, C., & Merikle P. (2000). Five plus two equals yellow. *Nature*, 406, 365.

Smilek, D., Dixon, M. J., Cudahy, C., & Merikle, P. M. (2001). Synaesthetic photisms influence visual perception. *Journal of Cognitive Neuroscience*, *13*, 930-936.

Rouw, R. & Scholte, S.H. (2007). Increased structural connectivity in grapheme-colour synaesthesia. *Nature Neuroscience*, *10*, 792-797.

Dixon, M.J., Smilek, D., & Merikle, P. (2004). Not all synaesthetes are created equal. Projector versus Associator synaesthetes. *Cognitive, Affective, and Behavioral Neuroscience*, *4*(3), 335-343.

Supplementary reading: (Not required, but interesting)!

Ramachandran, V.S. & Hubbard, E.M. (2001)., Synaesthesia— A window into perception, thought and language. *Journal of Consciousness Studies*, *8*, 3–34.

Smilek, D., Dixon, M.J., Cudahy, C., & Merikle, P.M. (2002). Synaesthetic color experiences influence memory. *Psychological Science*, *13*, 548-552.

Palmeri, T. J., Blake, R., Marois, R., Flanery, M.A. & Whetsell, W. (2002). The perceptual reality of synesthetic colors. *Proceedings of the National Academy of Science*, *99* (6), 4127–4131.

Oct 9th, Time-Space and Number-Form Synaesthesia

Smilek, D., Callejas, A, Dixon, M.J., Merikle, P.M (2007). Ovals of time: Time-space associations in synaesthesia. *Consciousness and Cognition*, *16*(2), 507-519.

Jarick, M., Dixon, M.J., Maxwell E.C., Nicholls, M.E.R. & Smilek, D. (2009)._The ups, and downs (and lefts and rights) of synaesthetic number forms: Validation from spatial cueing and SNARC-type tasks. *Cortex*, *45*,_1190-1199.

Jarick, M., Dixon, M.J., Stewart, M.T., Maxwell, E.C., & Smilek, D. (2009). A different outlook on time: Visual and auditory month names elicit different mental vantage points for a time-space synaesthete. *Cortex*, *45*,_1217-1228

Oct 16th Disorders of Body Schema

Ramachandran, V.S. (1995). Anosognosia in parietal lobe syndrome. *Consciousness and Cognition*, *4*, 22-5.

Reading Armel, K.C., and Ramachandran, V. S. (2003). Projecting sensations to external objects: Evidence from skin conductance response. *Proceedings of the Royal Society, B: Biological Sciences*, *270*, 1499-1506.

Oct 23rd: Introduction to Categorization (two classics)

Rosch, E., Mervis, C.B., Gray, W.D., Johnson, D.M., Boyes-Braem, P. (1976). Basic Objects in Natural Categories. *Cognitive Psychology*, *8*, 382-439.

Kruschke, J.K. (1992). ALCOVE: an exemplar-based connectionist model of category learning, *Psychological Review*, 99, 22-44.

Oct 30th: Category-specific Object Identification Deficits

TAKE HOME ALCOVE ASSIGNMENT To be returned Oct 30th

Dixon, M., Bub, D.N., Arguin, M. (1997). The interaction of object form and object meaning in the identification performance of a patient with category -specific visual agnosia. *Cognitive Neuropsychology*, 14, 1085-1130.

Dixon, M., Chertkow, H. Bub, D.N., Arguin, M. (1999). Object Recognition Deficits in Alzheimer's Disease: Combined Effects of Semantic and Visual Proximity. *Journal of the International Neuropsychological Society*, 5, 330-345

Schweizer, T., Dixon, M.J. (2006). The influence of visual and nonvisual attributes in visual object identification. *Journal of the International Neuropsychological Society*, 12, 176-183.

Nov 6: Can meaning influence perception?

Dixon, M.J., Desmarais, G., Gojmerac, C., Schweizer, T.A., Bub, D.N. (2002). The role of premorbid expertise on object identification in category-specific visual agnosia. *Cognitive Neuropsychology*, 19, 401-420.

