Social-Emotional Memory in the Developing Brain
Course Syllabus
PSYC 3446

Course Information
200c Schermerhorn
Mondays
2:10-4:00PM

Instructor Information
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pronouns: she/her/hers

Course Description
Why do some emotional memories feel so powerful and enduring? How do our earliest social experiences shape the way we interpret and respond to the world around us—often in ways we don't even realize? This seminar explores the neuroscience of social-emotional memory, diving into how the brain constructs, refines, and applies interpersonal-affective "attachment" schemas across development. We'll examine why certain social-emotional patterns become ingrained, how the developing brain balances past experiences with new learning, and what happens when these processes go awry. Along the way, we'll unpack cutting-edge research on memory, prediction, and social connection, asking: How do our brains extract emotional meaning from our earliest relationships, and how might these mechanisms impact emotional behavior across development? There is no cohesive body of knowledge on this topic, so students will be taking the methods and results from one area (e.g., neural underpinnings of schema acquisition) and applying those ideas to content and theory from another area (e.g., amygdala-dependent memory development)- the goal is to generate new hypotheses and ideas through this integration across of cognitive and developmental neuroscience subfields.

Prerequisites
Instructor permission, plus an introductory psychology course (e.g., PSYC 1001), plus at least one course introducing cognitive, development, and/or neuroscience topics (e.g., Cognition and the Brain, Cognition: Memory & Stress, Cognitive Neuroscience, Social Neuroscience, Behavioral Neuroscience, Introduction to Developmental Psychology, Developmental Cognitive Neuroscience, The Developing Brain). Rationale for these prerequisites: familiarity with theories covered in cognitive and developmental neuroscience will help make our readings more accessible. Students who are new to most of our topics will need to put in extra time preparing for class discussions, as the workload for the course assumes familiarity with at least some theories from cognitive and developmental psychology that we draw on (e.g., Attachment Theory, Neuroconstructivism, Concepts and Schemas, Systems Consolidation Theory, Predictive Coding Theory, etc.).

Admission to the Seminar
If there is more student interest than there is space, priority will go to undergrad Psychology and Neuroscience & Behavior majors and Psychology postbacs in the Certificate Program. Other things being equal, students who have the best preparation and strongest motivation for our course topics will be selected.

Role in the Psychology Curriculum
This course is designed to give advanced undergraduate and graduate students in the Psychology Department a deeper understanding of the cognitive and developmental neuroscience theories that can help us understand the emergence of social-emotional knowledge about the self and others.

This course fulfills the following requirements of the following programs:

- Psychology Majors & Post-Bacs: Seminar requirement or Group 2 requirement
- Neuroscience & Behavior Majors: P5 (Seminar) Requirement

Motivating Questions

1. What do our brains *know* about emotions and relationships, and how did they learn it?
2. What are the neural foundations of these conceptual-level social-emotional memories?
3. How does the brain acquire and refine this knowledge over time?
4. What are the computational consequences of these mental models for memory, prediction, and emotional behavior?

Course Objectives

1. Students will gain a deeper understanding of theories from cognitive and developmental neuroscience disciplines that can help explain the emergence of social-emotional memories about the self and the self in relation to others.
2. Students will be able to integrate their knowledge about the neural mechanisms underlying social-emotional memory development and cognitive memory schemas to generate with new insights and hypotheses, both in typical development and when these processes go awry.
3. Students will leave the course with a deep familiarity of developmental and cognitive neuroscience approaches more generally: they will be able to recognize and critique commonly used research methods, to assess the validity and reliability of experimental designs, and to interpret and judge the inferences and conclusions that other researchers lay out in their papers.

Course Organization

Class

Each two-hour class meeting will consist primarily of in-class insight labs based on the readings, student presentations of one of the readings, and discussion of the topics of those readings. Whether or not it is your day to present, please come to class prepared to actively participate.

Assignments

In-class insight labs. At the beginning of most class meetings, you will complete a short **"insight lab"** based on that week's readings. These are meant to replace the traditional online response posts. Instead of writing outside of class, you will practice synthesizing, analyzing, and applying ideas *in the moment*. There are two types of insight labs:

1. **AI Labs**: You will be given a short AI-generated summary or response and asked to critique, revise, and/or extend it. The goal is to strengthen your ability to use AI critically, spotting errors or oversimplifications and deepening the analysis. The focus is on *working with AI, not learning from AI*.
2. **Writing Labs**: without notes or devices, you will write a response (1 paragraph, roughly 5-7 sentences, ~100-150 words) to a prompt based on the week's readings. These are meant to strengthen your skills in articulating and synthesizing ideas quickly.

