**Consciousness and Cognitive Science**

**GU4224**

**4 points**

**Nora Isacoff, PhD (ni2237@columbia.edu)**

**Tuesdays, 12:10 – 2**

**200C Schermerhorn**

**Office: Uris Hall 204C | Office Hours: Mon & Tues 2:45 – 3:45**

**Description**

Our human experience is rich: the thrill of falling in love, the spark of a new idea, the zing of table salt, the sharpness of pain. For thousands of years, philosophers, artists, and religious scholars have tried to explain our subjective experience. More recently, neuroscientists and artificial intelligence experts have contributed to this discussion, weighing in on whether we are “more than meat” (as Descartes famously put it), and whether computers can ever be sentient. In this class, we will begin with the big questions and an interdisciplinary overview of consciousness, then delve into psychology’s role. Using literature from perception, memory, emotion, metacognition, attention, and symbolic development, among other areas of psychology, we will see what empirical evidence can tell us about who we are, what we are able to know, and why we even have an experience of the world at all.

**Prerequisites**

PSYC UN1001 The Science of Psychology, or an equivalent introductory course in psychology. It is recommended that students have also taken an additional course in Psychology, preferably one focusing on cognition, development, or research methods. Instructor permission is required.

**Role in the Psychology Curriculum**

GU4224 is a seminar open to graduate students and advanced undergraduate students. It fulfills the following degree requirements:

* For undergraduates pursuing a Psychology major or concentration in the College or GS or the Psychology Postbac certificate, it meets the Group I (Perception & Cognition) distribution requirement.
* For Psychology majors and Psychology Postbac students, it fulfills the seminar requirement.
* For undergraduates pursuing the Neuroscience & Behavior major, it fulfills the P5 advanced seminar requirement in the Psychology portion of the major.
* Graduate students in Psychology and junior and senior Neuroscience & Behavior and Psychology majors will have priority for registration.

**Goals:**

* Gain exposure to some of the deepest questions related to consciousness in psychology.
* Learn how psychology can inform and be informed by other areas within cognitive science such as philosophy, neuroscience, and artificial intelligence.
* Learn to challenge initial intuitions and analyze empirical papers critically to determine how well evidence supports a claim
* Develop strong oral and written communication skills that will benefit both interdisciplinary collaboration and independent research

**Assignments and grades**

Reading Reflections: 20%

Discussion Leading: 20%

Project Proposal: 10%

Rough Draft: 15%

Final Draft: 15%

Flash Talk: 5%

Participation: 15%

**Reading reflections:** Due 12 on Mondays on Canvas. (No reading reflections on flash talk weeks or on the week you are presenting).

The aim of reading reflections is to facilitate class discussions. As you are reading, think about what you would like to discuss in class. Some possibilities:

* Connections to other readings from our seminar or other classes
* Critiques of the methodology/alternative explanations for results
* Something you were or are having trouble understanding, and how you are going about trying to learn more/what we can clarify
* Thoughts about implications and/or applications
* How you would extend the work (e.g., follow-up experiments, future directions)
* [qalmri](https://hesp.umd.edu/sites/hesp.umd.edu/files/QALMRI.pdf) is a helpful resource

Format: Whatever you want (paragraphs, bullet points, etc.)

Length: About 200 words

Grading: On a scale from 0 – 5, based on how well it prepares us for rich discussion in class

You may choose to write just about one of the day’s readings or multiple readings, but you must still complete all readings for the day and be prepared to discuss them in class.

**Discussion Leading.**

The aim of the discussion leader is to facilitate discussion of 1 or 2 of the day’s readings (approximately 40 minutes). The expectation is that you will be thoroughly familiar with the paper(s) you are leading. It is generally helpful to prepare slides that cover the main points and to give an introduction, but you should primarily aim to help lead a discussion and to be able to help answer questions your classmates raise. It is expected that you will not simply read from your slides but instead, that you will be thoughtful about which aspects of the reading to highlight and how best to lead and facilitate discussion. Reading the Reading Responses and preparing some answers ahead of time will be helpful. If more than one person is discussion leading on a given day, I recommend that you coordinate, to decide whether there is overlapping information that only one of you will address. You do NOT need to submit a reading reflection on a day when you are leading a class discussion. Please send me your slides by the start of class.

**Independent study.** The goal of this assignment is to dive deep into a particular topic within consciousness and cognitive science; to grapple with open questions in the literature; and to immerse yourself in a topic that excites you. The end “product” is almost always a 10–12-page double-spaced paper (not including title page/reference page), but I hope that you truly will think of this project as an independent study. If you would like to do something in lieu of a paper, please speak to me about your idea well in advance. General advice is that narrower topics tend to be more successful. We can discuss what this means in class or individually. There are 4 parts to this assignment (all due at 11:59pm).

