Metacognition and Embodiment
PSYC-612 | Section 52742 | Spring 2024
Advanced Seminar in Social Psychology
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==*Draft syllabus; details may change.*==
The official syllabus will live on Blackboard.

When & where
Mon, 2-5:50pm, room tba

Office hours
Mon, after class; Wed afternoon (by email arrangement), or at other times via zoom (by email arrangement). Email: norbert.schwarz@usc.edu | Office: 205 VPD

What is this class about?
Two separate streams of research in social and cognitive psychology have highlighted the importance of metacognitive and embodied processes for judgment and decision making. Metacognitive research focuses on how people think about their own thinking and what they learn from the subjective experiences of ease or difficulty that accompany the thought process. The questions it addresses include how people determine how likely they are to remember something; how they determine whether a claim is true; when and how they recognize a potential bias and how they correct for it; and what determines confidence in one's own thoughts. Embodiment research focuses on how human thinking is grounded in sensory experience with the world. The questions it addresses include how sensory experience shapes mental representations; how concurrent bodily sensations influence judgment and decision making; and how sensory experience guides abstract thought through conceptual metaphors. This seminar addresses the interface of metacognition and embodiment by asking how these lines of research can enrich, and challenge, one another. For this purpose, an overview of core theorizing and research in metacognition will be followed by an overview of core theorizing and research in embodiment, leading to the development of research questions that explore their interface.

To get a sense of the topics we will cover you may want to peruse the two handbook chapters linked below, which review key lessons from metacognitive and embodiment research.

Schwarz, N (2015). Metacognition. In M. Mikulincer, P.R. Shaver, E. Borgida, & J. A. Bargh (Eds.), *APA Handbook of Personality and Social Psychology: Attitudes and Social Cognition* (pp. 203-229)*.* Washington, DC: APA. pdf

Schwarz, N., & Lee, S.W.S. (2019). Embodied cognition and the construction of attitudes. In D Albarracin & B. T. Johnson (Eds.), *Handbook of attitudes* (2nd ed., Vol. 1, pp. 450-479). New York: Taylor & Francis. pdf

Format and readings

The bulk of this doctoral seminar will be discussion based. In a typical week (say week #2), a 4-hour class ends with an introductory lecture to next week's (week #3) topic that puts the readings into context. All participants read the core readings for the week. Some volunteer to submit issues for discussion ahead of class (on email) and I will organize them prior to class. In addition, the core readings are complemented by presentations of select additional papers, which contribute to class discussion.

All required readings will be on Blackboard. Some additional readings will be posted as well, but when you present on a topic you are expected to *read beyond the assigned readings* and to check on follow-up work. Google Scholar can help you identify relevant material – have a look at who cites the paper you start out with to identify related work.

Requirements and grading

This format results in the following requirements:
- Read the core papers each week
- Submit thoughts and questions to stimulate class discussion (expect to be responsible for that 3-4 weeks)
- Make short presentations (expect 3-4).
- There is no final paper and no exam.

Grading will be based on your presentations (60%), your thoughts and questions submitted for discussion (30%), and in-class discussion participation (10%).

Statement for Students with Disabilities

Any student requesting academic accommodations based on a disability is required to register with Disability Services and Programs (DSP) each semester. A letter of verification for approved accommodations can be obtained from DSP. Please be sure the letter is delivered to me (or to TA) as early in the semester as possible. DSP is located in STU 301 and is open 8:30 a.m.–5:00 p.m., Monday through Friday.
Contact information: (213) 740-0776 (Phone), (213) 740-6948 (TDD only), (213) 740-8216 (FAX) ability@usc.edu;
http://sait.usc.edu/academicsupport/centerprograms/dsp/home_index.html

Statement on Academic Integrity

USC seeks to maintain an optimal learning environment. General principles of academic honesty include the concept of respect for the intellectual property of others, the expectation that individual work will be submitted unless otherwise allowed by an instructor, and the obligations both to protect one's own academic work from misuse by others as well as to avoid

using another's work as one's own. All students are expected to understand and abide by these principles. *SCampus*, the Student Guidebook, (www.usc.edu/scampus or http://scampus.usc.edu) contains the University Student Conduct Code (see University Governance, Section 11.00), while the recommended sanctions are located in Appendix A.

