

Department of Psychology

Trent University

PSYC 4225H: Advanced Topics in Physiological Psychology and Neuroscience



Coordinator: Liana Brown  
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Psychology Dept.

Course Description: This course will examine how perception, cognition, and action are influenced by the sensory and movement capabilities of our bodies. All topics will be approached from a systems-neuroscience perspective.

Required Readings: See course outline

Evaluation:	1. Presentation (1 x 20%)	20%
	2. Discussion Papers (2 x 15%)	30%
	3. Verbal participation	15%
	4. Thought notes	10%
	4. Research proposal (10% + 15%)	25%

Explanation of Assignments **Presentation (20%):** On one occasion over the course of the semester, each student will be responsible for presenting (25-35 minutes) an assigned reading to the class. It is expected that students will present enough background information to clearly explain the rationale for the study, and that the description of the methods, research, and implications of the study will be well-organized and accurate.

**Discussion Papers and Role of the Discussant (30%):** On two different occasions, each student will be responsible for leading the discussion of an assigned reading. One cannot be the discussion leader and presenter for the same article. The discussion leader's role is to read the article carefully (as carefully as the presenter) and assemble a set of questions or issues that he/she believes will stimulate discussion. The discussion leader must also submit a paper that both summarizes the article and describes one or more criticisms or theoretical positions in reaction to the article. Paper format: 3-5 pages, double spaced.

**Verbal Discussion Participation (15%):** This is a discussion-based course, so plan to attend and discuss! Students are expected to be prepared to share a position in reaction to the article.

**Thought Notes (aka Written Participation; 10%).** The purpose of the thought notes assignment is to help you prepare for the verbal discussion. It's much easier to participate in a discussion/debate if you've thought about the points you'd like to make in advance. Each week of student presentations in which you are not a presenter or discussant, you will be required to submit a short (one page) set of thought notes on the readings for the week **at the beginning of class**. The thought notes must be typed but can be in point-form or numbered.

**Research Proposal Paper (25%):** Each student will propose a research study to be conducted on any topic related to the course. The paper will define the research question, identify the populations and/or variables to be measured/manipulated, present the hypothesis and the predictions, and finally outline the methods (target participation group(s), apparatus, procedure, design, and proposed statistical analyses). **Draft proposals are due February 9 (worth 10% of your grade).** You will receive feedback on your drafts by February 23. **Final proposals are due March 30.** Additional details will be provided.

Meeting Format At our first meeting, the coordinator and students will form a schedule of presentations and discussion leaders for the entire semester. For the remainder of the semester, the majority of class time will be focused on student presentations. The instructor will lecture on (set up) the topic when necessary.

Course Policy on Late Papers and Homework Submissions **Homework and papers that are more than one week late will receive a grade of 0.** Documentation will be required to support requests for extensions (see policy below).

WHEN IT COMES TO ASKING FOR EXTENSIONS OR DEFERRALS, TIMING IS IMPORTANT. CONTACT ME ([lianabrown@trentu.ca](mailto:lianabrown@trentu.ca)) AS SOON AS YOU KNOW THAT YOU ARE IN NEED.

Course Policy on attendance Attendance is required and will be noted.

Contacting the coordinator **Liana Brown, Ph.D., OC 146 - E-mail: [lianabrown@trentu.ca](mailto:lianabrown@trentu.ca)**

Note: **Please use your Trent email account when contacting me.** During the week, please allow 24 hrs for a response. Do not expect a response on weekends.

**Finally, always acknowledge that you received a response and let me know if your question was answered.** If your question wasn't answered or if I fail to respond in 24 hours, try again!