Gauthier, I., James, T.W, Curby, K., Tarr, M.J. (2003). The influence of conceptual knowledge on visual discrimination. *Cognitive Neuropsychology*, 20, 507-523.

Schyns, P.G. (1998) Diagnostic recognition: task constraints, object information, and their interactions. *Cognition*, 67, 147-179

Nov 13: Prosopagnosia, Expertise, and Caricatures

Dixon, M., Bub, D.N., Arguin, M. (1998). Semantic and visual determinants of face recognition in a prosopagnosia patient. *Journal of Cognitive Neuroscience*, 10, 362-376.

Moscovitch, M., Winocur, G., Behrmann, M. (1997). What is special about face recognition? Nineteen experiments on a person with visual object agnosia and dyslexia but normal face recognition. *Journal of Cognitive Neuroscience*, 9, 555-604.

Rhodes, G., Carey, S., Byatt, G., Proffitt, F. (1998). Coding spatial variations in faces and simple shapes: a test of two models, *Vision Research*, 38, 2307-2321.

Nov 20, 27th, December 4th, Student Presentations.

DEADLINE: Papers are due December 15th

Academic Integrity: In order to maintain a culture of academic integrity, members of the University of Waterloo are expected to promote honesty, trust, fairness, respect and responsibility.

Discipline: A student is expected to know what constitutes academic integrity, to avoid committing academic offences, and to take responsibility for his/her actions. A student who is unsure whether an action constitutes an offence, or who needs help in learning how to avoid offences (e.g., plagiarism, cheating) or about “rules” for group work/collaboration should seek guidance from the course professor, academic advisor, or the Undergraduate Associate Dean. When misconduct has been found to have occurred, disciplinary penalties will be imposed under Policy 71 – Student Discipline. For information on categories of offenses and types of penalties, students should refer to Policy 71 - Student Discipline, <http://www.adm.uwaterloo.ca/infosec/Policies/policy71.htm>

Grievance: A student who believes that a decision affecting some aspect of his/her university life has been unfair or unreasonable may have grounds for initiating a grievance. Read Policy 70 - Student Petitions and Grievances, Section 4, <http://www.adm.uwaterloo.ca/infosec/Policies/policy70.htm>

Appeals: A student may appeal the finding and/or penalty in a decision made under Policy 70 - Student Petitions and Grievances (other than regarding a petition) or Policy 71 - Student Discipline if a ground for an appeal can be established. Read Policy 72 - Student Appeals, <http://www.adm.uwaterloo.ca/infosec/Policies/policy72.htm>

Academic Integrity website (Arts):

http://arts.uwaterloo.ca/arts/ugrad/academic_responsibility.html

Academic Integrity Office (UW): <http://uwaterloo.ca/academicintegrity/>

Accommodation for Students with Disabilities:

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.

Students who are requesting accommodation for course requirements (assignments, midterm tests, final exams, etc.) due to illness should do the following:

- seek medical treatment as soon as possible and obtain a completed UW Verification of Illness Form: http://www.healthservices.uwaterloo.ca/Health_Services/verification.html
<http://www.healthservices.uwaterloo.ca/Health_Services/verification.html>
- submit that form to the instructor within 48 hours.
- (preferably) inform the instructor by the due date for the course requirement that you will be unable to meet the deadline and that documentation will be forthcoming.

In the case of a missed final exam, the instructor and student will negotiate an extension for the final exam which will typically be written as soon as possible, but no later than the next offering of the course.

In the case of a missed assignment deadline or midterm test, the instructor will either

- a) waive the course component and re-weight remaining term work as he/she deems fit according to circumstances and the goals of the course, or
- b) provide an extension.

In the case of bereavement, the instructor will provide similar accommodations to those for illness. Appropriate documentation to support the request will be required.

Students who are experiencing extenuating circumstances should also inform their academic advisors regarding their personal difficulties.