You will complete a total of **9 insight labs total** across the semester. Labs are graded on a simple scale (0-2 points): *2 points (full credit,* thoughtful and engaged response directly addresses the task, connects to course ideas, and shows clear effort); *1 point: (partial credit,* minimal effort, vague response, or partial engagement with the prompt); and *0 points* (no submission, off-topic, or clear lack of effort). To give you flexibility, I will **automatically drop the lowest score**. Grading is based on thoughtful effort and engagement, not perfection.

Student paper presentations. Each student will briefly present a chosen empirical paper during one class period. Each topic on our syllabus has 1 or 2 presentable papers listed (these are the starred ones), but you are also welcome to suggest an alternative paper on the same topic. To swap in an alternative paper, please discuss your ideas with me at least 1 week before the class period in question. Your job as presenter is to be our "resident expert" on the topic for this week, so while you can assume everyone has read the paper, your presentation should help to clarify any particularly tricky methods or results from the studies, and address any questions that your fellow students have. I'll be there to help you with this both as you prepare your presentation and during class, so ask as many questions as you need, and feel free to send me drafts of your slides.

Your **10- to 15-minute presentation** should briefly cover the paper's important points and scientific value, recap the study's methods and results, and also offer a critical assessment of the work in the context of other course materials, including what is novel, potential pitfalls/misinterpretation, and possible future directions. Presentations should also include **questions to spark our discussion**. This means that even though you'll only be preparing up to 15 minutes' worth of material, you likely won't get to your final slide until 30+ minutes into class. Presentations will be graded on clarity, command of audience, quality of presentation, and thoughtfulness of ideas.

Detailed requirements for the presentation will be discussed during the first class meeting, when we will also go over the list of topics and the tentative schedule. Please have your calendars handy during our first class meeting to facilitate our creation of the schedule.

Accessible science presentation **[December 8]**. On the final day of class, each student will give a short accessible science presentation. Your task is to take one neuroscience idea related to social-emotional memory in the developing brain and present it in a way that is clear, engaging, and visually compelling for a non-scientific audience. Think of this as a live version of a STEM TikTok or YouTube Short: concise, creative, and memorable (through metaphor, analogy, story, visual design, drawing, etc.). The purpose is to practice translating complex scientific ideas into forms that are meaningful beyond the academic world.

Your presentation time is 2 minutes (strict maximum), followed by 1 minute of Q&A. Imagine explaining your idea to a friend, sibling, or family member who has *no background in neuroscience*. Avoid jargon; focus on clarity and storytelling. You may use slides, images, props, analogies, and other visuals – but keep them simple and highly engaging. Creativity is highly encouraged. Grading is based on clarity and accessibility (is the concept explained in a way a nonscientist can understand?), engagement (is it interesting, creative, or surprising?), visual quality (are the visuals clean and compelling?), and timing (staying within the 2-minute limit).

Midterm essay exam **[November 10]**. This one-hour, in-class handwritten exam will ask you to write **two integrative essays** based on the first half of the course (Weeks 1–8). Topics may include neural plasticity as a foundation for developmental change, attachment as a learning and memory process, the role of caregiving experiences in shaping emotional brain circuitry, the neural representation of self and others, neurobiology of memory schema mechanisms, and the developmental emergence of amygdala- and hippocampus- dependent memory. You will be expected to integrate evidence from the readings, compare theoretical frameworks, and generate your own arguments. The exam is closed-book, but you can prepare a one-page, single-space annotated bibliography (0.5 inch margins, 10 point Arial font). You are also encouraged to prepare by synthesizing themes across papers. Grading will be based on clarity of writing, depth of integration, and creativity of ideas. The midterm is designed as a "dress rehearsal" and preparation for the final exam.

