SEMINAR OF DEVELOPMENTAL PSYCHOLOGY: BEHAVIORAL AND NEUROLOGICAL CORRELATES – 4010-M

4010 3.0 M begins January 8, 2013 - Tuesday 11:30-2:30 in VH 1158
Reading Week February 19, 2013 – Final class April 3, 2013.

Course Instructor: Professor Maria Legerstee
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*Correspondence with students can also by email but only when students use their York email (for security reasons - prevents impersonation ☺)

The stated (Undergraduate Handbook) prerequisites for PSYC 4010 3.0 are that students must be in their 4th year of an Honours Psychology Programme and have completed successfully PSYC 1010 6.0 with a minimum grade of C, PSYC 2020 6.0 or PSYC 2021 3.0 or equivalent (Psych stats course) and PSYC 2110 3.0 Developmental Psychology.

Important days:
http://www.yorku.ca/roweb/enrol/dates/Jan-Apr2013Calendars.htm

January 8, 2013 – First day of class – April 2-2013 – Last day of classes
January 21 – Last day to enroll without permission
February 19 – Reading Week
March 15 – Last day to drop without grade
April 2- – Final class
April 23 - papers due

Introduction

One of the most important things that develops after birth is an understanding of people. The area of research that refers to the ability to understand people is called socio-cognition. Socio-cognition covers the understanding of the foundational perceptual skills that allow us to discriminate between people and objects, to the development of mental state awareness (from consciousness to theory of mind) to name a few. Recent research on socio-cognitive development has documented that the capacities of infants to process information, remember experienced events, and make cognitive and behavioral decisions as they interact with their social environment are more sophisticated than previously believed.

Although the study of socio-cognitive development has answered many important questions, and revealed significant developmental milestones, the lack of integration of the diverse developmental, behavioral and neurological methodologies, have failed to provide a comprehensive account of the developmental trajectories of children's

capacities. In order to achieve a more thorough understanding, research orientations and methods must combine in order to reveal the mechanisms of change and how these account for brain and behavioral functioning in order to present an integrated look of development. **Definitions of some brain measure techniques are provided at the end of this syllabus.**

Purpose of the course

In this course, we will examine the work of scholars, who each, through the use of several methodologies, have revealed how the infants' perceptual, social and cognitive abilities interact, thereby providing a comprehensive picture of socio-cognitive development.

READINGS

We will be using 10 readings from ***The Infant Mind: Origins of the Social Brain (2013, Guilford Publishers),*** edited by Drs. Maria Legerstee (York University), David Haley (University of Toronto), and Marc H. Bornstein, (NICHD). Because the book will not be available until February 19, 2013, you will be provided with photocopies of the articles you need to read. However, you will be asked to pay the York Bookstore for your book in advance. Only students who have pre-paid the book, and can show a receipt will be provided with copies of the chapters.

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SCHEDULE

There are 12 class weeks.

Week 1 - January 8, 2013, Introduction – Syllabi are handed out

Week 2 – January 15, 2013 - Legerstee presents overview of course and chapter 10 of the book "*The Developing Social Brain: Social connections and social bonds, social rejections and jealousy in infancy* - Maria Legerstee. You are asked to read the chapter, write a one page abstract and develop some questions to ask in class.

In this paper I will address the existence of a social brain in infants by discussing the intersubjective transactions infants engage in soon after birth which play a crucial role in subsequent regulation of early brain development (Gallagher, this volume, Trevarthen & Jonathan Delafield-Butt this volume). Intersubjectivity enables infants not only to connect with the social world and bond with their caretakers, but also to become anxious about being separated from them

(separation anxiety, Bowlby, 1973), and disturbed when being excluded in triadic contexts (Hart, 2010; Legerstee et al., 2010).

However, whereas onto now, much of the data addressing these topics have relied on clever experimentation and the collection of behavioral data, recent merging with developmental social neuroscience has shed new light on important aspects of the infant brain. As a consequence, the behavioral data of social phenomena are being elucidated by their neural foundations, thereby revealing the role the various neural structures, genes, and neurotransmitter systems play in social cognition. Specifically, it has been shown that "cortical regions in the temporal lobe participate in perceiving socially relevant stimuli, whereas the amygdala, right somatosensory cortices, orbitofrontal cortices, and cingulate cortices all participate in linking perception of such stimuli to motivation, emotion, and cognition." (Adolph, (2001). Nevertheless, questions remain about the domain specificity of social cognition (emotions and thought), and the role the environment plays in development. We will address these questions in the course

Weeks of January 22, 29, February 5, 12, 26, 2013 – Students read the remaining 9 chapters, write abstracts to be handed in, and prepare -group-PPT-presentations on the 9 book chapters.

