**** Preliminary Syllabus****

Memory and Executive Function Through the Lifespan

Instructor: Dr. David Friedman

PSYC G4223y	Contact Information:
4 Points	df12@cumc.columbia.edu
Spring 2016	(914):874-4290
Day/Time/Room	Wednesday, 12:10-2:00, SCH 200C
Office hours:	11:00-12:00 PM
Schermerhorn Hall	356 Schermerhorn Extension

You must e-mail me to obtain permission before you register for this seminar. In your email request, please list any relevant research work and prior courses, and any other experiences you believe might enhance your contribution to the seminar.

Optimal preparation for the course would include not only the required introductory psychology and cognitive neuroscience courses, but also courses in experimental design (PSYC W1450 or W1455) and statistics (PSYC W1610 or STAT W1001, W1111, or W1211).

Bulletin Description:

Prerequisites: Instructor's permission plus PSYC W1001 and W1010, or the equivalent.

Memory and executive processing are critical cognitive functions required for successfully navigating everyday life. In lifespan studies, both exhibit relatively long developmental trajectories followed by stasis and then relative decline in old age. Yet neither memory nor executive function is a unitary construct. Both are comprised of separable components that may change in different ways across the lifespan. Moreover, memory is malleable and is a reconstruction of past experience, not an exact reproduction. We will consider why this is so important and will discuss, from a cognitive-neuroscience perspective, a range of topics related to the development, maintenance and potential decline in memory and executive function from infancy through old age.

Full Course Description:

All aspects of human memory and executive function are critical for navigating everyday life as well as becoming a successful contributor to society. For example, our stored experiences provide us with a sense of who we are and enable us to use these past experiences to carry out current task goals and even to peek into the future. Similarly, executive processing provides us with the ability to plan, render decisions and create strategies for dealing not only with situations we've encountered in the past but, most important, to deal with entirely novel circumstances that do not have representations in memory. Hence, this seminar is intended to provide a forum for theoretical discussion concerning the wide

variety of memory and executive processes that underpin the modern human mind. Questions we will consider include the following: Do implicit (procedural memory) and explicit (declarative or episodic) memory develop similarly from infancy through childhood and young adulthood; do these processes deteriorate inexorably as individuals age? Which brain systems underlie the different aspects of memory and executive function and do they change in any systematic fashion across the lifespan? Is the older-adult brain plastic enough to overcome the deleterious effects of aging on the brain and the concomitant decreases in memory and executive function?

The seminar emphasizes the cognitive aspects of the targeted functions but also considers the contribution of cognitive neuroscience perspectives (event-related potentials and fMRI) to the development of these essential neurocognitive functions. Each session is intended to engender theoretically-based discussion of the topic at hand that will engage you and your fellow students in a stimulating and thought-provoking exchange of ideas.

Course Goals and Objectives:

You will gain a broad understanding of the lifespan development of memory and executive function from a few different theoretical and methodological perspectives. Importantly, the course will also provide discussion of the practical aspects of experimental design, enabling you to critique particular designs and analyses and whether they allow the investigators to reach the conclusions they do. The seminar will also provide you with a basic understanding of how to plan and conduct scientific research and enable you to design your own experiment dealing with an aspect of memory and/or executive function, cognitive abilities that have powerful effects in shaping your everyday life experience and future. Finally, your written materials, oral presentations and final experimental paper will increase your critical thinking and communication skills and your knowledge of these vitally-important cognitive functions.

During and after completing this course you should be able to:

- Discuss the various components that comprise memory and executive processing.
- Describe how the various aspects of memory and executive function change over the lifespan and the challenges that their study entails.
- Review, interpret, discuss and provide critical commentary of original scientific readings.
- Create your own experimental design that enables the examination of an aspect of memory and/or executive function that you are particularly interested in or any topic discussed in the seminar and present your experimental ideas to the class and in a final paper.
- Lead discussions of the readings and contribute to those discussions by posting questions and speaking in all seminar sessions.