Emergency Preparedness/Course Continuity in a Crisis
In case of a declared emergency if travel to campus is not feasible, USC will announce an electronic way for instructors to teach students using a combination of Blackboard, teleconferencing, and other technologies.

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Topics

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1/08   #1 Introduction, overview, and organization
We begin with introductions and organizational issues to organize the first few weeks. We will revisit the organization later to make adjustments where needed. An overview lecture introduces key topics in metacognition and embodiment and previews what's to come.

1/15   MLK Day

1/22   #2 How do we know that we know?
Sometimes we are convinced that we know something although we can't remember it and at other times we "know" that we do not know without even searching. How does this work? How do we assess whether we know something? What influences these judgments? And how accurate are the judgments? The Koriat (2007) chapter reviews the core approaches to this issue (focus on pp. 294-307). Sloman & Rabb (2016) suggest that people fail to distinguish between their own understanding and others' understanding, leading them to feel that they "know" and "understand" when others do. How that works remains a bit of a mystery and we'll discuss possible processes. Potentially shedding light on some of this, Fisher et al (2015) explore how the internet inflates knowledge estimates and Sparrow et al (2011) report that tricky knowledge questions increase the accessibility of concepts related to online searching.

Required
Koriat, A. (2007). Metacognition and consciousness. In P. D. Zelazo, M. Moscovitch, & E. Thompson (Eds.), *The Cambridge handbook of consciousness* (pp. 289–326). New York, NY: Cambridge University Press. doi:10.1017/CBO9780511816789. 012

Sloman, S. A., & Rabb, N. (2016). Your understanding is my understanding: Evidence for a community of knowledge. *Psychological Science*, *27*(11), 1451-1460. DOI: 10.1177/0956797616662271

Presentations

Fisher, M., Goddu, M. K., & Keil, F. C. (2015). Searching for explanations: How the Internet inflates estimates of internal knowledge. *Journal of Experimental Psychology: General*, *144*(3), 674-687. Doi:10.1037/xge0000070

Sparrow, B., Liu, J., & Wegner, D. M. (2011). Google effects on memory: Cognitive consequences of having information at our fingertips. S*cience*, 1207745. – Note that this paper has supplemental materials for download; you can't determine what they did without that.

Recommended
Koriat, A. (1993). How do we know that we know? The accessibility model of the feeling of knowing. *Psychological Review, 100*, 609–639. doi:10.1037/0033-295X.100.4.609

Koriat, A., & Levy Sadot, R. (2001). The combined contributions of the cue-familiarity and accessibility heuristics to feelings of knowing. *Journal of Experimental Psychology: Learning, Memory, and Cognition, 27*, 34–53. doi:10.1037/0278-7393.27.1.34

Reder, L. M. (1987). Strategy selection in question answering. *Cognitive Psychology, 19*, 90–138. doi:10.1016/0010-0285(87)90005-3

1/29   #3 Confidence, overconfidence, optimism and related flaws
A large body of work across many domains shows that people are overly optimistic in their self-assessments and have more confidence in their judgment, knowledge, and performance than warranted. and are overly optim. Dunning, Heath, & Suls (2004) review what we know about flawed self-assessment and Dunning (2012) discusses judgments of confidence. Gigerenzer (1994) notes important ambiguities in how over/confidence is often assessed and Koriat & Adiv (2015) summarize an information sampling theory of confidence judgment (which Koriat et al., 2016, use to suggest that some apparent social influence phenomena may have little to do with any social influence).

