

**SEMINAR IN MEMORY AND COGNITION (HH/SC PSYC 4270 3.0 M)**

Term W 2021

Tuesdays, 11:30-14:30 (11:30-13:00 devoted to discussion of presentations and readings)

Zoom and eClass

Faculty of Health, York University

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**INSTRUCTOR:** R. Shayna Rosenbaum  
Office Hours: by appointment  
shaynar@yorku.ca

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**COURSE DELIVERY**

Due to the ongoing pandemic, this course will be delivered virtually through a combination of 1. pre-recorded lectures and student presentations that should be viewed **prior** to the scheduled class time, and 2. in-person group discussion via Zoom, which will take place during the first half of the scheduled class time (i.e., 11:30-13:00). Active participation is expected and will be evaluated (further details below).

**PREREQUISITES**

Students should be familiar with basic principles of brain function to fully appreciate the nature of cognitive models of memory.

**Course prerequisites are strictly enforced and include:**

- HH/PSYC 1010 6.00 (Introduction to Psychology), with a minimum grade of C.
- HH/PSYC 2021 3.00 (Statistical Methods I) or HH/PSYC 2020 6.00 (Statistical Methods I and II)
- HH/PSYC 2030 3.00 (Introduction to Research Methods) or substitutes
- HH/PSYC 2260 3.00 (Cognition) or HH/PSYC 3265 3.00 (Memory)
- Students must be in an Honours program in Psychology and have completed at least 84 credits (excluding (EDUC) education courses)

**Course Credit Exclusions:** Please refer to [York Courses Website](#) for a listing of any course credit exclusions.

**Course website:** [eClass](#)

**COURSE DESCRIPTION**

This course will survey a variety of topics in the area of human memory and its relationship with other cognitive processes, such as perception, emotion, and executive function. Current theories and data on memory will be presented, focusing on the processes and systems involved at encoding, storage, and retrieval, as well as the errors of memory and the importance of memory in our everyday lives. Evidence derived from work with clinical populations with severe memory disturbances and healthy older individuals will be reviewed. Reference will also be made to research involving the use of animal

models and the growing use of brain-imaging techniques to study the neural basis of memory. Students will have the opportunity to discuss and critique current research in memory, with particular attention to the ongoing debate regarding unitary versus multiple memory systems and the neural correlates of such systems.

## LEARNING OUTCOMES

Upon completion of this course, students should be able to:

1. Demonstrate in-depth knowledge of memory and cognition.
2. Critically evaluate, synthesize and resolve conflicting results of memory and cognition.
3. Articulate trends in the psychology of memory and cognition.
4. Locate research articles on memory and cognition and show critical thinking about research findings.
5. Express knowledge of memory and cognition in written form.
6. Engage in evidence-based dialogue with course director and peers.
7. Demonstrate an ability to work with others.

## EVALUATION

There is no examination in this course. Students will be assessed as follows:

1. Weekly Thought Papers: 40%

Students are required to submit 5 “thought papers” via email based on the week’s readings at the beginning of class (excluding the first and final classes). The purpose of the thought paper is to present your view of the readings in at least one of the following ways: describe the interesting or main questions and how well you believe they were addressed by one or more of the papers; evaluate the experimental design and/or the authors’ interpretation of the findings; discuss ideas for theory or experiments that the paper(s) inspired; describe how the papers complemented or contradicted each other. Importantly, the thought paper is NOT meant to summarize the readings but rather to serve as a stimulus for class discussion.

Thought papers should be 2 pages long (double-spaced, 12-point font, 1-inch margins all around), not including the title page and references (at least 1 reference must be included). 5 thought papers are required. A thought paper cannot be on the same topic of your class presentation (described next). Each paper will be graded on an 8-point scale. **Late thought papers will not be accepted, so be sure to meet the deadline.**

2. Class Presentation: 35%

Each student will serve as a discussion leader and be responsible for presenting a seminar on one of the assigned topics. This will involve extracting the important issues of one or two of the readings and posing discussion questions for class.