Week	Themes	Topic and Readings
		<b>Background reading is optional. The background readings are offered to provide context for the primary readings. If you are having trouble understanding the primary readings, take a look at the background reading. If it is your turn to present, the background reading is highly recommended.</b>
Jan. 12	Organization	<b>Review course outline, assign readings to students for presentation and discussion papers, and determine method for photocopying.</b>
Jan. 19	<b>Sensory Physiology;</b> <b>Linking Neural Systems to Complex Behaviour in Humans</b>	Jones, L. A., and Lederman, S. J. (2006). Neurophysiology of hand function (pp. 24 – 41). <u>Human Hand Function</u> . Oxford: Oxford University Press.  Goldstein, E. B. (2007/2010). The cutaneous senses (pp 329-354). <u>Sensation and Perception, Eighth Edition</u> . Belmont, CA: Wadsworth Press.
Jan. 26	<b>Definitions of Body Image and Body Schema</b>	<b>Definitions</b>  Gallagher, S. (2005). Terms of embodiment. <u>How the Body Shapes the Mind</u> (pp. 17-39). Oxford: Oxford University Press.  Carruthers, G. (2009). Types of body representation and the sense of embodiment. <u>Consciousness and Cognition</u> , 17, 1302-1316.  Schwoebel, J. and Coslett, H. B. (2005). Evidence for multiple, distinct representations of the human body. <u>Journal of Cognitive Neuroscience</u> , 17, 43-53.
Feb. 2	<b>Representation of Body Space – Vision</b>	<b>Background Reading:</b> Peelen, M. V. and Downing, P. E. (2007). The neural basis of visual body perception. <u>Nature Reviews: Neuroscience</u> , 8, 636-648.  Craig, A. D. (2009). How do you feel-now? The anterior insula and human awareness. <u>Nature Reviews: Neuroscience</u> , 10, 59-70.  <b>For presentation:</b>  Urgesi, C., Berlucchi, G. and Aglioti, S. M. (2004). Magnetic stimulation of extrastriate body area impairs visual processing of nonfacial body parts. <u>Current Biology</u> , 14, 2130-34.  Pitcher, D., Charles, L., Devlin, J. T., Walsh, V., Duchaine, B. (2009). Triple dissociation of faces, bodies and objects in extrastriate cortex. <u>Current Biology</u> , 19, 319-332.  Karnath, H. O., Baier, B., Nagele, T. (2005). Awareness of the function of one's own limbs mediated by the insular cortex? <u>Journal of Neuroscience</u> , 25, 7134-38.
Feb. 9	<b>Representation of Body Space – Vision, Touch, and Proprioception</b>	<b>Background Reading:</b> Graziano, M.S.A. & Botvinick, M.M. (2001). How the brain represents the body: Insights from neurophysiology and psychology. In W. Prinz & B. Hommel (Eds.), <u>Common mechanisms in perception and action: Attention and Performance XIX</u> (pp 136-157). New York: Oxford University Press.  <b>For presentation:</b>  Graziano, M.S.A. (1999). Where is my arm? The relative role of vision and proprioception in the neuronal representation of limb position. <u>Proceedings of the National Academy of Science USA</u> , 96, 10418-21.  Graziano, M.S.A. (2000). Coding the location of the arm by sight. <u>Science</u> , 290, 1782 – 1786.  Fuentes, C. T. and Bastian, A. J. (2010). Where is your arm? Variations in proprioception across space and tasks. <u>Journal of Neurophysiology</u> , 103, 164-171
Feb. 16	<b>READING WEEK</b>	<b>No Class – Happy Reading!</b>
Feb. 23	<b>Perception and Attention in Nearby Space</b>	<b>Background Reading:</b> Ladavas, E. & Farne, A. (2005). Multisensory representation of peripersonal space. In G. Knoblich, I. M. Thornton, M. Grosjean, & M. Shiffrar, (Eds.), <u>Human Body Perception From The Inside Out</u> (pp. 89-104). Oxford: Oxford University Press.  <b>For Presentation:</b>  Ladavas, E., di Pellegrino, G., Farne, A., & Zeloni, G. (1998). Neuropsychological evidence of an integrated visuo-tactile representation of peripersonal space in humans. <u>Journal of Cognitive Neuroscience</u> , 10, 581-589.  Brown, L. E., Kroliczak, G., Demonet, J.-F., & Goodale, M. A. (2008). A hand in blindsight: Hand placement near target improves size perception in the blind visual field. <u>Neuropsychologia</u> , 46, 786–802.

