PSYC G4680 – Developmental Affective Neuroscience. Spring 2008

Preliminary Syllabus

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I. Bulletin description

G4680. Developmental Affective Neuroscience (seminar).
4 pts. N. Tottenham. Monday 4:10 – 6:00
Prerequisites: Courses in developmental psychology, and either research methods or affective neuroscience, and the instructor's permission. [email: nlt2002@med.cornell.edu]

Introduction to leading theoretical perspectives employed by developmental psychologists in the study of affective neuroscience. Exploration of the development of brain and behavior relationships in humans and animal models of typical and atypical emotional behavior, with a critical reading of recent research findings in this field.

II. A full description of the content of the course

Why do I feel the way I do? The reason usually involves an understanding of one's developmental history. This course uses a developmental approach to address emotional brain-behavior relationships. We will discuss theoretical papers and empirical work that covers typical and atypical behavior and the neurobiology that supports behavioral change across age. A translational approach is taken that uses animal models and human examples to illustrate these developmental trajectories. We will cover experimental approaches during discussion of each topic. Much of the discussion will occur within the context of an epigenetic framework with extensive discussion surrounding critical and sensitive periods of development.

The first segment of the course is devoted to identifying a theoretical structure for developmental affective neuroscience to guide seminar discussions throughout the semester. Next, we will discuss emotions as the individual experiences them, followed by sessions that give us a better understanding of the developmental agents (parents, peers, genes) that contribute to emotional and affective states. We will then examine the literature on the development of social behavior and the associated neurobiology. We conclude with discussions of atypical emotional and social development.

III. The rationale for giving the course

The purpose of this course is to introduce students to the emerging field of developmental affective neuroscience. The topics cover a wide range of sub-areas within the field of

developmental affective neuroscience, with a continuing theme that surrounds issues regarding early experience, critical and sensitive periods, gene-environment interactions, and individual differences. The goal is to expose students to contemporary issues in the field while maintaining a connection to traditional emotional developmental findings and theories.

With its developmental focus, this seminar will complement seminars on the psychophysiology of emotion (W3410), on social cognitive neuroscience (W3680/G4680), and on the neuroscience of cognitive and affective control (W3485/G4485) while ameliorating a shortage of developmental offerings. This course is open to Graduate students, senior undergraduate Psychology majors, and postbacs, and these students will have priority, followed by junior majors, followed by non-majors.

PSYC G4680 is an advanced seminar, designed particularly for graduate students, for advanced undergraduates who are majoring in Psychology or in Neuroscience and Behavior, and for students participating in the Postbac Psychology Program. It fulfills the following degree requirements:

• For Psychology Graduate Students, PSYC G4680 will apply toward the "two seriously graded seminars" requirement of the Master's degree.

• For the Psychology major or concentration in the College and in G. S., for the Psychology minor in Engineering, and for the Psychology Post-bac, G4680 meets the Group III (Social, Personality, and Abnormal) distribution requirement.

• For the Neuroscience and Behavior joint major, G4680 will fulfill the 5th Psychology requirement: "one advanced psychology seminar from a list approved by the Psychology Department advisor to the program."

• G4680 will meet the social science requirement of GS, provided that students obtain the necessary permissions and have taken the prerequisite psychology courses.

• For the Psychology Post-bac certificate, PSYC G4680 will fulfill the advanced seminar requirement.

• For the Barnard Psychology major, PSYC G4680 will fulfill the senior seminar requirement.

IV. The reading list and weekly syllabus

Students are encouraged to incorporate additional readings (particularly from empirical papers) if they feel that they would enhance discussion. Most readings are available online through CLIO. If not, they will be placed on http://courseworks.columbia.edu.