Role of the Course in the Departmental Curriculum:

PSYC G4223 will help address several gaps in the psychology curriculum, including an absence of lifespan developmental courses and the loss of Prof. Ed Smith's courses on memory. In addition, the course will fulfill the following degree requirements:

- For Psychology Graduate Students, it 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 Postbac certificate, it will meet the Group I (Perception and Cognition) distribution requirement.
- For the Neuroscience and Behavior joint major, it will fulfill the 5th Psychology requirement: "one advanced psychology seminar from a list approved by the Psychology Department advisor to the program."
- For Psychology Postbac certificate students, and for Psychology majors who enter Columbia in the Fall of 2013 or later, it will fulfill the seminar requirement.
- For non-majors in the College and G.S., it will count as one term of the natural science requirement, provided that students obtain the necessary permission and have taken the prerequisite psychology courses. Graduate students, and students who are majoring in Psychology or in Neuroscience and Behavior, will have priority over students who are taking the course for the science requirement, and we anticipate the course will rarely be used for the latter.
- For the Barnard Psychology major, it will fulfill the senior seminar requirement.

Readings:

All readings will be posted on *CourseWorks*.

Course Requirements and Grading:

Regular attendance and full participation in seminar discussions are essential requirements. You must carefully, thoroughly and thoughtfully complete all reading and writing assignments prior to each class. Each week, two students will serve as discussants. This means they will have read, digested and mastered the assigned papers, read additional material, each posted discussion questions, and each prepared a Power-Point presentation. Additionally, each of the non-discussants will prepare two cogent questions for each of the four assigned papers. These will serve to alert the discussants to points they may want to cover in their presentation of the papers. The questions will also be useful for each of the non-discussants to bring up in class on the day the papers are discussed. All questions are to be posted two days prior to class on CourseWorks and the handouts and/or power-point presentations are due on the day you have been designated a discussant. Class presentations should be short and to the point (no

more than fifteen minutes for the two assigned papers and an additional ten-fifteen minutes for discussion).

In addition to the requirement for contributions during class, there will be a mid-term written and oral presentation of an outline of your ideas for an experiment and, based on this, a final experimental paper (with Abstract, Introduction, Methods, Hypothesized Results and Discussion) and an oral presentation of your experimental paper. Following both the initial and final presentations, written peer reviews will be required from each member of the class. These various components of your class performance will contribute to your grade as follows:

Grading:

- 30% Class participation
- 30% Leading discussions of readings and posting questions
- 35% Research Proposal, comprising:

  5% – Initial written and oral proposal
  15% – In-class Power-Point presentation of proposal
  15% – Final written experimental paper
-
- 5% Peer reviews of fellow-student initial and final presentations

Final Experimental Paper:

Each student will complete a 10-12 page (not counting references) experimental paper on a memory/executive function topic of your choice following consultation with me. This is essentially a research proposal, as the results will be "hypothetical," that is, created by you on the basis of your readings and extended research into the topic you choose. These papers should be of similar format (only much briefer) to the experimental papers that have been read and discussed in class. I have provided a template below at the end of this syllabus that you can use in writing up your experiment. Two days prior to Session 6, you will post a paragraph describing the questions your research proposal will address and the methodology you intend to use, and provide at least two relevant references. A written outline will be due in class on Session 9, and you will also make an oral presentation of your research proposal in that class. Oral presentations of your final research paper will take place during the last two classes of the semester (sessions 13 and 14). The final written version will be due on the last day of class. Please see the timeline below for all deadlines.

Course Policies:

- **Academic Integrity –** Academic integrity is a vital aspect of the scientific enterprise and, importantly, its written output. Hence, plagiarism is not permissible and will not be tolerated. I want to know what you think. This means that all of the work that you submit must be your own, with appropriate citations to work that others have done (including URLs and titles for websites) upon which you are building. Please read Columbia's policy on academic integrity at: https://www.college.columbia.edu/academics/integrity. Each time you submit an assignment in

this class you will be asked to affirm that you have not plagiarized, used unauthorized materials, or given or received illegitimate help.