To lead the discussion, it will be necessary to elaborate on the Introduction of the paper and provide the theoretical context in which the main question or questions were asked in the paper. To do this well, you may need to read an additional article or two in order to be fully prepared to discuss the assigned paper. If you choose an empirical article, it will also be necessary to provide a concise description of the

methods, the main findings, and interpretation of the findings. You should also share your take on the paper and prepare a few questions to discuss during class time. The questions can be points of confusion, issues for further consideration, follow-up research ideas, and so on. Sample questions are included with each topic, and you may use these as a guide for the questions that you pose for discussion. The presentation should take approximately 20 minutes. **Presentations will be uploaded to eClass to be viewed by students PRIOR to the lecture. Questions will be posed by the presenter during class time, and the presenter will be responsible for facilitating discussion based on the questions posed.**

### 3. Class Participation: 25%

Students are required to participate in class discussions by presenting the opinions, comments, or views they expressed in their thought papers and by offering answers to questions posed by others.

**Note: The last day to drop the course without receiving a grade on your transcript is March 12, 2021.**

## READINGS

There is no assigned text. Readings for each topic will consist of articles and/or book chapters selected by the instructor and will be available for download from the course website. The readings are intended to acquaint students with current issues and debate in the field of memory and serve to elaborate on topics discussed in class. Students will be expected to read the required readings for each topic *prior* to class and are also encouraged to sample any supplementary readings that are provided.

## ACADEMIC POLICIES

### Grading as per Senate Policy

The grading scheme for the course conforms to the 9-point grading system used in undergraduate programs at York (i.e., A+ = 9, A = 8, B+ = 7...C+ = 5, etc.). Assignments will bear either a letter grade designation or a corresponding number grade (e.g. A+ = 90 to 100, A = 80 to 90, B+ = 75 to 79, etc.)

For a full description of York grading system see the York University Undergraduate Calendar - [Grading Scheme for 2020-21](#)

### Missed Classes, Presentations, or Assignment Deadlines

1. Students must email the instructor in advance of any missed class/presentation/deadline if possible; otherwise, within 24 hours following the missed class/presentation/deadline.
2. For any missed quiz or late assignment, students **MUST** complete the following online form which will be received and reviewed in the Psychology undergraduate office. At this time, due to COVID-19 an Attending Physician's Statement (APS) is not required, but a reason for missing an evaluated component in the course must be provided.

HH PSYC: Missed Tests/Exams Form. Failure to complete the form within 48 hours of the original deadline will result in a grade of zero for participation in a given class or missed presentation/assignment.

### Add/Drop Deadlines

For a list of all important dates please refer to: Fall/Winter 2020-21 Important Dates

	Fall (F)	Year (Y)	Winter (W)
Last date to add a course <b>without permission</b> of instructor (also see Financial Deadlines)	Sept 22.	Sept 22.	Jan. 25
Last date to add a course <b>with permission</b> of instructor (also see Financial Deadlines)	Oct. 6	Oct. 27	Feb. 8
Drop deadline: Last date to drop a course without receiving a grade (also see Financial Deadlines)	Nov. 6	Feb. 5	March 12
Course Withdrawal Period (withdraw from a course and receive a grade of "W" on transcript – see note below)	Nov. 7-Dec. 8	Feb. 6 – April 12	March 13-April 12

### Add and Drop Deadline Information

There are deadlines for adding and dropping courses, both academic and financial. Since, for the most part, the dates are **different**, be sure to read the information carefully so that you understand the differences between the sessional dates below and the Refund Tables.

You are strongly advised to pay close attention to the "Last date to enrol without permission of course instructor" deadlines. These deadlines represent the last date students have unrestricted access to the registration and enrolment system.

After that date, you must contact the professor/department offering the course to arrange permission.

You can drop courses using the registration and enrolment system up until the last date to drop a course without receiving a grade (drop deadline).

You may withdraw from a course using the registration and enrolment system after the drop deadline until the last day of class for the term associated with the course. When you withdraw from a course, the course remains on your transcript without a grade and is notated as 'W'. The withdrawal will not affect your grade point average or count towards the credits required for your degree.

### Electronic Device Policy

This course will be delivered in an online format and therefore electronic devices (e.g., tablets, laptops) are permitted during class time for course-related purposes (e.g., presenting, Zoom). Use of personal electronic devices (e.g., texting, email, social media) during class is strongly discouraged and may affect participation marks.

### Course Policy on Academic Integrity

York University takes academic integrity very seriously; please familiarize yourself with Information about the Senate Policy on Academic Honesty.