Final essay exam **[December 15, 1:10-4:00pm]**. This three-hour, in-person exam is replacing the traditional 10-page paper that is often submitted as part of seminars. The final exam will cover the full arc of the course (Weeks 1–13) and will be handwritten. You will demonstrate your ability to connect neural plasticity, social-emotional experiences, memory systems, and schema-based predictive processing across development. The exam will include:

- **Two longer integrative essays** (chosen from multiple prompts) that ask you to bring together theories and evidence on topics such as schema instantiation, memory transformation, neural prediction, plasticity in typical and atypical contexts, and the role of early experience (both positive and adverse) in shaping social-emotional memory.
- **One experimental design question** where you will propose a developmental study (behavioral or neuroimaging) testing a hypothesis about social-emotional memory and its neural underpinnings.
- **One shorter creative essay** asking you to explain a core concept (e.g., plasticity, schemas, attachment as prediction) to a lay audience or apply theories to real-world social-emotional challenges.

You may bring a 2-page, singled spaced annotated bibliography to the final exam (0.5 inch margins, 10 point Arial font). All other materials are closed-book. Grading will emphasize quality of argument, integration across readings, clarity of writing, and originality.

Grading

Component	Points Available
Attendance/participation	12
In-class insight labs	16
Paper presentation	20
Midterm	18
Accessible science presentation	10
Final exam	25
Total	100

There is no extra credit for this course. For students who are on the border between grades, I will consider their contributions to discussions throughout the term to decide whether to bump them up to the next highest grade (e.g., a very high B+ could be bumped to an A-).

Academic Integrity

Academic honesty includes presenting only your own work in exams and assignments, and correctly attributing others' ideas where appropriate. Taking credit for work that is not your own is a serious violation within the academic community, and anyone found to be cheating or plagiarizing in this class will be reported to the university. Detailed definitions and examples of academic dishonesty (and a rundown of the consequences) are available in Columbia's Guide to Academic Integrity (http://www.college.columbia.edu/academics/integrity).

Course Policy on AI. Generative AI tools like ChatGPT, Claude, and Gemini can do a lot of heavy lifting in academic contexts. Such tools aren't inherently good or bad—it's all up to how you use them. To visualize our course policy, imagine AI as something like an e-bike: the electric motor removes most of the effort that would have been required of the cyclist in order to get them to their destination. If the goal is to get somewhere with the least exertion (and sweat) possible, then the e-bike is a godsend. But if part of the goal in cycling was for the rider to get some exercise and build physical strength or endurance, then the e-bike works against those purposes. A recent study out of MIT supports this idea – researchers found that students using LLM-assisted essay writing (i.e., ChatGPT) engaged their cortical brain circuitry less than those using search engine-assisted (i.e., Google) and brain-only essay writing.

To dismount from this tortured metaphor: the purpose of this seminar is not primarily to teach you content (get you to some destination); our main goals are to give you experience in thinking critically, examining and critiquing past research and theories, and expressing your own ideas both orally and in writing. So: to the extent that AI can help you understand material, it can be useful—e.g., asking it to explain some of the statistical procedures or experimental design details in a paper you're reading. And if you find AI useful in helping to format or polish your presentations, that's fine too.

Ultimately, the ideas and words you share in class and in your written work for this course must all be either your own, or properly attributed to their source. In reading responses, I want to know how each student is thinking about the papers we're reading that week—reading a dozen AI reactions to our papers wastes my time while giving me no guidance for how to direct our next discussion. In presentations, although you're welcome to seek AI help in the aesthetics of your slides, the words presented in them should be your own. And in your policy paper and final papers, it's fine to get AI help with editing, but the ideas, wording, and thoughts on the page need to have been produced by you alone.

I assume you're all here because you're interested in the course topics and enthusiastic to learn as much as you can. But I know that in real life, stuff happens. I always prefer to deal with any issues before they get so bad that they become overwhelming, or so bad that a student feels that cheating or plagiarism is his or her best (or only) option. In the MIT study, students who used LLMs (i.e., ChatGPT) to assist with essay writing had more trouble citing/quoting their sources accurately; this is improper scientific and academic conduct. So please do come to me if you have any questions about how to properly cite a source or build upon others' ideas, or if you're feeling stressed out about the class workload (or about anything else). If you have an issue that you'd rather not talk about with me, you might consider speaking with your academic advisor or dean; with one of the Psych Department's Directors of Undergraduate Studies; or with the counselors at Columbia's Counseling and Psychological Services (http://health.columbia.edu/services/cps).