- **Assignment Submission** – All assignments are to be turned in on time (see timeline below) and all comments and questions for discussion must be posted on CourseWorks two days prior to class. The research proposal outline and final paper must be brought to class on the assigned day. For every day they are late, 5 points will be deducted from your final score. If additional time is needed to complete an assignment because of an unexpected emergency, you must contact me directly and provide appropriate documentation.

- **Attendance Policy** – Your active participation in this class via contributions to the discussions is an integral aspect of the structure of the seminar. If you cannot attend a class you must notify me in advance. If your absence is due to an emergency, you must provide documentation from either a doctor or your dean.

- **Technology Usage** – Using cell phones, laptops, or other electronic devices is not permitted, unless they are used for reasons related directly to class discussion (for example, for note taking).

TIMELINE (subject to revision):

All readings will be available on CourseWorks.
Asterisks (*) indicate optional reading materials

SESSION 1: **(Jan 20) Introduction and Syllabus overview; Mini-lectures on Episodic Memory and Executive Function**

Background Reading for first session:

Craik, F. I., & Bialystok, E. (2006). Cognition through the lifespan: mechanisms of change. *Trends in Cognitive Science, 10*(3), 131-138. doi: 10.1016/j.tics.2006.01.007

Each session will begin with an approximately 10-15 minute presentation by me to orient the class to the importance and relevance of the assigned papers to the topic under discussion.

***SESSION 2*: (Jan 27) Memory Systems I: Episodic, Direct or Declarative Memory**

***Readings*:**

- Tulving, E. (1993). What is episodic memory? *Current Directions in Psychological Science, 2*, 67-70.
- Squire, L. R. (2009). The legacy of patient H.M. for neuroscience. *Neuron, 61*(1), 6-9. doi: 10.1016/j.neuron.2008.12.023
- Yonelinas, A. P. (2001). Components of episodic memory: the contribution of recollection and familiarity. *Philosophical Transactions of the Royal Society of London B: Biological Sciences, 356*(1413), 1363-1374.

- Rugg, M. D., & Yonelinas, A. P. (2003). Human recognition memory: a cognitive neuroscience perspective. *Trends in Cognitive Science, 7*(7), 313-319.
- *Allen, T. A., & Fortin, N. J. (2013). The evolution of episodic memory. *Proceedings of the National Academy of Sciences U S A, 110 Supplement 2*, 10379-10386. doi: 10.1073/pnas.1301199110
- *Milner, B., Corkin, S., & Teuber, H-L. (1968). Further analysis of the hippocampal amnesic syndrome: 14-year follow-up study of H.M. *Neuropsychologia, 6*, 315-344.
- ***Milner, B., Squire, L. R., & Kandel, E. R. (1998). Cognitive neuroscience and the study of memory. *Neuron, 20*(3), 445-468
- *Rugg, M. D., & Vilberg, K. L. (2013). Brain networks underlying episodic memory retrieval. *Current Opinion in Neurobiology, 23*(2), 255-260. doi: 10.1016/j.conb.2012.11.005

SESSION 3: **(Feb 3) Memory Systems II: Implicit, Indirect or Non-Declarative Memory**

