

**\*\*\*\* Preliminary Syllabus\*\*\*\***

**Memory and Executive Function Through the Lifespan**

**Instructor: Dr. David Friedman**

PSYC GU4223y

4 Points

Spring 2021

Day/Time/Room

Office hours:

Schermerhorn Hall

Contact Information:

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(914):874-4290

Wednesday, 12:10-2:00, SCH 200C

By appointment using Zoom

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 UN1450, UN1455, or UN1490) and statistics (PSYC UN1610 or STAT UN1001, UN1101, or UN1201).

**Prerequisites:** Instructor's permission plus PSYC UN1001 The Science of Psychology, and UN1010 Mind, Brain, & Behavior or UN2430 Cognitive Neuroscience, or the equivalent.

**Bulletin Description:**

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, fMRI and other techniques) 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. Moreover, your written materials, oral presentations and final review paper will increase your critical thinking and communication skills and your knowledge of these vitally-important cognitive functions. Finally, this course will enable you to make sense of the discussions of scientific findings pertaining to memory and executive function published in the media and to critically evaluate them with respect to decisions you make about your life and those close to you.

**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 conceptual/theoretical overviews of the assigned papers and speaking in all seminar sessions.

**Role of the Course in the Departmental Curriculum:**

PSYC GU4223 will help address several gaps in the psychology curriculum, including an absence of lifespan developmental courses and the loss of Professor Ed Smith's courses on memory. In addition, the course will fulfill the following degree requirements:

- For Psychology Graduate Students, with prior permission from the Director of Graduate Studies (DGS), this course could 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 5<sup>th</sup> 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 may fulfill the senior seminar requirement.

**Readings:**

All readings will be posted on *CourseWorks*. There is no textbook required.

**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, three students will serve as discussants (one for each assigned paper). This means they will have read, digested and mastered the assigned papers, read additional material (for example, the optional readings), each asked questions germane to their presentations, and each prepared a Power-Point slide series. Additionally, each of the non-discussants will prepare a conceptual/theoretical brief essay (no more than one double-spaced page in length) that summarizes and points out what they believe to be the theoretical importance of the three assigned readings. These essays will also serve to alert the discussants to points they may want to cover in their presentation of the papers. These short

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essays will also be useful for each of the non-discussants to bring up in class on the day the papers are discussed. All essays are to be posted two days prior to class (on Monday by 12 AM) on CourseWorks. Power-point presentations are to be sent to me in draft form by Sunday evening prior to Wednesday's class. The final version is due on CourseWorks and in class the day you have been designated a discussant. Class presentations should be short and to the point (no more than ten minutes for each of the assigned papers and an additional ten 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 a critical and theoretical review of an area (within the purview of the seminar's subject matter) of your choosing and, based on this, a final paper (with ***Introduction, Review, and Discussion***). There will be a final oral presentation of your review paper during the last two classes of the semester. These various components of your class performance will contribute to your grade as follows:

#### **Grading:**

- 30% Class participation
- 10% Theoretical, brief essays
- 30% Leading discussions of readings
- 30% Research Review, comprising:
  - 5% – Initial written and oral review
  - 10% – In-class Power-Point presentation of review
  - 15% – Final written review paper

#### **Final Review Paper:**

Each student will complete a double-spaced, 12-15 page (not counting references) review paper on a memory/executive function topic of your choice following consultation with me. This is essentially a short, critical and theoretical review 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 to some of the review 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 your review. Two days prior to Session 6, you will post a paragraph describing the topic your review will address 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 review in that class. Oral presentations of your final research review paper will take place during the last two classes of the semester (sessions 13 and 14). The final typed 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 brief essays for discussion must be posted on CourseWorks two days prior to class. The review outline and final paper must be brought to class on the assigned day. For every day it is late, **5 points will be deducted** from your final score. Similarly, if your brief essay on the readings is not uploaded on time, **1 point will be deducted** for every day it is late. 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).