It is recommended that you review Academic Integrity by completing the [Academic Integrity Tutorial](#) and [Academic Honesty Quiz](#)

In the event that plagiarism is suspected, the instructor has the right to use plagiarism detection software, such as Turnitin.com

### **Email Policy**

All email correspondence to Dr. Rosenbaum must include the course code (PSYC 4270) in the subject-heading to prevent messages from being filtered as spam, and close with your full name and student number (e.g., “Jennifer Jones, 867530986”). A response from Dr. Rosenbaum can be expected within 48 hours, not including weekends. Please re-send your message if you do not receive a reply within this timeframe.

**Before contacting Dr. Rosenbaum, please reread the syllabus carefully to determine if it answers your question.**

### **Attendance Policy**

Attendance on Zoom is mandatory, and **camera must remain on** with microphones muted unless contributing to discussion or presenting. To receive full participation marks, a student must:

1. Arrive on time and stay for the duration of the class.
2. Participate in class discussion.
3. Demonstrate knowledge of the assigned readings.

Please inform the instructor as soon as possible if there are extenuating circumstances that may interfere with the successful completion of the course requirements in order to make appropriate arrangements.

### **Academic Accommodation for Students with Disabilities**

While all individuals are expected to satisfy the requirements of their program of study and to aspire to do so at a level of excellence, the university recognizes that persons with disabilities may require reasonable accommodation to enable them to do so. The university encourages students with disabilities to register with *Student Accessibility Services (SAS)* to discuss their accommodation needs as early as possible in the term to establish the recommended academic accommodations that will be communicated to Course Directors as necessary. **Please let me know as early as possible in the term if you anticipate requiring academic accommodation so that we can discuss how to consider your accommodation needs within the context of this course.**

<https://accessibility.students.yorku.ca/>

### **Excerpt from Senate Policy on Academic Accommodation for Students with Disabilities:**

1. Pursuant to its commitment to sustaining an inclusive, equitable community in which all members are treated with respect and dignity, and consistent with applicable accessibility legislation, York University shall make reasonable and appropriate accommodations in order to promote the ability of students with disabilities to fulfill the academic requirements of their programs. This policy aims to eliminate systemic barriers to participation in academic activities by students with disabilities.

All students are expected to satisfy the essential learning outcomes of courses. Accommodations shall be consistent with, support and preserve the academic integrity of the curriculum and the academic standards of courses and programs. For further information please refer to: [York University Academic Accommodation for Students with Disabilities Policy](#).

### **Course Materials Copyright Information**

These course materials are designed for use as part of the HH/PSYC 4270 3.0M course at York University and are the property of the instructor unless otherwise stated. Third party copyrighted materials (such as book chapters, journal articles, music, videos, etc.) have either been licensed for use in this course or fall under an exception or limitation in Canadian Copyright law.

Copying this material for distribution (e.g. uploading material to a commercial third-party website) may lead to a violation of Copyright law. [Intellectual Property Rights Statement](#)

### **Additional Resources**

A number of valuable resources are available to students at York University. Importantly, this includes the Writing Center. Please visit the website: <https://writing-centre.writ.laps.yorku.ca/>

**SCHEDULE OF LECTURES AND READINGS**

The reading list will be modified throughout the term, and additional readings will be added on occasion. See course Moodle site for most up-to-date list of readings for each week.

Jan. 12      **Course Overview**

No Readings

Jan. 19      **History and Methods in Memory and Cognitive Research**

History and Current Trends

Bower, G.H. (2000). A brief history of memory research. In Tulving, E., & Craik, F.I.M. (Eds.), *The Oxford Handbook of Memory*. New York: Oxford University Press.

Queenan, B.N., Ryan, T.J., Gazzaniga, M.S., & Gallistel, C.R. (2017). On the research of time past: the hunt for the substrate of memory. *Annals of the New York Academy of Sciences*, 1396(1). 108-125.

Lesion Method

Rosenbaum, R.S., Gilboa, A., & Moscovitch, M. (2014). Case studies continue to illuminate the cognitive neuroscience of memory. The Year in Cognitive Neuroscience, *Annals of the New York Academy of Sciences*, 1316, 105-133.