***Readings*:**

- Tulving, E, & Schacter, D L. (1990). Priming and human memory systems. *Science, 247*, 301-306.
- Warrington, E K., & Weiskrantz, L. (1968). New method of testing long-term retention with special reference to amnesic patients. *Nature, 217*, 972-974.
- Cohen, N. J., & Squire, L. R. (1980). Preserved learning and retention of pattern-analyzing skill in amnesia: dissociation of knowing how and knowing that. *Science, 210*(4466), 207-210.
- Squire, L R. (1992). Declarative and nondeclarative memory: Multiple brain systems supporting learning and memory. *Journal of Cognitive Neuroscience, 4*, 232-243.
- *Schacter, D. L., Church, B., & Treadwell, J. (1994). Implicit Memory in Amnesic Patients - Evidence for Spared Auditory Priming. *Psychological Science, 5*(1), 20-25. doi: DOI 10.1111/j.1467-9280.1994.tb00608.x
- *Schacter, D. L. (1992). Understanding implicit memory. A cognitive neuroscience approach. *American Psychologist, 47*(4), 559-569.
- *Roediger, H. L. (1990). Implicit Memory - Retention without Remembering. *American Psychologist, 45*(9), 1043-1056. doi: Doi 10.1037//0003-066x.45.9.1043
- *Heindel, W. C., Salmon, D. P., Shults, C. W., Walicke, P. A., & Butters, N. (1989). Neuropsychological evidence for multiple implicit memory systems: a comparison of Alzheimer's, Huntington's, and Parkinson's disease patients. *Journal of Neuroscience, 9*(2), 582-587.

SESSION 4: **(Feb 10) Executive Function and Working Memory**

***Readings*:**

- Diamond, A. (2013). Executive functions. *Annual Review of Psychology, 64*, 135-168. doi: 10.1146/annurev-psych-113011-143750
- Miyake, A., & Friedman, N.P. (2012). The Nature and Organization of Individual Differences in Executive Functions: Four General Conclusions. *Current Directions in Psychological Science, 21,* 8-14.
- Shallice, T., & Burgess, P. (1996). The domain of supervisory processes and temporal organization of behaviour. *Philosophical Transactions of the Royal Society of London, 351*(1346), 1405-1411.

- Baddeley, A. (1992). Working Memory. *Science, 255*, 556-559.
- *Banich, M.T. (2009). Executive Function: The Search for an Integrated Account. *Current Directions in Psychological Science, 18*(2), 89-94.
- *Elward, R. L., & Wilding, E. L. (2010). Working memory capacity is related to variations in the magnitude of an electrophysiological marker of recollection. *Brain Research, 1342*, 55-62. doi: S0006-8993(10)00937-6 [pii]10.1016/j.brainres.2010.04.040
- *Diamond, A. (2013). Executive functions. *Annual Review of Psychology, 64*, 135-168. doi: 10.1146/annurev-psych-113011-143750
- *Welshon, R., (2010). Working Memory, Neuroanatomy, and Archaeology. *Current Anthropology, 51* (S1), S191-S199.
- *Balter, M. (2010). Evolution of behavior. Did working memory spark creative culture? *Science, 328*(5975), 160-163. doi: 328/5975/160 [pii]10.1126/science.328.5975.160
- *Balter, M. (2010). Evolution of behavior. Does 'working memory' still work? *Science, 328*(5975), 162. doi: 328/5975/162 [pii]10.1126/science.328.5975.162
- *****Baddeley, A. (2000). The episodic buffer: a new component of working memory? *Trends in Cognitive Science, 4*(11), 417-423.

SESSION 5: **(Feb 17) Development of Executive Function and Working Memory across the Lifespan**