### **Policy on Academic Integrity in the Virtual and Hybrid Class Environment**

The Columbia undergraduate classroom, whether real or virtual, is a vital and dynamic space for learning, sustained by the expectation that the class experience is shared only by participants in the course. The free and respectful exchange of ideas is the foundation of teaching and learning and can occur only if all course participants agree as a matter of academic integrity (subject to standard penalties) to respect the guidelines established below. To support and sustain the class experience, the Columbia undergraduate Committee on Instruction sets forth the following expectations, pertaining both to course materials and to course meetings:

- Course materials, including handouts, readings, slides, and attendant materials must not be broadly shared, distributed, or sold outside the course environment (including on social media) without permission of the instructor. They must be understood as the product of instructors' intellectual work, and treated as their property.
- The contents of class discussion and breakout rooms may not be circulated outside the classroom, in whole or in part, for non-educational purposes (e.g., on social media) or outside the Columbia community. Students are expected to respect the complex dynamics of class discussion and use discretion when repeating the ideas of others outside of the classroom. The audio and visual recordings of class discussion and breakout rooms belong to the course participants and must be understood in the context of the course. This is especially crucial to protect the identity of speakers; in certain circumstances, failure to do so could be a form of bullying and could endanger course participants.
- Recordings of class sessions must not be shared, in whole or in part, with those outside the class. Students are not permitted to record any portion of class sessions without the explicit consent of the instructor. If you have questions about any aspects of this policy, please consult with your instructor, or with your school administrators.

**TIMELINE (subject to revision):**

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

**SESSION 1: (Jan 13) 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 15-20 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 20) Memory Systems I: Episodic, Direct or Declarative Memory**

**Readings: \* indicates a supplemental reading that's not required, but may be useful for adding to a presentation and/or use in term paper.**

- 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
- 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
- \*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.
- \*The Other Side of the Memory Story: Why do we forget?
  - Wixted, J. T. (2005). A Theory About Why We Forget What We Once Knew. *Current Directions in Psychological Science*, 14(1), 6-9.
  - Norby, S. (2015). Why Forget? *On the Adaptive Value of Memory Loss. Perspectives in Psychological Science*, 10(5), 551-578. doi:10.1177/1745691615596787

**SESSION 3: (Jan 27) 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.
- Squire, L R. (1992). Declarative and nondeclarative memory: Multiple brain systems supporting learning and memory. *Journal of Cognitive Neuroscience*, 4, 232-243.
- \*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.
- \*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.

Here's a reading on **Implicit Bias**, which is currently a hot topic springing from the study of implicit memory:

- \*Sleek, S. The Bias Beneath (2018), *The Observer*, February, 31 (2), 11-14; retrieved from: <https://www.psychologicalscience.org/observer/the-bias-beneath-two-decades-of-measuring-implicit-associations>

**SESSION 4: (Feb 3) 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.
- Baddeley, A. (1992). Working Memory. *Science*, 255, 556-559.
- \*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.
- \*Banich, M.T. (2009). Executive Function: The Search for an Integrated Account. *Current Directions in Psychological Science*, 18(2), 89-94.
- \*Edward, 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 10) 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]
- 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
- \*Beran, M. J. (2015). Chimpanzee Cognitive Control. *Current Directions in Psychological Science*, 24(5), 352-357. doi: 10.1177/0963721415593897
- \*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
- \*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.
- *A paper and commentary on methodological problems with the original marshmallow test well worth a look-see:*



- \*Watts, T.W., Duncan, G.J., and Quan, H. (2018). Revisiting the Marshmallow Test: A Conceptual Replication Investigating Links Between Early Delay of Gratification and Later Outcomes. *Psychological Science*, [doi.org/10.1177/0956797618761661](https://doi.org/10.1177/0956797618761661)
- *Commentary: A New Approach to the Marshmallow Test Yields Complicated Findings* (2018); *The Observer*, 31, Retrieved from: <https://www.psychologicalscience.org/publications/observer/obsonline/a-new-approach-to-the-marshmallow-test-yields-complex-findings.html>

**SESSION 6: (Feb 17) Memory in infancy and Early Childhood (Paragraph describing your Research Review 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.
- 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.
- \*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: (Feb 24) Does Implicit Memory Develop?**

**Readings:**

- Graf, P. (1990). Life-span changes in implicit and explicit memory. *Bulletin of the Psychonomic Society*, 28, 353-358.
- 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.