Neuroimaging

Poldrack, R. A., & Farah, M. J. (2015). Progress and challenges in probing the human brain. *Nature*, 526(7573), 371–379. <https://doi.org/10.1038/nature15692>

Argyropoulos, G. P., Loane, C., Roca-Fernandez, A., Lage-Martinez, C., Gurau, O., Irani, S. R., & Butler, C. R. (2019). Network-wide abnormalities explain memory variability in hippocampal amnesia. *eLife*, 8, e46156. <https://doi.org/10.7554/eLife.46156>

Jan. 26      **Object and Face Recognition**

Cohen, A. L., Soussand, L., Corrow, S. L., Martinaud, O., Barton, J., & Fox, M. D. (2019). Looking beyond the face area: lesion network mapping of prosopagnosia. *Brain*, 142(12), 3975–3990. <https://doi.org/10.1093/brain/awz332>

Ratan Murty, N. A., Teng, S., Beeler, D., Mynick, A., Oliva, A., & Kanwisher, N. (2020). Visual experience is not necessary for the development of face-selectivity in the lateral fusiform gyrus. *Proceedings of the National Academy of Sciences of the United States of America*, 117(37), 23011–23020. <https://doi.org/10.1073/pnas.2004607117>

Woolnough, O., Rollo, P. S., Forseth, K. J., Kadipasaoglu, C. M., Ekstrom, A. D., & Tandon, N. (2020). Category selectivity for face and scene recognition in human medial

parietal cortex. *Current Biology*, 30(14), 2707–2715.e3.  
<https://doi.org/10.1016/j.cub.2020.05.018>

Freud, E., Stajduhar, A., Rosenbaum, R. S., Avidan, G., & Ganel, T. (2020). The COVID-19 pandemic masks the way people perceive faces. *Scientific reports*, 10(1), 22344. <https://doi.org/10.1038/s41598-020-78986-9>

## Feb. 2 **Implicit Memory**

Background – Cognitive/Neuropsychology: Schacter, D.L. (1987). Implicit memory: History and current status. *Journal of Experimental Psychology: Learning, Memory, and Cognition*, 13, 501-518.

Background – Neuroimaging: Reber, P.J. (2013). The neural basis of implicit learning and memory: a review of neuropsychological and neuroimaging research. *Neuropsychologia*, 51, 2026-2042.

Mazancieux, A., Pandiani, T., & Moulin, C. (2020). Perceptual identification task points to continuity between implicit memory and recall. *Cognition*, 197, 104168.  
<https://doi.org/10.1016/j.cognition.2019.104168>

Kim, K., Hsieh, L. T., Parvizi, J., & Ranganath, C. (2020). Neural repetition suppression effects in the human hippocampus. *Neurobiology of learning and memory*, 173, 107269.  
<https://doi.org/10.1016/j.nlm.2020.107269>

Ward, E. V., Berry, C. J., Shanks, D. R., Moller, P. L., & Czsiser, E. (2020). Aging predicts decline in explicit and implicit memory: A life-span study. *Psychological Science*, 31(9), 1071–1083. <https://doi.org/10.1177/0956797620927648>

## Feb. 9 **Retrieval and Distortion**

### Retrieval

Background: Eldridge, L.L. et al. (2000). Remembering episodes: a selective role for the hippocampus during retrieval. *Nature Neuroscience*, 3, 1149-1152.

Bowles, B., Crupi, C., Mirsattari, S.M., Pigott, S.E., Parrent, A.G., Pruessner, J.C., Yonelinas, A.P. & Kohler, S. (2007). Impaired familiarity with preserved recollection after anterior temporal-lobe resection that spares the hippocampus. *Proceedings of the National Academy of Sciences, USA*, 16382-16387.

Diamond, N. B., Armson, M. J., & Levine, B. (2020). The truth is out there: Accuracy in recall of verifiable real-world events. *Psychological Science*, 31(12), 1544–1556.  
<https://doi.org/10.1177/0956797620954812>

### Distortion



Thakral, P.P., Madore, K.P., Devitt, A.L., & Schacter, D.L. (2019). Adaptive constructive processes: An episodic specificity induction impacts false recall in the Deese-Roediger-McDermott paradigm. *Journal of Experimental Psychology: General*, 148(9), 1480-1493.

Ghosh, V.E., Moscovitch, M., Melo Colella, B., & Gilboa, A. (2014). Schema representation in patients with ventromedial PFC lesions. *Journal of Neuroscience*, 34, 12057-12070.

Feb. 16 **Reading Week**

Feb. 23 **Encoding and Perception**

Background: Craik, F.I. (2002). Levels of processing: past, present, and future? *Memory*, 10, 305-318.