***Readings*:**

- Zelazo, P. D. (2004). The development of conscious control in childhood. *Trends in Cognitive Science, 8*(1), 12-17. doi: S1364661303002997[pii]
- Davidson, M. C., Amso, D., Anderson, L. C., & Diamond, A. (2006). Development of cognitive control and executive functions from 4 to 13 years: evidence from manipulations of memory, inhibition, and task switching. *Neuropsychologia, 44*(11), 2037-2078.
- Reimers, S., & Maylor, E. A. (2005). Task switching across the life span: effects of age on general and specific switch costs. *Developmental Psychology, 41*(4), 661-671.
- Mischel, W., Ayduk, O., Berman, M. G., Casey, B. J., Gotlib, I. H., Jonides, J., et al. (2011). 'Willpower' over the life span: decomposing self-regulation. *Social Cognitive and Affective Neuroscience, 6*(2), 252-256. doi: 10.1093/scan/nsq081
- *Friedman, D., Nessler, D., Cycowicz, Y.M., & Horton, C. (2009). Development of and Change in Cognitive Control: A Comparison of Children, Young and Older Adults. *Cognitive and Affective Behavioral Neuroscience, 9*(1), 91-102.
- *Zelazo, P. D., Craik, F. I.M., & Booth, L. (2004). Executive function across the life span. *Acta Psychologica (Amsterdam), 115*(2-3), 167-183.
- *Cowan, N., Naveh-Benjamin, M., Kilb, A., & Saults, J. S. (2006). Life-span development of visual working memory: when is feature binding difficult? *Developmental Psychology, 42*(6), 1089-1102. doi: 2006-20488-009 [pii]10.1037/0012-1649.42.6.1089
- *Moffitt, T. E., Arseneault, L., Belsky, D., Dickson, N., Hancox, R. J., Harrington, H., Caspi, A. et al. (2011). A gradient of childhood self-control predicts health, wealth, and public safety. *Proceedings of the National Academy of Sciences USA, 108*(7), 2693-2698. doi: 10.1073/pnas.1010076108
- *Diamond, A., & Lee, K. (2011). Interventions shown to aid executive function development in children 4 to 12 years old. *Science, 333*(6045), 959-964. doi: 333/6045/959 [pii]10.1126/science.1204529

***SESSION 6*: (Feb 24) Memory in infancy and Early Childhood (*Paragraph describing your experimental proposal is due on CourseWorks 2 days prior to class*)**

***Readings*:**

- Rovee-Collier, C. (1999). The development of infant memory. *Current Directions in Psychological Science, 8*, 80-83.
- McKee, R.D., & Squire, L.R. (1993). On the development of declarative memory. *Journal of Experimental Psychology: Learning, Memory, and Cognition, 19*, 397-404.
- Rovee-Collier, C., Hartshorn, K., & DiRubbo, M. (1999). Long-term maintenance of infant memory. *Developmental Psychobiology, 35*(2), 91-102.
- Meltzoff, A. N. (1995). What infant memory tells us about infantile amnesia: long-term recall and deferred imitation. *Journal of Experimental Child Psychology, 59*(3), 497-515.
- *Morgan, K., & Hayne, H. (2011). Age-related changes in visual recognition memory during infancy and early childhood. *Developmental Psychobiology, 53*(2), 157-165. doi: 10.1002/dev.20503
- *Rovee-Collier, C. (1997). Dissociations in infant memory: rethinking the development of implicit and explicit memory. *Psychological Review, 104*(3), 467-498.
- *Hayne, H., Boniface, J., & Barr, R. (2000). The development of declarative memory in human infants: age-related changes in deferred imitation. *Behavioral Neuroscience, 114*(1), 77-83.
- *Alvarado, M. C., & Bachevalier, J. (2000). Revisiting the maturation of medial temporal lobe memory functions in primates. *Learning and Memory, 7*(5), 244-256.

***SESSION 7*: (Mar 2) Does Implicit Memory Develop?**

***Readings*:**

- Graf, P. (1990). Life-span changes in implicit and explicit memory. *Bulletin of the Psychonomic Society, 28*, 353-358.
- Schacter, D L., & Moscovitch, M. (1984). Infants, amnesics, and dissociable memory systems. In M Moscovitch (Ed.), *Infant Memory* (pp. 173-216).
- Cycowicz, Y. M., Friedman, D., Snodgrass, J. G., & Rothstein, M. (2000). A developmental trajectory in implicit memory is revealed by picture fragment completion. *Memory, 8*(1), 19-35.
- Russo, R., Nichelli, P., Gibertoni, M., & Cornia, C. (1995). Developmental-Trends in Implicit and Explicit Memory - a Picture Completion Study. *Journal of Experimental Child Psychology, 59*(3), 566-578. doi: DOI 10.1006/jecp.1995.1026
- *Billingsley, R. L., Lou Smith, M., & Pat McAndrews, M. (2002). Developmental patterns in priming and familiarity in explicit recollection. *Journal of Experimental Child Psychology, 82*(3), 251-277.
- *Perez, L. A., Peynircioglu, Z. F., & Blaxton, T. A. (1998). Developmental differences in implicit and explicit memory performance. *Journal of Experimental Child Psychology, 70*(3), 167-185. doi: 10.1006/jecp.1998.2449
- *Murphy, K., McKone, E., & Slee, J. (2003). Dissociations between implicit and explicit memory in children: the role of strategic processing and the knowledge base. *Journal of Experimental Child Psychology, 84*(2), 124-165.
- *Hayes, B. K., & Hennessy, R. (1996). The nature and development of nonverbal implicit memory. *Journal of Experimental Child Psychology, 63*(1), 22-43. doi: 10.1006/jecp.1996.0041