* 1. By March 3, you should write a 500-word proposal detailing a specific research question. Depending on your topic, it might include 2 competing hypotheses about the research question and an example of the type of evidence that could bear on this question, or it might simply spell out some sub-questions that you are interested in investigating. It should also include at least 3 scholarly sources that you plan to read, or have begun reading. I highly suggest you spend some time before this deadline beginning to work on your project so that I can give you specific feedback and you can get on the right track from the beginning.
	2. By April 18, you should submit a rough draft of the term paper including the research question and any sub-questions, explaining experimental methods and results that relate to the research question, and trying to make sense of conflicting results and positions within the literature. You also have the option of proposing a new experiment at the end of your paper. You should cite at least 7 sources, and this should be a complete attempt at a paper, meaning at or very close to the length of the final paper, proofread, etc.
	3. Flash Talks: April 22 & 29
	4. By May 7, you should submit a final draft of the term paper, incorporating in feedback from the rough draft and from your Flash Talk.

**Participation:** Last year, for the first time, I added participation as a component of the grade. I have always been wary to do this because quantifying participation is inherently subjective and because I don’t want anxiety about participating the “right” amount to impede genuine discussions. However, class discussions are the core of any seminar, and I think it is only fair to give you credit for this contribution. The expectation is that you will come to class fully prepared and that you will be ready to engage in thoughtful discussion. One way to improve your participation is to consider putting away all devices—taking notes with a pen and paper—so that you aren’t distracted. You don’t *have* to do this, but the expectation is that everyone will be “conscious” of what is happening in class. Your participation grade will be based on a make space/take space model, and you are very welcome to check in with me at any point during the semester if you would like feedback about your level of participation.

**Academic integrity.**

* Inclusion of AI statement: Any use of AI (e.g., ChatGPT) in any graded assignment (reading reflection, slides, independent study) must be disclosed, with a detailed description including the prompt(s) you entered, the output, and how you used the information. Use of AI without a disclosure can result in failure of the class in addition to penalties at the University level.
* Other information about academic integrity can be found here: [www.college.columbia.edu/academics/academicintegrity](http://www.college.columbia.edu/academics/academicintegrity).

**Attendance.** If you need to miss a class, please notify me as soon as possible. Of course, if you are sick (even with a cold) you should stay home, but staying in touch with me about this with be very helpful. You will still be responsible for the work due in a class you miss, e.g., reading response and interim project deadlines. Please let me know if you have any questions about this policy.

**Late assignments.** Late reading responses will get a maximum of 3 out of 5 points and cannot be turned in after we have discussed them in class. For your independent study: In my experience, when students do not hand this in on time, it is because they are overwhelmed with the prospect of working on an independent study. Remember that I’m available to discuss your project with you throughout the semester. Be in touch with me as you’re working on it, and I’d be glad to talk through ideas with you. Late assignments will drop one letter grade per day.

**Students with disabilities**. If you are a student with special needs and require accommodation, meet me before the first class to discuss your needs. You must also contact Disability Services before the first class to register for specific accommodations (https://health.columbia.edu/disability-services).

**A note about the readings:** I have curated this collection of readings very carefully. The readings are meant to be in conversation with each other, building on and challenging each other over the course of the semester. The expectation is that you will keep in mind and refer to previous readings as the semester progresses, building an ever richer and more nuanced understanding of the topic. For this reason, it is important to keep up with all the readings, as a shared set of texts for our scholarly community.

**Topics & Readings**

Chapters not otherwise specified refer to Dietrich, A. (2007). *Introduction to consciousness.* Cambridge University Press.

\*Readings available for discussion leading

**Week 1 Introductions**

No assigned readings

**Week 2 Theoretical perspectives**

*Required*

Chapter 3 Basic Positions

\*Masi, M. (2023). An evidence-based critical review of the mind-brain identity theory. *Frontiers in Psychology, 14*. <https://doi.org/10.3389/fpsyg.2023.1150605>

Hofstadter, D. R. (2007). On Souls and their Sizes. In *I am a strange loop* (pp 9 - 24). Basic Books.