		Brown, L. E., Morrissey, B. F., & Goodale, M. A. (2009). Vision in the palm of your hand. <u>Neuropsychologia</u> , <i>47</i> , 1621-6.
<b>Mar. 2</b>	<b>Perception, Experience and Tool-use</b>	<p><b>Background Reading:</b> Maravita A. and Iriki, A. (2004). Tools for the body schema. <u>Trends in Cognitive Science</u>.</p> <p><b>For Presentation:</b></p> <p>Clark, S. A., Allard, T., Jenkins, W.M., and Merzenich, M.M. (1988). Receptive fields in the body-surface map in adult cortex defined by temporally correlated inputs. <u>Nature</u>, <i>332</i>, 444-445.</p> <p>Berti, A. &amp; Frassinetti, F. (2000). When far becomes near: Remapping of space by tool use. <u>Journal of Cognitive Neuroscience</u>, <i>3</i>, 415-420.</p> <p>Cardinali, L., Frassinetti, F., Brozzoli, C., Urquizar, C., Roy, A. C., and Farnè, A. (2009). Tool-use induced morphological updating of the body schema. <u>Current Biology</u>, <i>19</i>, R478-479.</p>
<b>Mar. 9</b>	<b>Cognitive Definitions of Body Space – Changes in size due to Growth and Development</b>	<p><b>Background Reading:</b> Adolph, K. E. (2008). The growing body in action: What infant locomotion tells us about perceptually guided action. In R. Klatzky, M. Behrmann, &amp; B. MacWhinney (Eds.), <u>Embodiment, Ego-space, and Action</u> (pp. 275-321). Mahwah, NJ: Erlbaum.</p> <p><b>For Presentation:</b></p> <p>Adolph, K. E. &amp; Avolio, A. M. (2000). Walking infants adapt locomotion to changing body dimensions. <u>Journal of Experimental Psychology: Human Perception and Performance</u>, <i>26</i>, 1148-66.</p> <p>Linkenauger, S. A., Witt, J. K., Bakdash, J. Z., Stefanucci, J., &amp; Proffitt, D. R. (2009). Asymmetrical body perception: a possible role for neural body representations. <u>Psychological Science</u>, <i>20</i>, 1373-1380.</p> <p>Stefanucci, J. K. &amp; Geuss, M. (in press). Changing spaces: Body size influences the perception of apertures. <u>Perception</u>.</p>
<b>Mar. 16</b>	<b>Body Perception Disorders: Peripheral Neuropathy &amp; Spinal-Cord Injuries</b>	<p><b>Background Reading:</b> Cole, J. (1995). <u>Pride and a daily marathon</u>. Cambridge, MA: MIT Press.</p> <p><b>For Presentation:</b></p> <p>Conomy, J. P. (1973). Disorders of body image after spinal cord injury. <u>Neurology</u>, <i>23</i>, 842-50.</p> <p>Cole, J. D., Sedgwick, E. M. (1992). The perceptions of force and of movement in a man without large myelinated sensory afferents below the neck. <u>Journal of Physiol</u>, <i>449</i>, 503-15.</p> <p>Balslev, D., Miall, R. C., &amp; Cole, J. (2007a). Proprioceptive deafferentation slows down the processing of visual hand feedback. <u>Journal of Vision</u>, <i>7</i>, 12.1-7.</p> <p>Balslev, D., Miall, R. C., &amp; Cole, J. (2007b). Proprioception contributes to the sense of agency during visual observation of hand movements: evidence from temporal judgments of action. <u>Journal of Cognitive Neuroscience</u>, <i>19</i>, 1535-41.</p>
<b>Mar. 23</b>	<b>Body Perception Disorders: Phantom Limb Syndrome</b>	<p><b>Background Reading:</b> Ramachandran VS &amp; Hirstein, W. (1998). The perception of phantom limbs: The D. O. Hebb Lecture. <u>Brain</u>, <i>121</i>, 1603-1630.</p> <p><b>For Presentation:</b></p> <p>Melzack, R. (1990). Phantom limb and the concept of a neuromatrix. <u>Trends in Neurosciences</u>, <i>13</i>, 88-92.</p> <p>Flor, H., Nikolajsen, L., and Jensen, T. S. (2006). Phantom limb pain: A case of maladaptive CNS plasticity. <u>Nature Reviews Neuroscience</u>, <i>7</i>, 873-881.</p> <p>Brugger et al. (2000). Beyond re-membering. Phantom sensations in congenitally absent limbs. <u>Proceedings of the National Academy of Sciences USA</u>, <i>97</i>, 6167-6172.</p> <p>Katz, J. P. (1992). Psychophysical correlates of phantom limb experience. <u>Journal of Neurology, Neurosurgery, and Psychiatry</u>, <i>55</i>, 811-821.</p>
<b>Mar. 30</b>	<b>Body Perception Disorders: Pain</b>	<p><b>Guest Speaker: Dr. Keith Nicholson, C. Psych.</b>, Comprehensive Pain Program, Toronto Western Hospital &amp; Krembil Neuroscience Centre.</p> <p>Readings TBA</p>
<b>Apr. 6</b>	<b>Body Perception Disorders associated with Eating Disorders</b>	<p><b>Guest Speaker: Dr. Kim Van Walsum, C. Psych., and the Women's Health Team</b>, Women's Health Clinic, Peterborough Regional Health Centre</p> <p>Readings TBA</p>