- *See also the Rovee-Collier "Dissociations in Infant Memory" paper in the readings for the previous section above

SESSION 8: (Mar 9) **Development of Episodic Memory through Childhood and Adolescence – Neurocognitive Approaches**

Readings:

- Ornstein, P.A., & Haden, C.A. (2001). Memory Development or the Development of Memory? *Current Directions in Psychological Science, 10*, 202-205.
- Cycowicz, Y. M., Friedman, D., Snodgrass, J. G., & Duff, M. (2001). Recognition and source memory for pictures in children and adults. *Neuropsychologia, 39*(3), 255-267.
- Ofen, N., Kao, Y. C., Sokol-Hessner, P., Kim, H., Whitfield-Gabrieli, S., & Gabrieli, J. D. (2007). Development of the declarative memory system in the human brain. *Nature Neuroscience, 10*(9), 1198-1205. doi: nn1950 [pii]10.1038/nn1950
- Friedman, D., de Chastelaine, M., Nessler, D., & Malcolm, B. (2010). Changes in familiarity and recollection across the lifespan: An ERP perspective. *Brain Research, 1310*, 124-141. doi: S0006-8993(09)02442-1 [pii]10.1016/j.brainres.2009.11.016
- *Ghetti, S., DeMaster, D. M., Yonelinas, A. P., & Bunge, S. A. (2010). Developmental differences in medial temporal lobe function during memory encoding. *Journal of Neuroscience, 30*(28), 9548-9556. doi: 30/28/9548 [pii]10.1523/JNEUROSCI.3500-09.2010
- *Gathercole, S. E. (1998). The development of memory. *Journal of Child Psychology and Psychiatry, 39*(1), 3-27.
- *de Haan, M., Mishkin, M., Baldeweg, T., & Vargha-Khadem, F. (2006). Human memory development and its dysfunction after early hippocampal injury. *Trends in Neuroscience, 29*(7), 374-381. doi: S0166-2236(06)00096-8 [pii]10.1016/j.tins.2006.05.008
- *Chiu, C. Y., Schmithorst, V. J., Brown, R. D., Holland, S. K., & Dunn, S. (2006). Making memories: a cross-sectional investigation of episodic memory encoding in childhood using FMRI. *Dev Neuropsychol, 29*(2), 321-340. doi: 10.1207/s15326942dn2902_3

SPRING RECESS: March 14, 2015 to Friday, March 18, 2015

SESSION 9: **(Mar 23)** ***Outline of research paper is due. Give oral presentation (Power-Point) of outline in class.***

SESSION 10: **(Mar 30) Development of Episodic Memory – Decline at Older Ages, Neurocognitive Approaches**
(Peer reviews of the outlines are due and must be posted on CourseWorks 2 days before class)

Readings*:*

- Friedman, D., Nessler, D., & Johnson, R., Jr. (2007). Memory encoding and retrieval in the aging brain. *Clinical EEG and Neuroscience*, 38(1), 2-7.
- Fleischman, D. A., Wilson, R. S., Gabrieli, J. D., Bienias, J. L., & Bennett, D. A. (2004). A longitudinal study of implicit and explicit memory in old persons. *Psychology and Aging*, 19(4), 617-625.