*Optional*

Chapter 1 The Nature of Consciousness

Chapter 2 A Brief History

**Week 3 Empirical perspectives Part 1**

*Required*

\*Velmans, M. (2008). [How to separate conceptual issues from empirical ones in the study of consciousness](http://research.gold.ac.uk/26158/). In: Rahul Banerjee and Bikas K. Chakrabarti, eds. *Models of Brain and Mind: Physical, Computational and Psychological Approaches*. Boston: Elsevier, 1-9. <web-archive.southampton.ac.uk/cogprints.org/5380/1/Conceptual_vs_emprical_issues.pdf>

\*Seth, A.K., Bayne, T. Theories of consciousness. *Nat Rev Neurosci* 23, 439–452 (2022). <https://doi.org/10.1038/s41583-022-00587-4>

Hofstadter, D. R. (2007). This Teetering Bulb of Dread and Dream. In *I am a strange loop* (pp 25 - 35). Basic Books.

*Optional*

Chapter 4 Physical Mechanisms

Chapter 6 Neurocognition and Evolution

**Week 4. Empirical perspectives Part 2**

*Required*

\*Scott, R.B., Samaha, J., Chrisley, R., Dienes, Z. (2018). [Prevailing theories of consciousness are challenged by novel cross-modal associations acquired between subliminal stimuli](../../Downloads/Scott.pdf). *Cognition,* 175, 169-185.

\*Brown, R., Lau, H., & LeDoux, J. E. (2019). Understanding the higher-order approach to consciousness. *Trends in Cognitive Sciences, 23*(9), 754–768. <https://doi.org/10.1016/j.tics.2019.06.009>

Hofstadter, D. R. (2007). Of Selves and Symbols. In *I am a strange loop* (pp 73 - 86). Basic Books.

*Optional*

Chapter 7 Perception

Chapter 6 (If not previously read)

**Week 5. Dimensions of Consciousness**

*Required*

\*Birch, J., Schnell, A.K., & Clayton, N.S. (2020). [Dimensions of animal consciousness](../../Downloads/Birch.pdf). *Trends in Cognitive Science*, 24 (10), 789 – 801.

\*Bayne, T. & Carter, O. (2018). [Dimensions of consciousness and the psychedelic state](https://academic.oup.com/nc/article/2018/1/niy008/5103991). *Neuroscience of Consciousness*, 4(1): niy008, 1-8.

Hofstadter, D. R. (2007). The Elusive Apple of My “I”. In *I am a strange loop* (pp 177 - 191). Basic Books.

*Optional*

Chapter 13 Drug States and Other Alternities

**Week 6. Evolution & Neuroplasticity**

*Required*

\*Thaler, L. & Goodale, M.A. (2016). [Echolocation in humans](../../Downloads/Thaler.pdf): An overview. *WIREs Cogn Sci*, 7, 382-393.

\*Merker, B. (2005). [The liabilities of mobility: A selection pressure for the transition to consciousness in animal evolution](../../Downloads/Merker.pdf). *Consciousness and Cognition* (14), 89 – 114.

*Optional*

Chapter 6 (if not previously read)

**Week 7. Causal Reasoning & Metacognition**

*Required*

\*Wolford, G., Miller, M. B., & Gazzaniga, M. (2000). [The left hemisphere's role in hypothesis formation](file:///C%3A%5CUsers%5Cnisac%5CDownloads%5CWolford.pdf). *The Journal of Neuroscience,* 20(6), RC64, 1-4.

\*Heyes, C., Bang, D., Shea, N., Frith, C.D., & Fleming, S.M. (2020). [Knowing ourselves together: The cultural origins of metacognition](file:///C%3A%5CUsers%5Cnisac%5CDownloads%5CHeyes.pdf). *Trends in Cognitive Science*, 24(5), 349-362.

\*Brown, R., Lau, H., & LeDoux, J. E. (2019). [Understanding the higher-order approach to consciousness](file:///C%3A%5CUsers%5Cnisac%5CDownloads%5CBrown.pdf). *Trends in Cognitive Sciences*, 23(9), 754–768.

*Optional*

Chapter 10 Metacognition

**Week 8. Complexity Theory & Emergence**

*Required*

\*Feinberg, T. E., & Mallatt, J. (2020). Phenomenal consciousness and emergence: Eliminating the explanatory gap. *Frontiers in Psychology, 11*, 1-15. <https://doi.org/10.3389/fpsyg.2020.01041>

\*Mitchell, M. (2005). [Self-awareness and control in decentralized systems](https://www.aaai.org/Papers/Symposia/Spring/2005/SS-05-04/SS05-04-013.pdf). In *Working Papers of the AAAI 2005 Spring Symposium on Metacognition in Computation.* Menlo Park, CA: AAAI Press, 1 - 6.

\*Money, N. P. (2021). Hyphal and mycelial consciousness: The concept of the fungal mind. *Fungal Biology, 125*(3), 257–259. <https://doi.org/10.1016/j.funbio.2021.02.001>

**Week 9. The Self**

*Required*

\*Moldoveanu, M., & Stevenson, H. (2001). [The self as a problem: The intra-personal coordination of conflicting desires](file:///C%3A%5CUsers%5Cnisac%5CDownloads%5CMoldoveanu.pdf). *Journal of Behavioral and Experimental Economics, 30*(4), 295–330.