Background: Wagner, A. D. et al. (1998). Building memories: remembering and forgetting of verbal experiences as predicted by brain activity. *Science*, 281, 1188-1191.

Brod, G., Lindenberger, U., Wagner, A.D., & Shing, Y.L. (2016). Knowledge acquisition during exam preparation improves memory and modulates memory formation. *Journal of Neuroscience*, 36, 8103-8111.

Behrmann, M., Lee, A.C., Geskin, J.Z., Graham, K.S., & Barense, M.D. (2016). Temporal lobe contribution to perceptual function: A tale of three patient groups. *Neuropsychologia*, 90, 33-45.

Baker, S., Vieweg, P., Gao, F., Gilboa, A., Wolbers, T., Black, S.E., & Rosenbaum, R.S. (2016). The Human Dentate Gyrus Plays a Necessary Role in Discriminating New Memories. *Current Biology*, 26, 2629-2634.

March 2 **Remote Memory and Consolidation**

Overview: Moscovitch, M., Nadel, L., Winocur, G., Gilboa, A., & Rosenbaum, R.S. (2006). The cognitive neuroscience of remote episodic, semantic, and spatial memory. *Current Opinion in Neurobiology*, 16, 179-190.

Bonnici, H. M., & Maguire, E. A. (2018). Two years later - Revisiting autobiographical memory representations in vmPFC and hippocampus. *Neuropsychologia*, 110, 159-169. <https://doi.org/10.1016/j.neuropsychologia.2017.05.014>

Lynch, K., Keane, M. M., & Verfaellie, M. (2020). The status of semantic memory in medial temporal lobe amnesia varies with demands on scene construction. *Cortex*, 131, 114-122. <https://doi.org/10.1016/j.cortex.2020.07.005>

Cellini, N., & Capuozzo, A. (2018). Shaping memory consolidation via targeted memory reactivation during sleep. *Annals of the New York Academy of Sciences*, 10.1111/nyas.13855. Advance online publication. <https://doi.org/10.1111/nyas.13855>

March 9 **Episodic Memory, Prospection, and Time**

Overview: Schacter, D.L. (2019). Implicit Memory, Constructive Memory, and Imagining the Future: A Career Perspective. *Perspectives on Psychological Science*, 14(2), 256-272.

Hassabis, D., Kumaran, D., Vann, S.D., & Maguire, E.A. (2007). Patients with hippocampal amnesia cannot imagine new experiences. *Proceedings of the National Academy of Sciences*, 104, 1726-1731.

Mok, J.N.Y., Kwan, D., Green, L., Myerson, J., Craver, C.F., & Rosenbaum, R.S. (2020). Is it time? Episodic imagining and the discounting of delayed and probabilistic rewards in young and older adults. *Cognition*, 199.

De Brigard, F., Hanna, E., St Jacques, P.L., & Schacter, D.L. (2019). How thinking about what could have been affects how we feel about what was. *Cognition and Emotion*, 33(4), 646-659.

March 16 **Spatial Memory and Navigation**

Overview: Ekstrom, A., Spiers, H.J., Bohbot, V.D., & Rosenbaum, R.S. (2018). *Human Spatial Navigation*. Princeton University Press.

- Chapters 3 and 7

Mullally, S.L., Intraub, H., Maguire, E.A. (2012). Attenuated boundary extension produces a paradoxical memory advantage in amnesic patients. *Curr. Biol.* 22:261–68

Robin, J., Rivest, J., Rosenbaum, R.S., & Moscovitch, M. (2019). Remote spatial and autobiographical memory in cases of episodic amnesia and topographical disorientation. *Cortex*, 119, 237-257.

Patai, E.Z.\* , Javadi, A.-H.\* , Ozubko, J.D., O'Callaghan, A., Ji, S., Robin, J., Grady, C.L., Winocur, G., Rosenbaum, R.S., Moscovitch, M., & Spiers, H.J. (2019). Hippocampal and retrosplenial goal distance coding after long-term consolidation of a real-world environment. *Cerebral Cortex*, 29, 2748-2758.

Stangl, M., Topalovic, U., Inman, C. S., Hiller, S., Villaroman, D., Aghajan, Z. M., Christov-Moore, L., Hasulak, N. R., Rao, V. R., Halpern, C. H., Eliashiv, D., Fried, I., & Suthana, N. (2020). Boundary-anchored neural mechanisms of location-encoding for self and others. *Nature*, 10.1038/s41586-020-03073-y.