- Jennings, J. M., & Jacoby, L. L. (1993). Automatic versus intentional uses of memory: aging, attention, and control. *Psychology and Aging*, 8(2), 283-293.
- Reuter-Lorenz, P.A., & Cappell, K.A. (2008). Neurocognitive Aging and the Compensation Hypothesis. *Current Directions in Psychological Science, 17*(3), 177-182.
- *Danckert, S. L., & Craik, F. I. (2013). Does Aging Affect Recall More Than Recognition Memory? *Psychology and Aging*. doi: 10.1037/a0033263
- *Bailey, H. R., Zacks, J. M., Hambrick, D. Z., Zacks, R. T., Head, D., Kurby, C. A., & Sargent, J. Q. (2013). Medial temporal lobe volume predicts elders' everyday memory. *Psychological Science*, 24(7), 1113-1122. doi: 10.1177/0956797612466676
- *Nyberg, L., Lovden, M., Riklund, K., Lindenberger, U., & Backman, L. (2012). Memory aging and brain maintenance. *Trends in Cognitive Science, 16*(5), 292-305. doi: 10.1016/j.tics.2012.04.005
- *Friedman, D. (2013). The cognitive aging of episodic memory: a view based on the event-related brain potential. *Frontiers in Behavioral Neuroscience, 7*, 111. doi:10.3389/fnbeh.2013.00111
- *Nessler, D., Johnson, R., Bersick, M., & Friedman, D. (2006). On why the elderly have normal semantic retrieval but deficient episodic encoding: A study of left inferior frontal ERP activity. *Neuroimage*, 30(1), 299-312.

***SESSION 11*: (Apr 6) Memory is malleable: Behavioral and Brain Studies**

Readings:

- Loftus, E.F. (2004). Memories of Things Unseen. *Current Directions In Psychological Science*, 13, 145-147.
- Schacter, D.L. (1997). False recognition and the brain. *Current Directions in Psychological Science*, 6, 65-70.
- H.L. Roediger, III, & McDermott, K.B. (1995). Creating False Memories: Remembering Words Not Presented in Lists. *Journal of Experimental Psychology: Learning, Memory, and Cognition*, 21(4), 803-814.
- Okado, Y., & Stark, C. (2003). Neural processing associated with true and false memory retrieval. *Cognitive, Affective, & Behavioral Neuroscience*, 3, 323-334.
- Gonsalves, B., & Paller, K. A. (2002). Mistaken memories: Remembering events that never happened. *Neuroscientist*, 8(5), 391-395. doi: Doi 10.1177/107385802236964
- *Loftus, E. F. (2005). Planting misinformation in the human mind: a 30-year investigation of the malleability of memory. *Learning and Memory*, 12(4), 361-366. Doi: 10.1101/Lm.94705
- *Brainerd, C.J., & Reyna, V.F. (2002). Fuzzy-Trace Theory and False Memory. *Current Directions in Psychological Science, 11*, 164-169.
- *Atkins, A. S., & Reuter-Lorenz, P. A. (2011). Neural mechanisms of semantic interference and false recognition in short-term memory. *Neuroimage, 56*(3), 1726-1734. doi: 10.1016/j.neuroimage.2011.02.048

***SESSION 12*: (Apr 13) Malleable Memory: False Memory in Children and Older Adults**

***Readings*:**

- Ghetti, S. (2008). Rejection of False Events in Childhood A Metamemory Account. *Current Directions in Psychological Science, 17*(1), 16-20.