Diversity & Inclusion

Every learning environment should accommodate a wide range of students' backgrounds, opinions, and identities. For seminars, it is even more crucial that everyone in the room feels able to freely express their thoughts, and is willing to respectfully listen to others'. This doesn't mean we all need to be perfectly aligned on everything—or even anything! In the area of our course discussions in particular, disagreement will challenge each of us to hone our own arguments, uncover our misconceptions, and expand our perspectives. But it's equally important to leave space for—and to learn from—non-academic forms of diversity, such as nationality, sex or gender, sexuality, race, class, religion, differences in ability, and many others. In the service of these goals, please let me know if any of the following is true:

- You have a name and/or set of pronouns that differ from those that appear in SSOL or on Canvas.
- Something that was said in class made you uncomfortable or unwelcome.
- Your ability to take part in our class is being affected by events or experiences outside of our class. Even if it's something I can't help with directly, I can try to connect you with resources or support on or off campus.

Nobody is ever finished learning about diverse perspectives and identities, me included. I'm very open to feedback; on this topic (and many others) you can teach me as much as, if not more than, I can teach you.

Accommodations

Students with specific needs who may require accommodations should make an appointment to see me as soon as possible, at least by the end of the second week of class. If you have not already done so, stop by the Office of Disability Services (ODS) on the 7th floor of Lerner Hall to register for support services. ODS often requires two weeks to process an application, so please contact them as soon as you can, preferably before the course begins.

Wellness

All of us at some point experience challenges to our mental health and well-being. This is true at any time, and has been even more so in the past couple of years. I urge you to take care of yourselves—and of each other. Please prioritize your mental health and wellbeing and know that there are many resources available to you both within our classroom community and throughout the university:

https://health.columbia.edu/content/counseling-and-psychological-services
http://blogs.cuit.columbia.edu/nightline/
https://universitylife.columbia.edu/student-resources-directory#health
https://columbiavirtualcampus.com/

Please reach out for help if you need it, and if you see others who are struggling, please point them toward these or other sources of help, or encourage them to talk to me or one of the Directors of Undergraduate Studies in the Psychology Department.

List of Topics & Readings

Each class after the first week will be devoted to one topic related to the neuroscience of social-emotional memory. The exact order of topics is somewhat flexible if necessary: we can often shift our topics within each group to fall on weeks when it is more convenient for the student presenter.

We'll assign each student both a topic and a week to present during or shortly after our first class meeting. In some weeks we will have two student presenters—in these cases, you will each be presenting on one paper, on your own (i.e., it isn't a group project), but I'll put you in touch with the other presenter so that you can make sure there's not too much overlap between your presentations. Articles are subject to change. Students are encouraged to incorporate additional readings (particularly from empirical papers) that they feel would enhance discussion.

Course Materials

There are no required textbooks for this course. The articles listed below can be found on Google Scholar (while on the Columbia campus) and will be posted on Canvas.

Notes on this reading list:

- Articles listed with an asterisk/star are eligible for students to present. If more than one article for one week is starred, the presenter(s) for that week may choose which paper they prefer to present.
- Articles listed without an asterisk/star are background readings, or they provide an alternative/complementary perspective on a topic. The background readings will be critical to provide an overview of the field and to integrate information from the developmental and cognitive neuroscience fields.
- Everyone should plan to read all articles listed before each class meeting (both those starred and those unstarred), except for any labeled as "optional."

Week 1 (September 8): Let's Get Started (What is social-emotional memory? Why does brain development matter?)

- No required readings

Week 2 (September 15): How To's (Read papers and integrate ideas from cognitive and developmental neuroscience)

- Bosmans, G., Bakermans-Kranenburg, M. J., Vervliet, B., Verhees, M. W., & van IJzendoorn, M. H. (2020). A learning theory of attachment: Unraveling the black box of attachment development. *Neuroscience & Biobehavioral Reviews*, *113*, 287-298.
- Qin, P., Wang, M., & Northoff, G. (2020). Linking bodily, environmental and mental states in the self—A three-level model based on a meta-analysis. *Neuroscience & biobehavioral reviews*, *115*, 77-95.
- OPTIONAL: LeDoux, J. E. (2014). Emotion as memory: Anatomical systems underlying indelible neural traces. In *The handbook of emotion and memory* (pp. 269-288). Psychology Press.