Week:

1) **Overview & organization**

2) **Background (History, Theory)**
    a. Evolutionary accounts & Probabilistic Epigenesis
        i. Gottlieb, G. (2007). Probabilistic epigenesis. *Developmental Science, 10*(1), 1-11
        ii. Darwin, *The Expression of the Emotions in Man and Animals*, Chapter I, pp. 15-23
    b. Biological Primer
        i. Davidson, R. J. (2001). Toward a biology of personality and emotion. *Annals of the N.Y. Academy of Science, 935*, 191-207
    c. Theoretical primer - Somatic Marker Hypothesis
        i. A Bechara, H Damasio, D Tranel, AR Damasio (2005)- *Trends in Cognitive Sciences,* 9(4), 159-162.

3) Foundations in Development
    a. Behavioral–
        i. Development as a dynamic system (Smith & Thelen, 2003, *Trends in Cognitive Science*, 7(8), 343-348.
        ii. The importance of a Developmental Approach (Karmiloff-Smith, A. (1994). Precis of Beyond modularity: A developmental perspective on cognitive science. Behavioral and Brain Sciences 17 (4): 693-745.
    b. Neural –
        i. Plasticity (Greenough & Black, 1992, Induction of Brain structure by experience: substrates for cognitive development. In M. Gunnar & CA Nelson (Eds).*_Developmental Behavioral Neuroscience. Minnesota Symposium on Child Psychology, Vol. 24, 155-200. New Jersey, Earlbaum*) – will post on courseworks
        ii. Biobehavioral approaches in development (Nelson & Bloom,1997, Child Development and Neuroscience*. Child Development, 68*, (5), 970-987.)

4) Emotional Learning across development
    a. Development of Classical Conditioning & Extinction
        i. Moriceau S, Sullivan RM. (2006). *Nature Neuroscience. 9*(8):1004-6.
        ii. Sevelinges Y, Moriceau S, Holman P, Miner C, Muzny K, Gervais R, Mouly AM, Sullivan RM (in press). Enduring Effects of Infant Memories: Infant Odor-Shock Conditioning Attenuates Amygdala Activity and Adult Fear Conditioning, *Biological Psychiatry. Approx. 10 pages*
        iii. A.P. Field & H. Schorah (in press), The verbal information pathway to fear and heart rate changes in children. *Journal of Child Psychology and Psychiatry. Approx. 10 pages*
        iv. Happaney K, Zelazo PD. (2004). Resistance to extinction: a measure of orbitofrontal function suitable for children? Brain Cogn. 2004 Jun;55(1):171-84.
    b. Social Learning
        i. Prather, M. D., Lavenex, P., Mauldin-Jourdain, M. L., Mason, W. A., Capitanio, J. P., Mendoza, S. P., & Amaral, D. G. (2001). Increased social fear and decreased fear of objects in monkeys with neonatal amygdala lesions. Neuroscience, 106(4), 653-658.

ii. Amaral DG. (2003). The amygdala, social behavior, and danger detection. *Annals of the NY Academy of Science,1000*: 337-47.

5) Temperament & Emotion Regulation

a. Definitions
   i. Rothbart, Ahadi, Evans (2000). Temperament and personality: origins and outcomes. J Pers Soc Psychology, 78(1):122-35.
   ii. Goldsmith HH, Buss AH, Plomin R, Rothbart MK, Thomas A, Chess S, Hinde RA, McCall RB. (1987). Roundtable: what is temperament? Four approaches. Child Dev. 58(2):505-29

b. Behavioral Inhibition & Biological markers
   i. Schwartz CE, Wright CI, Shin LM, Kagan J, Rauch SL. (2003). Inhibited and uninhibited infants "grown up": adult amygdalar response to novelty. Science. 300(5627):1952-3.
   ii. Fox NA, Henderson HA, Rubin KH, Calkins SD, Schmidt LA. (2001). Continuity and discontinuity of behavioral inhibition and exuberance: psychophysiological and behavioral influences across the first four years of life. Child Dev. 72(1):1-21.