March 23 **Emotional Memory**

Overview: Kensinger, E. A., & Ford, J. H. (2020). Retrieval of emotional events from memory. *Annual Review of Psychology*, 71, 251–272. <https://doi.org/10.1146/annurev-psych-010419-051123>

Kark, S. M., Slotnick, S. D., & Kensinger, E. A. (2020). Forgotten but not gone: fMRI evidence of implicit memory for negative stimuli 24 hours after the initial study episode. *Neuropsychologia*, *136*, 107277. <https://doi.org/10.1016/j.neuropsychologia.2019.107277>

Schumann, D., Joue, G., Jordan, P., Bayer, J., & Sommer, T. (2020). Test-retest reliability of the emotional enhancement of memory. *Memory*, *28*(1), 49–59. <https://doi.org/10.1080/09658211.2019.1679837>

Huan, S. Y., Liu, K. P., Lei, X., & Yu, J. (2020). Age-related emotional bias in associative memory consolidation: The role of sleep. *Neurobiology of Learning and Memory*, *171*, 107204. <https://doi.org/10.1016/j.nlm.2020.107204>

Parikh, N., McGovern, B., & LaBar, K. S. (2019). Spatial distancing reduces emotional arousal to reactivated memories. *Psychonomic Bulletin & Review*, *26*(6), 1967–1973. <https://doi.org/10.3758/s13423-019-01648-z>

### March 30 **Social Cognition**

Background: Frith, C.D. & Amodio, D.M. (2006). Meeting of Minds: The medial prefrontal cortex and social cognition. *Nature Reviews: Neuroscience*, *7*, 268-277.

Background: Amodio D. M. (2019). Social Cognition 2.0: An Interactive Memory Systems Account. *Trends in cognitive sciences*, *23*(1), 21–33. <https://doi.org/10.1016/j.tics.2018.10.002>

Jenkins AC, Macrae CN, Mitchell JP. (2008). Repetition suppression of ventromedial prefrontal activity during judgments of self and others. *Proceedings of the National Academy of Sciences*, *105*, 4507-4512.

Halilova, J., Addis, D.R., & Rosenbaum, R.S. (2020). Getting better without memory. *Social Affective and Cognitive Neuroscience*, *15*(8), 815-825.

Shenhav, A., & Greene, J.D. (2014). Integrative moral judgment: dissociating the roles of the amygdala and ventromedial prefrontal cortex. *Journal of Neuroscience*, *34*, 4741-4749.

Craver, C.F., Keven, N., Kwan, D., Kurczek, J., Duff, M., & Rosenbaum, R.S. (2016). Moral judgment in episodic amnesia. *Hippocampus*, *26*, 975-979.

### April 6 **Memory Across the Lifespan**

Overview: Cabeza R, Albert M, Belleville S, Craik FIM, Duarte A, Grady CL, Lindenberger U, Nyberg L, Park DC, Reuter-Lorenz PA, Rugg MD, Steffener J, Rajah MN. (2018). Maintenance, reserve and compensation: the cognitive neuroscience of healthy ageing. *Nature Reviews Neuroscience*, *19*(11), 701-710.

Overview: Donato, F., Alberini, C. M., Amso, D., Dragoi, G., Dranovsky, A., & Newcombe, N. S. (2020). The ontogeny of hippocampus-dependent memories. *Journal*

*of Neuroscience*, JN-SY-1651-20. Advance online publication.  
<https://doi.org/10.1523/JNEUROSCI.1651-20.2020>

Prabhakar, J., Johnson, E. G., Nordahl, C. W., & Ghetti, S. (2018). Memory-related hippocampal activation in the sleeping toddler. *Proceedings of the National Academy of Sciences of the United States of America*, *115*(25), 6500–6505.  
<https://doi.org/10.1073/pnas.1805572115>

Danckert SL, Craik FI. (2013). Does aging affect recall more than recognition memory? *Psychology and Aging*, *28*, 902-909.

Coughlan G, Coutrot A, Khondoker M, Minihane AM, Spiers H, Hornberger M. (2019). Toward personalized cognitive diagnostics of at-genetic-risk Alzheimer's disease. *Proceedings of the National Academy of Science USA*, *116*(19), 9285-9292.