Week 3 (September 22): Early social experiences and emotional brain development

- Callaghan, B. L., & Tottenham, N. (2016). The neuro-environmental loop of plasticity: A cross-species analysis of parental effects on emotion circuitry development following typical and adverse caregiving. *Neuropsychopharmacology*, *41*(1), 163-176.
- ***Rogers, C. R., Chen, X., Kwon, S. J., McElwain, N. L., & Telzer, E. H. (2022). The role of early attachment and parental presence in adolescent behavioral and neurobiological regulation. *Developmental Cognitive Neuroscience*, *53*, 101046.
- OPTIONAL: ***Gee, D. G., Gabard-Durnam, L. J., Flannery, J., Goff, B., Humphreys, K. L., Telzer, E. H., ... & Tottenham, N. (2013). Early developmental emergence of human amygdala–prefrontal connectivity after maternal deprivation. *Proceedings of the National Academy of Sciences*, *110*(39), 15638-15643.

Week 4 (September 29): Neurobiology of social-emotional knowledge

- ***Courtney, A. L., & Meyer, M. L. (2020). Self-other representation in the social brain reflects social connection. *Journal of Neuroscience*, *40*(29), 5616-5627.
- ***Ulmer-Yaniv, A., Waidergoren, S., Shaked, A., Salomon, R., & Feldman, R. (2022). Neural representation of the parent–child attachment from infancy to adulthood. *Social Cognitive and Affective Neuroscience*, *17*(7), 609-624.
- OPTIONAL: Pfeifer, J. H., Dapretto, M., & Lieberman, M. D. (2016). The neural foundations of evaluative self-knowledge in middle childhood, early adolescence, and adulthood. In *Developmental social cognitive neuroscience* (pp. 141-163). Psychology Press.

Week 5 (October 6): Neurobiology of memory schemas

- ***Brod, G., Lindenberger, U., & Shing, Y. L. (2017). Neural activation patterns during retrieval of schema‐related memories: Differences and commonalities between children and adults. *Developmental science*, *20*(6), e12475.
- ***Baldassano, C., Hasson, U., & Norman, K. A. (2018). Representation of real-world event schemas during narrative perception. *Journal of Neuroscience*, *38*(45), 9689-9699.
- Ghosh, V. E., & Gilboa, A. (2014). What is a memory schema? A historical perspective on current neuroscience literature. *Neuropsychologia*, *53*, 104-114.
- OPTIONAL: ***Cohen, S. S., Tottenham, N., & Baldassano, C. (2022). Developmental changes in story-evoked responses in the neocortex and hippocampus. *ELife*, *11*,

Week 6 (October 13): Bringing it all together: Neurobiological convergence of attachment, affective, and conceptual systems

- Tottenham, N. (2020). Neural meaning making, prediction, and prefrontal–subcortical development following early adverse caregiving. *Development and psychopathology*, *32*(5), 1563-1578.
- OPTIONAL: Roy, M., Shohamy, D., & Wager, T. D. (2012). Ventromedial prefrontal-subcortical systems and the generation of affective meaning. *Trends in cognitive sciences*, *16*(3), 147-156.

Neurodevelopment of mnemonic mechanisms that generate social-emotional memories

Week 7 (October 20): Amygdala-dependent affective memory

- ***Adolphs, R., Tranel, D., & Buchanan, T. W. (2005). Amygdala damage impairs emotional memory for gist but not details of complex stimuli. *Nature neuroscience*, *8*(4), 512-518.
- LaBar, K. S. (2003). Emotional memory functions of the human amygdala. *Current neurology and neuroscience reports*, *3*(5), 363-364.
- Meyer, H. C., & Pattwell, S. S. (2020). Memory across development, with insights from emotional learning: a nonlinear process. *The Cognitive Neurosciences*, *243*.
- OPTIONAL: ***Pinabiaux, C., Hertz-Pannier, L., Chiron, C., Rodrigo, S., Jambaqué, I., & Noulhiane, M. (2013). Memory for fearful faces across development: specialization of amygdala nuclei and medial temporal lobe structures. *Frontiers in human neuroscience*, *7*, 901.