- \*Schacter, D L., & Moscovitch, M. (1984). Infants, amnesics, and dissociable memory systems. In M Moscovitch (Ed.), *Infant Memory* (pp. 173-216).
- \*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

### **SPRING RECESS: Monday, March 1, 2021 to Friday, March 5, 2021**

#### **SESSION 8: (Mar 10) 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
- In case any of you believe you have true episodic memories from age 2 and below, check out this paper:
  - *Akhtar et al. (2018), Fictional First Memories, Psychological Science, 29 (10), 1612-1619.*

**SESSION 9: (Mar 17) Outline of Research Review paper is due. Give oral presentation (Power-Point) of outline in class.**

**SESSION 10: (Mar 24) Development of Episodic Memory – Decline at Older Ages, Neurocognitive Approaches**

**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.
- Reuter-Lorenz, P.A., & Cappell, K.A. (2008). Neurocognitive Aging and the Compensation Hypothesis. *Current Directions in Psychological Science*, 17(3), 177-182.
- \*Jennings, J. M., & Jacoby, L. L. (1993). Automatic versus intentional uses of memory: aging, attention, and control. *Psychology and Aging*, 8(2), 283-293.
- \*Aging Successfully: three short papers and newsworthy pieces that tell the other side of the aging story:
  - Castel, A. (2009). Memory and Successful Aging: A Conversation with Coach John Wooden. *The Observer*, 22.
  - Tsui, B. (2015). The Aging Advantage. Retrieved November 28, 2015, from <http://www.psmag.com/health-and-behavior/the-aging-advantage>
  - Vijg, J., & Kennedy, B. K. (2015). The Essence of Aging. *Gerontology*. doi: 10.1159/000439348
- \*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: (Mar 31) Memory is malleable: Behavioral and Brain Studies**

**Readings:**

- Loftus, E.F. (2004). Memories of Things Unseen. *Current Directions In Psychological Science*, 13, 145-147.

- 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.
- \*Schacter, D.L. (1997). False recognition and the brain. *Current Directions in Psychological Science*, 6, 65-70.
- 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 7) Malleable Memory: False Memory in Children and Older Adults**

#### **Readings:**

- 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
- \*Ghetti, S. (2008). Rejection of False Events in Childhood A Metamemory Account. *Current Directions in Psychological Science*, 17(1), 16-20.
- \*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 14) *Last Day of Class: Final, Written and Printed Research Review Paper is due in class* (Upload to CourseWorks the same or following day). Give ALL oral presentations.**

**FORMAT FOR FINAL REVIEW PAPER** (10-12 pages not counting references, charts or tables; please follow the guidelines precisely as written below):

**1. Abstract (200 word maximum)**

Give a very brief account of the background, importance of the review, the methods used and a well-honed take-home message.

**2. 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 the topic of your review is important. What is the research you are reviewing 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 review, critically evaluate existing knowledge, and specifically identify the gap(s) that you believe should be filled.

**2. Methods used (about 1-2 pages)**

Describe the experimental designs and procedures that have been used to do the work you are reviewing. Include methods of data collection, analysis and interpretation of the data and a rationale for why these specific procedures have been utilized.

**3. Results and Discussion of Studies Reviewed (4-6 pages)**

Begin with a brief summary of results and whether they are consistent with hypotheses that have been raised in the literature. Are the results consistent? Why are the results important both with respect to the area of research you've chosen as well as to the larger scientific community. 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, their interpretations and their importance and relevance to the field and the wider scientific community and, if applicable, the lay public.

**4. References (no page limit, but 2-3 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 and the date retrieved in the reference section; there should be many fewer of these web-site citations than of peer-reviewed papers).

**5. Figures/Charts (no page limit, but be sure they are *relevant and illustrate your points*)**