\*Becker, M., Vignoles, V. L., Owe, E., Easterbrook, M. J., Brown, R., Smith, P. B., … Lay, S. (2017). Being oneself through time: Bases of self-continuity across 55 cultures\*. *Self and Identity*, *17*(3), 276–293. <https://doi.org/10.1080/15298868.2017.1330222>

*Optional*

Chapter 8 Memory

Chapter 11 Free Will

**Week 10.** **Interoception & Emotion**

*Required*

\*Garfinkel, S. N., Seth, A. K., Barrett, A. B., Suzuki, K., & Critchley, H. D. (2015). Knowing your own heart: Distinguishing interoceptive accuracy from interoceptive awareness. *Biological Psychology, 104*, 65–74. <https://doi.org/10.1016/j.biopsycho.2014.11.004>

\*Barrett, L. F. (2017). [The theory of constructed emotion: An active inference account of interoception and categorization](file:///C%3A%5CUsers%5Cnisac%5CDownloads%5CBarrett.pdf)*.* *Social Cognitive and Affective Neuroscience, 12*(1), 1–23.

Hofstadter, D. R. (2007). Strangeness in the “I” of the Beholder. In *I am a strange loop* (pp 194 - 206). Basic Books

*Optional*

Chapter 9 Emotion

**Week 11. Aesthetic experience**

*Required*

\*Reber, R., Schwarz, N., & Winkielman, P. (2004). Processing fluency and aesthetic pleasure: Is beauty in the perceiver's processing experience? *Personality and Social Psychology Review, 8*(4), 364–382. <https://doi.org/10.1207/s15327957pspr08_3>

\*Palhares, P. T., Sas, M. I., & Gonçalves, Ó. F. (2024). Music and states of consciousness: A narrative review of the broader significance of music to understanding absorption, mind wandering and creative thought. *Neuroscience and biobehavioral reviews*, *167*, 105920. <https://doi.org/10.1016/j.neubiorev.2024.105920>

\*Curwen, C. (2018). Music-colour synaesthesia: Concept, context, and qualia. Consciousness and *Cognition*, 61, 94-106.

**Week 12. Artificial consciousness**

*Required*

\*Chalmers, D. J. (2023). Could a large language model be conscious? Boston Review. (Edited version of talk presented at Neural Information Processing Systems (NeurIPS), November 28, 2022). <https://www.bostonreview.net/articles/could-a-large-language-model-be-conscious/>

\*LeDoux, J., Birch, J., Andrews, K., Clayton, N. S., Daw, N. D., Frith, C., Lau, H., Peters, M. A. K., Schneider, S., Seth, A., Suddendorf, T., & Vandekerckhove, M. M. P. (2023). Consciousness beyond the human case. *Current biology : CB*, *33*(16), R832–R840. <https://doi.org/10.1016/j.cub.2023.06.067>

\*Dehaene, S., Lau, H., & Kouider, S. (2017). [What is consciousness, and could machines have it?](https://www.science.org/doi/10.1126/science.aan8871) *Science*, 358(6362), 486–492.

*Optional*

Chapter 5 Artificial Minds

**Weeks 13 & 14**

Flash Talks (no readings)

**Required Reading List**

Barrett, L. F. (2017). The theory of constructed emotion: An active inference account of interoception and categorization. Social Cognitive and Affective Neuroscience, 12(1), 1–23.

Bayne, T., & Carter, O. (2018). Dimensions of consciousness and the psychedelic state. Neuroscience of Consciousness, 4(1), niy008, 1–8.

Becker, M., Vignoles, V. L., Owe, E., Easterbrook, M. J., Brown, R., Smith, P. B., … Lay, S. (2017). Being oneself through time: Bases of self-continuity across 55 cultures. Self and Identity, 17(3), 276–293. <https://doi.org/10.1080/15298868.2017.1330222>

Birch, J., Schnell, A. K., & Clayton, N. S. (2020). Dimensions of animal consciousness. Trends in Cognitive Science, 24(10), 789–801.

Brown, R., Lau, H., & LeDoux, J. E. (2019). Understanding the higher-order approach to consciousness. Trends in Cognitive Sciences, 23(9), 754–768. <https://doi.org/10.1016/j.tics.2019.06.009>

Chalmers, D. J. (2023). Could a large language model be conscious? Boston Review. (Edited version of talk presented at Neural Information Processing Systems (NeurIPS), November 28, 2022). <https://www.bostonreview.net/articles/could-a-large-language-model-be-conscious/>

Curwen, C. (2018). Music-colour synaesthesia: Concept, context, and qualia. Consciousness and Cognition, 61, 94–106.