The book readings are then finished. They will provide source material for your major papers.

Week of February 19, 2012 – Reading Week

Week of March 5, 12, 19, 26, April 3. Individual oral presentations which are the foundations for the final written paper.

Week of April 3, 2013 - Final day of classes

April 23, 2013 – Final papers due .

EVALUATION:

Thus, there are 5 seminars during which all students must read the required 10 readings and prepare some questions/comments that you would like to discuss in class. This abstract and these discussion points should be typed, not longer than a page, and submitted via email, but also at the end of each class. Attendance and submission of abstracts will be recorded (25%). Make sure to ask for the attendance sheet.

Also during the seminar weeks you are asked to prepare a group oral presentation with two other students (depending enrollment) and present these in class. This oral presentation and your participation in it will also be marked (25%).

After reading the chapters and preparing abstracts, there are another 5 final weeks for your major presentations (after the Feb 26). The major presentation is a paper of your choice *based on the material handled in class*, **but different from what you have presented during the first half of the course.** All presentations/papers must address a theoretical controversy (introduction), derive a hypothesis from this controversy (the present study), and develop a solution (method). **Depending on how many students we have in class, 6 students will present the oral part of their final paper during a 1/2 hour ppt presentations (total 3 hours per class for 6 students).** This power point presentation should be circulated to your fellow classmates and professor (sent via email) 2 days prior to class (Sundays?), so that each student can participate in the discussion of the oral. This student participation will also be noted!

The oral presentations (25%) are the foundations for the final written paper. The final paper should be written as a journal article or research grant proposal (check APA – American Psychological association) guidelines on line – see for example http://www.oswego.edu/Documents/psychology/resources/sample_manuscript.pdf and should not be longer than approx. 15 pages excluding references. This format will be discussed further in class. The final paper (oral (25%) and written component (25%) is **50%** of the total mark. **Final papers are due one week prior to end of exam period April 23, 2013.**

OUTLINE AND READINGS

January 8, 2011 - Meet and Greet - Discussion syllabus – Assignments

January 15, 2012 – ***The Developing Social Brain: Social connections and social bonds, social rejections and jealousy in infancy - Maria Legerstee -***
Film: The baby's brain: Wider than the sky (Call Number: Video 6436).

January 22) - Dunbar and Gallese

Robin I. M. Dunbar
Oxford University, Oxford, England
The Social Brain Hypothesis owes its origin to an attempt to explain why primates have significantly larger brains for body size compared to all other mammals. Essentially, the claim is that primates live in unusually complex social systems, and it is the need to manage and manipulate a great deal of constantly changing information about the state of this social world that is computationally so demanding. Initially referred to as the Social Intelligence Hypothesis (Humphrey, 1976) and the Machiavellian Intelligence Hypothesis (Byrne & Whiten 1988), the consensus has now settled on the term 'Social Brain Hypothesis' as being less tendentious and descriptively more neutral. In the end, what we have to explain is the fact that primates have very large brains, both absolutely and relatively compared to other mammals, with most of this increased being attributed to an exponential growth in neocortex size (Finlay et al. 2001). Although some mammals do have volumetrically larger brains even than humans (e.g. elephants and many members of

the whale and dolphin family), the substantive issue lies in the size of the neocortex. Large neocortices are essentially a primate evolutionary novelty: in mammals in general, the neocortex accounts for 10-40% of total brain volume, whereas in primates it accounts for 50-80%.

The Role of Mirror Neurons in Social Cognition

Vittorio Gallese
Università of Parma, Parma, Italy

The motor cortical system, typically thought to merely enable movement programming and execution, plays in fact a crucial role in complex cognitive abilities such as the understanding of motor goals and of basic actions intentions. We qualify such abilities as motor cognition. We present neuroscientific evidence relating the existence and functions of a neural mechanism – the mirror neuron mechanism – with action and intention understanding in macaque monkeys and humans. The possible contribution of this mechanism to the development of social cognitive abilities in non-human primates and human infants is discussed. Finally, we address the relevance of motor cognition for the understanding of important aspects of the Autistic Spectrum Disorder.

January 29 - Pluess and Knafo

Differential Susceptibility to Early Experiences: Developmental and Evolutionary Mechanisms of Gene and Environment Interactions. Michael Pluess, Suzanne E. Stevens, & Jay Belsky

This chapter elaborates Belsky's influential theory in child development that individuals are differentially susceptible to the environment depending on genetic background. The main argument presented is that individuals with susceptible genes may fair better or worse depending on the environment. The chapter includes a new development of ideas and questions concerned with when these genetic susceptibilities are produced.