c. Effortful control
   i. Delay of gratification (Eigsti, Zayas et al., (2006). Predicting Cognitive Control From Preschool to Late Adolescence and Young Adulthood. Psychological Science, 17 (6), 478-484.
   ii. Hongwanishkul D, Happaney KR, Lee WS, Zelazo PD., (2005). Assessment of hot and cool executive function in young children: age-related changes and individual differences, Dev Neuropsychol, 28(2):617-44

6) Attachment behavior

a. Caregiver as regulator
   i. Hofer MA. (1994). Early relationships as regulators of infant physiology and behavior. Acta Paediatr Suppl. 397:9-18.

b. Substrates of attachment
   i. Parents
      1. Swain JE, Lorberbaum JP, Kose S, Strathearn L. (2007). Brain basis of early parent-infant interactions: psychology, physiology, and in vivo functional neuroimaging studies. J Child Psychol Psychiatry. 48(3-4):262-87.
      2. Febo M, Numan M, Ferris CF. (2005). Functional magnetic resonance imaging shows oxytocin activates brain regions associated with mother-pup bonding during suckling. J Neurosci. 25(50):11637-44.
   ii. Offspring
      1. Insel TR. (1997). A neurobiological basis of social attachment. Am J Psychiatry. 1997 Jun;154(6):726-35.
      2. Lemche E, Giampietro VP, Surguladze SA, Amaro EJ, Andrew CM, Williams SC, Brammer MJ, Lawrence N, Maier MA, Russell TA, Simmons A, Ecker C, Joraschky P, Phillips ML. (2006). Human attachment security is mediated by the amygdala: evidence from combined fMRI and psychophysiological measures. Hum Brain Mapp 27(8):623-35

3. Nelson EE, Panksepp J. (1998). Brain substrates of infant-mother attachment: contributions of opioids, oxytocin, and norepinephrine. Neurosci Biobehav Rev. 22(3):437-52.

c. Reactive attachment
    i. Boris & Zeanah (1999).Disturbances and disorders of attachment in infancy: An overview. Infant Mental Health Journal, 20 (1), 1-9.

7) Caregiving & its Consequences I: in & out of the species-typical range

a. Levine, S. (2005). Developmental determinants of sensitivity and resistance to stress. Psychoneuroendocrinology. 30(10):939-46.
b. On behavior
    i. Rosenblum LA, Andrews MW. (1994). Influences of environmental demand on maternal behavior and infant development. Acta Paediatr Suppl. 397:57-63.
    ii. Clarke AS, Wittwer DJ, Abbott DH, Schneider ML. (1994). Long-term effects of prenatal stress on HPA axis activity in juvenile rhesus monkeys. Dev Psychobiol. 27(5):257-69
c. On stress physiology
    i. Gunnar, M. (1998). Quality of early care and buffering of neuroendocrine stress reactions: potential effects on the developing human brain. Prev Med. 27(2):208-11
    ii. Gunnar, M. (2003). Integrating neuroscience and psychological approaches in the study of early experiences. Ann N Y Acad Sci.1008:238-47.
d. Neglect & Abuse
    i. Rutter M, O'Connor TG; English and Romanian Adoptees (ERA) Study Team. (2004). Are there biological programming effects for psychological development? Findings from a study of Romanian adoptees. Dev Psychol,. 40(1):81-94
    ii. Pollak, S. (2003). Experience-dependent affective learning and risk for psychopathology in children. Ann N Y Acad Sci. 1008:102-11.