Dehaene, S., Lau, H., & Kouider, S. (2017). What is consciousness, and could machines have it? Science, 358(6362), 486–492.

Dietrich, A. (2007). *Introduction to consciousness.* Cambridge University Press.

Feinberg, T. E., & Mallatt, J. (2020). Phenomenal consciousness and emergence: Eliminating the explanatory gap. Frontiers in Psychology, 11, 1–15. <https://doi.org/10.3389/fpsyg.2020.01041>

Garfinkel, S. N., Seth, A. K., Barrett, A. B., Suzuki, K., & Critchley, H. D. (2015). Knowing your own heart: Distinguishing interoceptive accuracy from interoceptive awareness. Biological Psychology, 104, 65–74. <https://doi.org/10.1016/j.biopsycho.2014.11.004>

Heyes, C., Bang, D., Shea, N., Frith, C. D., & Fleming, S. M. (2020). Knowing ourselves together: The cultural origins of metacognition. Trends in Cognitive Science, 24(5), 349–362.

Hofstadter, D. R. (2007). I am a strange loop. Basic Books. (Selections: “On Souls and their Sizes” pp. 9–24; “This Teetering Bulb of Dread and Dream” pp. 25–35; “Of Selves and Symbols” pp. 73–86; “The Elusive Apple of My ‘I’” pp. 177–191; “Strangeness in the ‘I’ of the Beholder” pp. 194–206.)

LeDoux, J., Birch, J., Andrews, K., Clayton, N. S., Daw, N. D., Frith, C., Lau, H., Peters, M. A. K., Schneider, S., Seth, A., Suddendorf, T., & Vandekerckhove, M. M. P. (2023). Consciousness beyond the human case. Current Biology, 33(16), R832–R840. <https://doi.org/10.1016/j.cub.2023.06.067>

Masi, M. (2023). An evidence-based critical review of the mind-brain identity theory. Frontiers in Psychology, 14. <https://doi.org/10.3389/fpsyg.2023.1150605>

Merker, B. (2005). The liabilities of mobility: A selection pressure for the transition to consciousness in animal evolution. Consciousness and Cognition, 14, 89–114.

Mitchell, M. (2005). Self-awareness and control in decentralized systems. In Working Papers of the AAAI 2005 Spring Symposium on Metacognition in Computation (pp. 1–6). Menlo Park, CA: AAAI Press.

Moldoveanu, M., & Stevenson, H. (2001). The self as a problem: The intra-personal coordination of conflicting desires. Journal of Behavioral and Experimental Economics, 30(4), 295–330.

Money, N. P. (2021). Hyphal and mycelial consciousness: The concept of the fungal mind. Fungal Biology, 125(3), 257–259. <https://doi.org/10.1016/j.funbio.2021.02.001>

Palhares, P. T., Sas, M. I., & Gonçalves, Ó. F. (2024). Music and states of consciousness: A narrative review of the broader significance of music to understanding absorption, mind wandering and creative thought. Neuroscience and Biobehavioral Reviews, 167, 105920. <https://doi.org/10.1016/j.neubiorev.2024.105920>

Reber, R., Schwarz, N., & Winkielman, P. (2004). Processing fluency and aesthetic pleasure: Is beauty in the perceiver's processing experience? Personality and Social Psychology Review, 8(4), 364–382. <https://doi.org/10.1207/s15327957pspr08_3>

Scott, R. B., Samaha, J., Chrisley, R., & Dienes, Z. (2018). Prevailing theories of consciousness are challenged by novel cross-modal associations acquired between subliminal stimuli. Cognition, 175, 169–185.

Seth, A. K., & Bayne, T. (2022). Theories of consciousness. Nature Reviews Neuroscience, 23, 439–452. <https://doi.org/10.1038/s41583-022-00587-4>

Thaler, L., & Goodale, M. A. (2016). Echolocation in humans: An overview. WIREs Cognitive Science, 7, 382–393.

Velmans, M. (2008). How to separate conceptual issues from empirical ones in the study of consciousness. In R. Banerjee & B. K. Chakrabarti (Eds.), Models of Brain and Mind: Physical, Computational and Psychological Approaches (pp. 1–9). Boston: Elsevier.

Wolford, G., Miller, M. B., & Gazzaniga, M. (2000). The left hemisphere's role in hypothesis formation. The Journal of Neuroscience, 20(6), RC64, 1–4.