

# THE ARTS AND THE BRAIN

PSYCH 3H03  
Term 2, 2009

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**Office Hours:** Monday 12:00-1:00 pm, or by appointment  
**Meeting Time/Place:** Monday 2:30-4:20 pm and Wednesday 2:30-3:20, BSB 138  
**TA's:** Brandon Aubie (aubiebn@mcmaster.ca), PC 320, extension 24832  
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**Prerequisites:** Sensory Processes; Human Learning and Cognition

## Course Description

*The Arts and the Brain* deals with the neurocognitive bases of artistic production and perception, with a focus on the theories and methods that enlighten how people create and apprehend all forms of the arts. In doing so, the course discusses a broad range of topics related to motor control, perception, emotion, language, learning, memory, and social cognition.

Four major branches of the arts will form the core of the course: music, dance, the literary arts, and the visual arts. Pairs of lecture-weeks will analyze, respectively, *production* and *perception* in each domain of the arts. A major goal of the course will be to discuss the *inter-relationships* between the arts – both cognitively and neurally – in an attempt to develop a general neurocognitive model of human artistic behaviour. Along these lines, discussions of anthropological and evolutionary theories of the arts will be included.

By the end of the semester, you should (a) have an understanding of the cognitive processes underlying artistic production and perception, (b) understand how the four major branches of the arts are related to one another, (c) be highly familiar with the structure of the human nervous system, (d) be conversant about the methods used to study human cognition and brain function, and (e) have a general understanding of how neural theory might be able to enlighten the nature of cross-cultural universals in human artistic behaviour.

## Required Text

Purves et al.'s *Neuroscience*, 4<sup>th</sup> Edition (2008). Associated with the book is a downloadable program called "Sylvius" showing images of the human brain.

Stix, G. (2008). Traces of a distant past. *Scientific American*, July 2008, pp. 56-63.

## **WebCT**

This course uses WebCT to post the course outline, lecture slideshows, and other materials. Please go to [webct.mcmaster.ca](http://webct.mcmaster.ca) in order to log onto the course's home page.

## **Course Evaluation**

### ***Exams***

A **neuroanatomy exam**, comprised of 30 multiple-choice questions, will occur during Week 3 of the course, accounting for 15% of the final grade. The idea behind this exam is that *if you haven't developed an understanding of the basic structure of the human nervous system by the third week, you will have great difficulty succeeding in the course as a whole, as the remainder of the course builds on this material.*

In addition, there will be two **exams** (midterms), each one comprised of a combination of true/false, fill-in, and short-answer questions. *Exam 2 will constitute one part of the final exam.* Finally, there will be a separate **comprehensive exam** (25 fill-in questions) that will constitute the second part of the final exam and that will cover material from the entire course.

Exams will cover the textbook, readings, and handouts. Lecture material that does not pertain to these three sources will not be tested. In addition to concepts, you will be tested extensively on *graphical* material, such as neuroanatomy and schematic figures from the textbook.

### ***Term Paper***

You will be asked to write a 4-5-page (double-spaced) paper on a topic of relevance to the course. It should be typed and submitted to your TA as a hard copy. The paper will count for 15% of the final grade, and must be turned in by the end of week 12 (**April 1** is the due date), although it can of course be turned in earlier.

The paper should be based on at least 3 *primary research articles* (i.e., not review articles or book chapters) that involve the use of neuroimaging methods (fMRI, PET, EEG, MEG, TMS, etc.) to analyze functions of relevance to the arts. The topic and a list of 3 references should be presented to your TA by week 10 (**March 18** is the final date). An analysis of the imaging methods beyond what is taught in the course is not expected of students. What is important is to discuss the experimental design, results, and interpretation of the studies. The research articles that are chosen should be related enough to one another that a comparison of their findings can be discussed.

NOTE: Citations and references should be written according to APA style. Be meticulous when creating your reference list. If you are not familiar with how to create citations or references, please consult your TA.

### ***Contribution of Assessments to the Final Grade***

Neuroanatomy exam	15% of the grade
2 exams (each one 25% of the grade)	50% of the grade
Comprehensive exam	20% of the grade
Term paper	15% of the grade

### **McMaster University Grading Scale**

A+	90-100
A	85-89
A-	80-84
B+	77-79
B	73-76
B-	70-72
C+	67-69
C	63-66
C-	60-62
D+	57-59
D	53-56
D-	50-52
F	0-49

NOTE: The grading scale is fixed. There will be no curving of grades.