8) Gene Environment Interactions

a. Overview
    i. Rutter, M. (2007). Gene-environment interdependence. Dev Sci. 10(1):12-8.
b. Temperament
    i. Fox, Hane, Pine, (2007). Plasticity for Affective Neurocircuitry: How the Environment Affects Gene Expression. Current Directions in Psychological Science, 16 (1), 1-5.
    ii. Fox, N.A., Nichols, K.E., Henderson, H.A., Rubin, K., Schmidt, L., Hamer, D., Ernst, M., & Pine, D.S. (2005). Evidence for a gene–environment interaction in predicting behavioral inhibition in middle childhood. Psychological Science, 16, 921–926
c. Pathology
    i. Caspi A, Moffitt TE. (2006). Gene-environment interactions in psychiatry: joining forces with neuroscience. Nature reviews. Neuroscience, 7(7):583-90.
d. Epigenetic effects

i. Meaney, M., Szyf, M., Seckl, J. (2007). Epigenetic mechanisms of perinatal programming of hypothalamic-pituitary-adrenal function and health Trends in Molecular Medicine, 13, (7), 269-277
ii. Weaver IC, Cervoni N, Champagne FA, D'Alessio AC, Sharma S, Seckl JR, Dymov S, Szyf M, Meaney MJ. (2004). Epigenetic programming by maternal behavior. Nature Neuoscience, 7(8):847-54.

9) Developmental Disorder I: Mood Disorders & Externalizing

a. Overview
   i. Cicchetti & Posner, (2005). Cognitive and affective neuroscience and developmental psychopathology, Developmental Psychopathology, 17(3):569-75.
b. Depression
   i. Ashman SB, Dawson G, Panagiotides H, Yamada E, Wilkinson CW. (2002). Stress hormone levels of children of depressed mothers.Dev Psychopathol.14(2):333-49.
   ii. Dawson G, Ashman SB, Carver LJ. (2000). The role of early experience in shaping behavioral and brain development and its implications for social policy.Dev Psychopathol, 12(4):695-712.
   iii. Dawson G, Frey K, Panagiotides H, Yamada E, Hessl D, Osterling J. (1999). Infants of depressed mothers exhibit atypical frontal electrical brain activity during interactions with mother and with a familiar, nondepressed adult. Child Development, 70(5):1058-66.
c. Anxiety
   i. Pine DS, (2007). Research review: a neuroscience framework for pediatric anxiety disorders*, J Child Psychol Psychiatry, 48*(7):631-48.
   ii. Thomas, K. M., Drevets, W. C., Dahl, R. E., Ryan, N. D., Birmaher, B., Eccard, C. H., Axelson, D., Whalen, P. J., & Casey, B. J. (2001). Amygdala response to fearful faces in anxious and depressed children. Arch Gen Psychiatry, 58(11), 1057-1063.
d. Aggression
   i. Stadler C, Sterzer P, Schmeck K, Krebs A, Kleinschmidt A, Poustka F. (2007). Reduced anterior cingulate activation in aggressive children and adolescents during affective stimulation: association with temperament traits, J Psychiatr Res. 41(5):410-7

10) Sleep, Puberty, & Emotions

a. Emotions & Puberty
   i. Steinberg, L (2005). Cognitive and affective development in adolescence. Trends Cogn Sci, 9(2):69-74.
b. Sleep
   i. Dahl RE, Lewin DS (2002). Pathways to adolescent health sleep regulation and behavior. J Adolesc Health, 31(6 Suppl):175-184.
c. Subcortical & Cortical Development
   i. Galvan A, Hare TA, Parra CE, Penn J, Voss H, Glover G, Casey BJ. (2006). Earlier development of the accumbens relative to orbitofrontal cortex might underlie risk-taking behavior in adolescents. J Neurosci. 26(25):6885-92.

ii. Ernst M, Nelson EE, Jazbec S, McClure EB, Monk CS, Leibenluft E, Blair J, Pine DS (2005). Amygdala and nucleus accumbens in responses to receipt and omission of gains in adults and adolescents. Neuroimage. 2005 May 1;25(4):1279-91.