Variation in Empathy: Development of Gene and Environment Interactions.

Ariel Knafo and Florina Uzefovsky
Psychology Department, The Hebrew University of Jerusalem .

Abstract
This chapter provides new insights into the genetic and environment effects that influence cognitive and affective components of empathy in young children. The authors describe the development of empathy, and then conduct a meta analysis of the extant literature on genetic and environmental contributions to individual differences in empathy. In affective empathy, genetics accounted for 30% of the variance, with the rest of the variance accounted for by non-shared environment and error. A different pattern was found for cognitive empathy, with the genetic effect estimated at 26%, all shared-environment effect estimated at 17% and the rest of the variance (57%) attributable to the non-shared environment and error. The authors go beyond separating variation into genetic and environmental effects. They show that economic risk moderates the genetic influence on empathy. Furthermore, medical risk in infancy is associated with

lower importance for genetic effects on empathy at age 3. Finally, the authors show a gene by parenting interaction between a genetic polymorphism, the exon III repeat region of the DRD4 receptor gene, and maternal negativity. Negativity related negatively to observed empathy towards an examiner at 3.5 years, but only among children carrying the 7-repeat allele of the polymorphism. The findings demonstrate the importance of gene X environment interactions in the early development of empathy.

February 5 – Bauer, - de Haan,

Event Memory: Links between Social, Cognitive, and Neural Developments.
Patricia Bauer

Patricia Bauer has shown that the development of explicit memory is possible as early as six months of age and that by the end of the second year of life, long-term recall is reliable and robust. She explores the developmental changes in memory that occur for past events, including socially relevant events, relying on a nonverbal imitation-based method and the recording of the brain's activity or event-related potentials (Eros), to assess the developmental changes in neural processing that occur as infants and children develop memory.

Development of Brain Networks for Visual Social-Emotional Information Processing in Infancy

Michelle de Haan[(1)] and Leslie J. Carver[(2)]
[(1)]University of College London, London, UK

February 12 - The *Situated Infant: Learning in Context.* - Arlene Walker-Andrews.

Arlene Walker-Andrews argues that perception develops optimally when stimulus information is dynamic, naturalistic, and multimodal (i.e., when faces, speech, and corresponding emotional characteristics are combined). She discusses how social interaction affects the development of awareness of the self, drawing on examples from her own work on infants' perception of expressions of emotion and infants' intermodal percepts. Her perspective is based on the Gibsonian notion that the brains of most organisms evolved in reciprocal relation to their environment.

FEBRUARY 19, READING WEEK.

February 26 Sabbagh and Mundy

Sabbagh, M. A, Benson, J. E., & Kuhlmeier, V. A.
False belief understanding in infants and preschoolers.

Abstract: The unique complexity of human social lives stems, at least in part, from having a sophisticated 'theory of mind' – an understanding that human behaviors is caused by internal, unseeable mental states such as beliefs, desires and intentions. In all

cultures that have been examined, preschool children go through a remarkable transition in their theory of mind capacity. During this time, they become able to recognize that epistemic mental states (such as knowledge and belief) are person specific representations that can differ in content from some true state of affairs. Yet, recent research suggests that the beginnings of such an understanding may be in place in children during the late infancy period. In our chapter, we will critically evaluate the evidence from infancy and use a burgeoning literature within the area f developmental cognitive neuroscience to better understand the nature of both the early and later developments.

Neural Connectivity, Joint Attention, and the Social-Cognitive Deficits of Autism. **Peter Mundy.**

To further elaborate on the different mechanisms that regulate the ability to share attention with others, Peter Mundy examines brain areas that are activated during social-cognitive tasks involving joint attention. Mundy argues that some forms of joint attention skills that emerge in infancy may be associated with activity in a cortical system that itself may be associated with social-cognitive processes in adults. This chapter provides new insights into specific brain regions that are involved in two key aspects of joint attention (initiating and responding to joint attention), which are clearly illustrated in children with autism.

MARCH 5 – 12, 19, 26, April 2, 2013 – Individual oral presentations begin.

Definitions of brain measure techniques

Electroencephalography (**EEG**) is the recording of electrical activity along the scalp produced by the firing of neurons within the brain.[2] In clinical contexts, EEG refers to the recording of the brain's spontaneous electrical activity over a short period of time, usually 20–40 minutes, as recorded from multiple electrodes placed on the scalp.