### **Academic Integrity**

You are expected to exhibit honesty and use ethical behaviour in all aspects of the learning process. The academic credentials you earn are rooted in principles of honesty and academic integrity. Academic dishonesty is to knowingly act or fail to act in a way that results or could result in unearned academic credit or advantage. This behaviour can result in serious consequences, e.g., the grade of zero on an assignment, loss of credit with a notation on the transcript (notation reads: "Grade of F assigned for academic dishonesty"), and/or suspension or expulsion from the university. It is your responsibility to understand what constitutes academic dishonesty. For information on the various types of academic dishonesty please refer to the Academic Integrity Policy, located at <http://www.mcmaster.ca/academicintegrity>

The following illustrates only three forms of academic dishonesty:

1. Plagiarism, e.g. the submission of work that is not one's own or for which other credit has been obtained.
2. Improper collaboration in group work.
3. Copying or using unauthorized aids in tests and examinations.

## Weekly Lecture Schedule

Week	Topic	Lecture Topic	Reading
<b>1</b> 1/5-7	<b>Introduction to the Arts</b>	(a) course overview; theories of the arts	
		(b) evolution of the arts	Sci. Am. paper
<b>2</b> 1/12-14	<b>Introduction to Neuroscience</b>	(a) the neuron; action potentials; synaptic transmission	Ch. 1; Ch. 2 (pp. 25-28)
		(b) neuroanatomy	Ch. 1; Appendix (p. 815-833)
		review of neuroanatomy using Sylvius	Sylvius
<b>3</b> 1/19-21	<b>Cognitive Neuroscience and its Methods</b>	(a) theories of cognition; theories of brain function; the emotion/cognition relationship	
		(b) neuroimaging methods	Ch. 1 (pp. 19-21); Ch. 28 (pp. 715-717)
		<b>Neuroanatomy Exam (January 21)</b>	
<b>4</b> 1/26-28	<b>Brain Mechanisms of Music Production</b>	(a) music theory	
		(b) the vocal system	
<b>5</b> 2/2-4	<b>Brain Mechanisms of Music Perception</b>	(a) neural control of vocalization	
		(b) the auditory system; music perception; the brains of musicians	Ch. 13
<b>6</b> 2/9-11	<b>Brain Mechanisms of Dance Production</b>	(a) cognitive dance theory; spatial patterning: the motor systems of the brain and spinal cord	Ch. 16 (pp. 397-403; 413-420); Ch. 17
		(b) temporal patterning: neural control of rhythm production and timing	Ch. 18; Ch. 19
<b>7</b> 2/23-25	<b>Brain Mechanisms of Dance Perception</b>	(a) perception from the dancer's perspective: vestibular sense and proprioception	Ch. 9; Ch. 16 (pp. 408-413); Ch. 14
		(b) perception from the viewer's perspective: spatial cognition and motion perception	
<b>8</b> 3/2-4	<b>Brain Mechanisms of Literary-Arts Production and Perception</b>	(a) the literary arts; the neuroscience of language	Ch. 27; Ch. 31 (pp. 791-794, 805-809);
<b>9</b> 3/9-11		<b>Exam 1, covering lectures 1a-7b (March 9)</b>	
		<b>NO CLASS on Wednesday March 11</b>	

<b>10</b> 3/16-18		(a) melody and rhythm in speech, poetry and song; writing systems	
		(b) perspective taking (role playing); emotional expression	
<b>11</b> 3/23-25	<b>Brain Mechanisms of Visual-Art Production</b>	(a) the visual arts; neural control of drawing and tool use; eye movement	<b>Ch. 20</b>
	<b>Brain Mechanisms of Visual-Art Perception</b>	(b) the retina; form and colour	<b>Ch. 11</b>
<b>12</b> 3/30- 4/2		(a) the central visual pathways; pictoriality (i.e., static spatial cognition and virtual motion)	<b>Ch. 12</b>
	<b>The Chemical Arts</b>	(b) olfaction and gustation; sniffing and tasting	<b>Ch. 15</b>
<b>13</b> 4/6	<b>Emotion</b>	(a) neural systems of aesthetics and affiliation	
	<b>Creativity and Talent</b>	(b) creativity and talent	
	<b>Summary of Course</b>	(c) summary of course	
<b>Final</b> 4/TBA		<b>Exam 2, covering lectures 8a-13c; Comprehensive Final</b>	