- Carneiro, P., Albuquerque, P., Fernandez, A., & Esteves, F. (2007). Analyzing false memories in children with associative lists specific for their age. *Child Development, 78*(4), 1171-1185. doi: 10.1111/j.1467-8624.2007.01059.x
- Dennis, N. A., Kim, H., & Cabeza, R. (2008). Age-related differences in brain activity during true and false memory retrieval. *Journal of Cognitive Neuroscience, 20*(8), 1390-1402. doi: 10.1162/jocn.2008.20096
- Paz-Alonso, P. M., Ghetti, S., Donohue, S. E., Goodman, G. S., & Bunge, S. A. (2008). Neurodevelopmental correlates of true and false recognition. *Cerebral Cortex, 18*(9), 2208-2216. doi: bhm246 [pii]10.1093/cercor/bhm246
- *Balota, D.A., Cortese, M.J., Duchek, J.M., Adams, D., III, H.L. Roediger, McDermott, K.B., & Yerys, B.E. (1999). Veridical and False Memories in Healthy Older Adults and in Dementia of the Alzheimer's Type. *Cognitive Neuropsychology, 16*, 361-384.
- *Duarte, A., Graham, K. S., & Henson, R. N. (2010). Age-related changes in neural activity associated with familiarity, recollection and false recognition. *Neurobiology of Aging, 31*(10), 1814-1830. doi: S0197-4580(08)00350-3 [pii]10.1016/j.neurobiolaging.2008.09.014
- *Ceci, S.J., Bruck, M., & Rosenthal, R. (1995). Children's Allegations of Sexual Abuse: Forensic And Scientific Issues: A Reply to Commentators. *Psychology, Public Policy, and Law 1*(2), 494-520.
- *Jacoby, L. L., Wahlheim, C. N., Rhodes, M. G., Daniels, K. A., & Rogers, C. S. (2010). Learning to diminish the effects of proactive interference: reducing false memory for young and older adults. *Memory and Cognition, 38*(6), 820-829. doi: 10.3758/MC.38.6.820

SESSION 13: **(Apr 20)** ***Written, Experimental Research Paper is due. Give oral presentations of research proposals (peer reviews written at home and due on CourseWorks 2 days prior to next session)***

SESSION 14: **(Apr 27) Last Day of Class:** ***Give remaining oral presentations (peer reviews written at home and due on CourseWorks 5 days later, i.e., 2 days before the next class would have met)***

FORMAT FOR FINAL PAPER (10-12 pages not counting references; please follow the guidelines precisely as written below):

1. Introduction (about 3-4 pages)

What is the question you want to answer? What research work has come before that you want to build on? In this section you want to pique the reader's interest and tell him/her why your experiment is important. What is the research you are proposing designed to accomplish? For example, it might be designed to test a specific hypothesis or develop a novel method that has not been used previously. As noted above, provide the background work leading to your study, critically evaluate existing knowledge, and specifically identify the gap(s) that the study is intended to fill.

2. Methods (3-4 pages)

Describe the experimental design and procedures to be followed to complete the study. Include methods for data collection, and methods for analyzing and interpreting the data and a rationale for why you are using these specific procedures. Describe any new method or

technique you might be using and why. Include a statement about informed consent and how it will be obtained.

3. Predicted Results (1-2 pages)

What do you expect given your hypotheses and background readings? End this section with a paragraph or two on the potential difficulties and/or limitations of the proposed procedures. Add any alternative procedures/methods that might be considered for future studies.

4. Discussion (3-4 pages)

Begin with a brief summary of your results and whether they are consistent with your hypothesis or hypotheses. How do your results make contact with the research work that's already been published? Why are your results important both with respect to the area of research you've chosen as well as to the larger scientific community and, potentially, the lay public? In other words, how do the results advance knowledge in the field? End with a "Conclusion" section (1-2 paragraphs) in which you highlight the findings, your interpretations and their importance and relevance to the field and the wider scientific community and, if applicable, the lay public.

5. References (no page limit, but 1 or 2 pages should suffice).

Use American Psychological Association format. This style is available in the ENDNOTE software program that is free for Columbia students and can be downloaded from the CUIT website. Do not cite articles unless you have read them. You can refer to papers you haven't read by citing them as "reviewed by "so and so et al." or as summarized in other places such as website sources (place the URLs and the website's title in the reference section).