The scalp EEG signal reflects the summation of post-synaptic potentials generated in specific layers of cortical pyramidal cells that are perpendicular to the cortical surface. As the EEG signal, these summated potentials may be picked up using electrode arrays that are pre-mounted on some kind of headgear (see below)

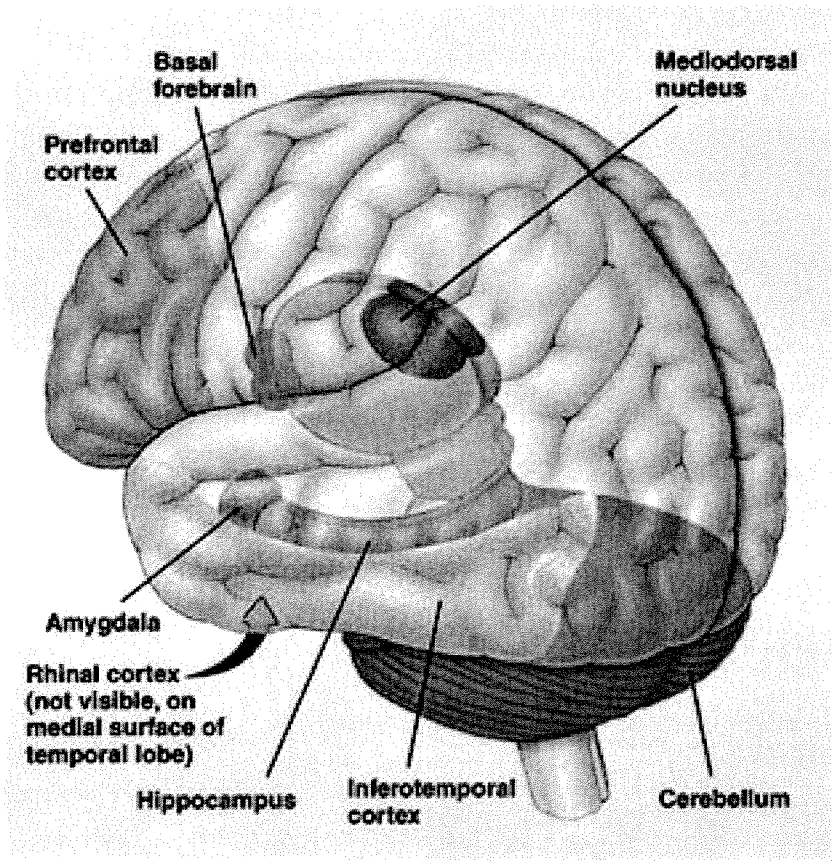
Event related potentials (ERP). Derivatives of the EEG technique include evoked potentials (EP), which involves averaging the EEG activity time-locked to the presentation of a stimulus of some sort (visual, somatosensory, or auditory). Event-related potentials (ERPs) refer to averaged EEG responses that are time-locked to more complex processing of stimuli; this technique is used in cognitive science, cognitive psychology, and psycho physiological research.

Example:

Event-related potentials (ERPs) are a useful tool for investigating the neurophysiological correlates of developmental changes as they can provide information not available from behavioral measures alone. In particular, they provide precise information about the timing and some information about the spatial distribution of the brain events underlying visual processing. Since ERPs can be obtained in "passive" tasks, where participants simply look at visual displays without any requirement to make a verbal or behavioral response, they allow use of the same procedure across a wide range of age and ability levels. For example, visual ERPs have been used to study face processing in infants only a few months old (e.g., Halit, de Haan, & Johnson, 2003) and have been used to investigate aspects of visual processing in children with various developmental disorders, including autism spectrum disorder (e.g., Dawson et al., 2002; Kemner, van der Gaag, Verbaten & van Engeland, 1999), Down syndrome (e.g., Karrer et al., 1998), and attention deficit-hyperactivity disorder (reviewed in Barry, Johnstone, & Clarke, 2003). Along with these distinct advantages, however, ERPs also present challenges both in terms of experimental design and data collection, and analysis and interpretation.

Functional MRI or **functional Magnetic Resonance Imaging (FMRI)** is a type of specialized MRI scan. It measures the hemodynamic response (the dynamic regulation of the blood flow in the brain. – i.e. change in blood flow) related to neural activity in the brain or spinal cord of humans or other animals. It is one of the most recently developed forms of neuroimaging. Since the early 1990s, fMRI has come to dominate the brain mapping field due to its relatively low invasiveness, absence of radiation exposure, and relatively wide availability.

NIRS – Near infrared spectroscopy- uses infrared light to measure changes in blood concentration as an indictor of blood concentration throughout the cortex (usually prefrontal).


Basal forebrain
Mediodorsal nucleus
Prefrontal cortex
Amygdala
Rhinal cortex (not visible, on medial surface of temporal lobe)
Hippocampus
Inferotemporal cortex
Cerebellum