Week 8 (October 27): Hippocampus-dependent memory with Special Guest- Dr. Tristan Yates, PhD

- *** Yates, T. S., Fel, J., Choi, D., Trach, J. E., Behm, L., Ellis, C. T., & Turk-Browne, N. B. (2025). Hippocampal encoding of memories in human infants. *Science*, *387*(6740), 1316-1320.
- ***Keresztes, A., Bender, A. R., Bodammer, N. C., Lindenberger, U., Shing, Y. L., & Werkle-Bergner, M. (2017). Hippocampal maturity promotes memory distinctiveness in childhood and adolescence. *Proceedings of the National Academy of Sciences*, *114*(34), 9212-9217.
- Donato, F., Alberini, C. M., Amso, D., Dragoi, G., Dranovsky, A., & Newcombe, N. S. (2021). The ontogeny of hippocampus-dependent memories. *Journal of Neuroscience*, *41*(5), 920-926.
- OPTIONAL: ***Ellis, C. T., Skalaban, L. J., Yates, T. S., Bejjanki, V. R., Córdova, N. I., & Turk-Browne, N. B. (2021). Evidence of hippocampal learning in human infants. *Current Biology*, *31*(15), 3358-3364.

*******NO CLASS DUE TO COLUMBIA BREAK: NOVEMBER 3*******

Week 9 (November 10): Memory Transformation and <u>MIDTERM</u>

- ***Lewis, P. A., & Durrant, S. J. (2011). Overlapping memory replay during sleep builds cognitive schemata. *Trends in cognitive sciences*, *15*(8), 343-351.
- Sekeres, M. J., Winocur, G., & Moscovitch, M. (2018). The hippocampus and related neocortical structures in memory transformation. *Neuroscience letters*, *680*, 39-53.
- OPTIONAL: ***Jimenez, C. A., & Meyer, M. L. (2024). The dorsomedial prefrontal cortex prioritizes social learning during rest. *Proceedings of the National Academy of Sciences*, *121*(12), e2309232121.

Week 10 (November 17): Neural prediction and memory schemas

- ***Lee, C. S., Aly, M., & Baldassano, C. (2021). Anticipation of temporally structured events in the brain. *elife*, *10*, e64972.
- ***Richardson, H., & Saxe, R. (2020). Development of predictive responses in theory of mind brain regions. *Developmental science*, *23*(1), e12863.
- Johnson, S. C., Dweck, C. S., & Chen, F. S. (2007). Evidence for Infants' Internal Working Models of Attachment. *Psychological Science*, *18*(6), 501-502.
- OPTIONAL: Ullman, T. D., & Tenenbaum, J. B. (2020). Bayesian models of conceptual development: Learning as building models of the world. *Annual Review of Developmental Psychology*, *2*(1), 533-558.

Week 11 (November 24): Schemas and new learning

- ***Sommer, T., Hennies, N., Lewis, P. A., & Alink, A. (2022). The assimilation of novel information into schemata and its efficient consolidation. *Journal of Neuroscience*, *42*(30), 5916-5929.
- ***Corlett, P. R., Mollick, J. A., & Kober, H. (2022). Meta-analysis of human prediction error for incentives, perception, cognition, and action. *Neuropsychopharmacology*, *47*(7), 1339-1349.
- Bein, O., Gasser, C., Amer, T., Maril, A., & Davachi, L. (2023). Predictions transform memories: How expected versus unexpected events are integrated or separated in memory. *Neuroscience & Biobehavioral Reviews*, 105368.
- OPTIONAL: ***Audrain, S., & McAndrews, M. P. (2022). Schemas provide a scaffold for neocortical integration of new memories over time. *Nature Communications*, *13*(1), 5795.

Week 12 (December 1): Pulling it all together: Attachment as prediction

- ***Aloi, J., Crum, K. I., Blair, K. S., Zhang, R., Bashford-Largo, J., Bajaj, S., ... & Blair, R. J. R. (2024). Childhood neglect is associated with alterations in neural prediction error signaling and the response to novelty. *Psychological Medicine*, *54*(14), 3930-3938.
- Tottenham, N., & Vannucci, A. (2025). Attachment as prediction: Insights from Cognitive and Developmental Neuroscience. *Current Directions in Psychological Science.*
- OPTIONAL: ***Cisler, J. M., Esbensen, K., Sellnow, K., Ross, M., Weaver, S., Sartin-Tarm, A., ... & Kilts, C. D. (2019). Differential roles of the salience network during prediction error encoding and facial emotion processing among female adolescent assault victims. *Biological psychiatry: cognitive neuroscience and neuroimaging*, *4*(4), 371-380.

Week 13 (December 8): Accessible science presentations and wrap-up

Final exam: December 15, 1:10-4:00pm