11) Social Behaviors

a. Face Processing
   i. Thomas, K. M., Drevets, W. C., Whalen, P. J., Eccard, C. H., Dahl, R. E., Ryan, N. D., & Casey, B. J. (2001). Amygdala response to facial expressions in children and adults. Biological Psychiatry, 49(4), 309-316.
   ii. Kanwisher N, Yovel G. (2006). The fusiform face area: a cortical region specialized for the perception of faces. Philos Trans R Soc Lond B Biol Sci. 361(1476):2109-28.
   iii. Passarotti, A. M., Paul, B. M., Bussiere, J. R., Buxton, R. B., Wong, E. C., & Stiles, J. (2003). The Development of face and location processing: an fMRI study. Developmental Science, 6(1), 100-117.
b. Presence of peers
   i. Gardner M, Steinberg L. (2005). Peer influence on risk taking, risk preference, and risky decision making in adolescence and adulthood: an experimental study. Dev Psychol.41(4):625-35
c. Emotional Intelligence
   i. Killgore WD, Yurgelun-Todd DA. (2007). Cogn Affect Behav Neurosci. 7(2):140-51.

12) Developmental Disorder II: Social Behaviors

a. Autism
   i. Dalton, K. M., Nacewicz, B. M., Johnstone, T., Schaefer, H. S., Gernsbacher, M. A., Goldsmith, H. H., Alexander, A. L., & Davidson, R. J. (2005). Gaze fixation and the neural circuitry of face processing in autism. Nat Neurosci, 8(4), 519-526.
   ii. Gauthier, I., & Nelson, C. A. (2001). The Development of face expertise. Current Opinion in Neurobiology, 11, 219-224.
   iii. Wang, A. T., Dapretto, M., Hariri, A. R., Sigman, M., & Bookheimer, S. Y. (2004). Neural correlates of facial affect processing in children and adolescents with autism spectrum disorder. J Am Acad Child Adolesc Psychiatry, 43(4), 481-490.
b. Williams Syndrome
   i. (Karmiloff-Smith, A. (1998) Development itself is the key to understanding developmental disorders. *Trends in Cognitive Sciences*, 2 (10), 389-398)

13) Student Presentations

V. Course requirements

Discussion leadership:

The first two classes will consist of background information provided by the instructor. On the first day of class, students will sign up for 2 class meetings during which he/she will present with a partner. Students should prepare a presentation of the required reading as well as thought-provoking questions addressed to the class. The presentation should be

comprehensive, but be open enough in format to allow for on going discussion. Students will meet with the instructor during the previous week to review the components of their presentation.

Questions generated by the readings:
Students are required to read all of the assigned papers before class in order to ensure lively discussion in class. Students will compose questions relevant to the readings and post their questions on courseworks no later than the Sunday night before class. Students are not allowed to replicate already posted questions. Additionally, to ensure that the questions are distributed across readings, there will be a limit placed on how many questions may be posted per reading. Discussion leaders should incorporate these questions into their presentation. Evaluation of the quality and quantity of participation will be included in final grade.

Thought paper:
Students will write a paper that is due on **May 7 @ 6 PM,** which is two days after the final day of class. The 10-15 page paper should take the form of a critical review paper that addresses a specific question related to the topics of the seminar. The topic must be approved by February 25th. Throughout the semester, students will meet independently with the instructor & will be required to submit an outline & list of references to facilitate the writing process. The paper may be an expansion of the presentation from class, but if the student chooses this option, it must truly expand on the presentation. Otherwise, students may choose to do a brief review/critique of any issue or area pertinent to developmental affective neuroscience. Students are free to take their main interest area as a starting point and then to bring what we know from the biological area to bear. In many cases, we will know very little (i.e., what is the bio-behavioral developmental trajectory of self-esteem?), so the student will be attempting to take a literature that seems related (e.g., reward systems, EEG asymmetry) and making bridges to their interest area. This is the "thought" component. When little is known, talking about what is known, what needs to be studied, and (in general terms), how might we go about studying the linkages between behavior and biology with regard to the student's interest area is what is desired. This paper should follow APA format. On the final meeting of class, each student will give a 10 minute presentation of their paper in Powerpoint format.

Grading:
Discussion / participation 10%
Questions 25%
Discussion leadership 40%
Thought paper/ presentation 25%