

University of Waterloo, Fall, 2004

Psychology 461

Introduction to Cognitive Neuroscience

Location: PAS 4288

Time: Friday 9:30-12:30

Instructor: Professor Mike Dixon office: PAS 4039

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course home page: <http://watarts.uwaterloo.ca/~mjdixon/psych461/index.html>

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 a number of paradigms that have been developed by cognitive psychologists to understand healthy adults. Rather than focusing on healthy adults, in this course students will learn how these paradigms have been used to understand the processes that have gone awry in brain damaged individuals. In particular we will be studying how these cognitive paradigms can inform us about people with various forms of agnosias: (abnormalities in identifying colours, 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.

The last 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 presentation on this topic. Topics to be covered can include: blindsight, covert face-recognition, hyperpriming in Alzheimer's disease, aprosody, 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.

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 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. The required readings for each week will either be sent via email (for .pdf files) or will be located in a box (labeled psych 461) in the department of psychology's photocopy room PAS 4028. Readings can be photocopied, but must not be taken from the photocopy room.

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 exact length of the presentation will depend on enrolment. Topics must be approved with me beforehand. 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 translate to object confusions in memory.

WORKING SCHEDULE OF TOPICS AND READINGS

September 17th: Overview of the Course – No readings, the film “Secrets of the Mind” will be shown.

September 24th: Colour Agnosia and the Continuum of Automaticity

Readings: in PAS 4028

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 1: Synaesthesia

Readings:

Dixon, M.J., Smilek, D., Wagar, B.M., & Merikle, P.M. (2004). Grapheme-Colour Synaesthesia: When 7 is Yellow and D is Blue. In Gemma A. Calvert, Charles Spence, and Barry E. Stein (eds.), *Handbook of Multisensory Processes*. (pp. 837-849). MIT Press. Cambridge, Mass.

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.

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

Supplementary reading: (Not required, but very interesting)!

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

October 8th: Introduction to Categorization (Classic Papers)

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.

October 15th : Category-specific Object Identification Deficits

Martin A, Ungerleider L.G, Haxby J.V. (2000). Category-specificity and the brain: the sensory motor model of semantic representations of objects. In Gazzaniga MS (Ed.) *The New Cognitive Neurosciences*, (2nd Edition) Cambridge, MA: MIT Press, pp. 1023-1036.

Cree, G. S. (2002). Review of theories designed to account for category-specific deficits. In Exploring the factors underlying the structure and computation of the meaning of concrete noun: Constraints imposed by Category-Specific Semantic Deficits. Doctoral Dissertation, University of Western Ontario.

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.

October 22th: Category-specific Object Identification Deficits and Continued...

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

Dixon et al., (2002). The role of premorbid expertise on the object identification performance of a patient with category-specific agnosia. *Cognitive Neuropsychology*, 401-420.

TAKE HOME ALCOVE ASSIGNMENT To be returned October 22nd.

October 29th: Prosopagnosia

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.

November 5th (no lecture)

November 12th: Anosognosia and how meaning can influence perception.

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

Smilek, D., Dixon, M.J., & Merikle, P.M. (2004, under review). Title: Revisiting the category effect: The influence of meaning and search strategy on the efficiency of visual search, Cognitive Brain Research.

November, 19th, 26th, Dec 3, Student Presentations.

DEADLINE: Papers are due Friday December 10th.

Note: this schedule is to be used as a guideline only. If certain topics take longer than anticipated, then the section on prosopagnosia will be dropped, or depending on enrolment, one of the student presentation days will be dropped.

Miscellaneous

“Note on avoidance of academic offences: All students registered in the courses of the Faculty of Arts are expected to know what constitutes an academic offence, to avoid committing academic offences, and to take responsibility for their academic actions. When the commission of an offence is established, disciplinary penalties will be imposed in accord with Policy #71 (Student Academic Discipline). For information on categories of offences and types of penalties, students are directed to consult the summary of Policy #71 which is supplied in the Undergraduate Calendar (section 1; on the Web at http://www.adm.uwaterloo.ca/infoucal/UW/policy_71.html). If you need help in learning how to avoid offences such as plagiarism, cheating, and double submission, or if you need clarification of aspects of the discipline policy, ask your course instructor for guidance. Other resources regarding the discipline policy are your academic advisor and the Undergraduate Associate Dean.”

How to Avoid Plagiarism and Other Written Offences: A Guide for Students and Instructors” see the following link (<http://watarts.uwaterloo.ca/~sager/plagiarism.html>).