Required
Dunning, D., Heath, C., & Suls, J. M. (2004). Flawed self-assessment: Implications for health, education, and the workplace. *Psychological Science in the Public Interest*, *5*(3), 69-106. DOI: 10.1111/j.1529-1006.2004.00018.x

Dunning, D. (2012). Confidence considered: Assessing the quality of decisions and performance. In P. Brinol & K.G. DeMarree (eds.), *Social metacognition* (pp. 63-80). New York: Psychology Press.

Presentations
Gigerenzer, G. (1994). Why the distinction between single-even probabilities and frequencies is relevant for psychology (and vice versa). In G. Wright & P. Ayton (Eds.), *Subjective probability* (pp. 129–161). New York, NY: Wiley.

Recommended

Koriat, A., & Adiv, S. (2015). A self-consistency theory of subjective confidence. In J. Dunlosky & S. U. K. Tauber (eds.), The Oxford handbook of metamemory. New York: Oxford University Press. DOI: 10.1093/oxfordhb/9780199336746.013.18

Koriat, A., Adiv, S., & Schwarz, N. (2016). Views that are shared with others are expressed with greater confidence and greater fluency independent of any social influence. *Personality and Social Psychology Review*, *20*(2), 176-193.

2/05   #4 It feels right: Fluency, beauty, and truth
This week we explore how people assess truth. The available findings suggest that people rely on a subset of five criteria in evaluating truth: Is it compatible with other things I believe? Is it internally consistent? Does it tell a plausible story? Does it come from a credible source? Are there many supporting arguments? Do others think so as well? Each criterion can be evaluated by drawing on relevant details (an effortful analytic strategy) or by attending to the ease with which the content can be processed (a less effortful intuitive strategy). Fluent (easy) processing provides an affirmative answer to each of these truth tests, even when more careful processing would identify the claim as faulty. Hence, ideas can "feel right" even when we have little evidence to support them. Moreover, the fluency variables that make things feel right also make things aesthetically pleasing, linking intuitions of truth with assessments of beauty. The Schwarz (2018) chapter reviews these lines of work and Schwarz, Newman, & Leach (2016) discuss the implications for social media and the spread of misinformation. The pieces selected for presentation are specific studies that exemplify fluency effects on judgments of truth and beauty.

Lewandowsky et al (2012) provide a comprehensive review of research into the correction of misinformation and Reber et al (2004) offer a fluency theory of beauty.

Required
Schwarz, N. (2018). Of fluency, beauty, and truth: Inferences from metacognitive experiences. In J. Proust & M. Fortier (Eds.), *Metacognitive diversity. An interdisciplinary approach* (pp. 25-46). New York: Oxford University Press.

Schwarz, N., Newman, E.J., & Leach, W. (2016). Making the truth stick and the myths fade: Lessons from cognitive psychology. *Behavioral Science & Policy, 2(1),* 85-95.

Presentations
Newman, Et.J., Sanson. M., et al. (2014) People with easier to pronounce names promote truthiness of claims. *PLoS ONE 9(2*): e88671. doi:10.1371/journal.pone.0088671

Reber, R., Winkielman, P., & Schwarz, N. (1998). Effects of perceptual fluency on affective judgments. *Psychological Science, 9*, 45-48.

Reber, R., & Schwarz, N. (1999). Effects of perceptual fluency on judgments of truth. *Consciousness and Cognition, 8*, 338-342.

Recommended
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,* 364-382.

Lewandowsky, S., Ecker, U. K. H., Seifert, C., Schwarz, N., & Cook, J. (2012). Misinformation and its correction: Continued influence and successful debiasing. *Psychological Science in the Public Interest, 13,* 106-131. -- DOI 10.1177/1529100612451018

2/12   #5 It feels right (or not): Cultural fluency and (dis)trust
The research discussed under #4 typically manipulated the ease of processing information about the target of judgment. However, things can also feel right or wrong in a more general sense – something in the context is not right. We address two versions of this contextual sensitivity, namely interpersonal (dis)trust and cultural (dis)fluency. Seeing a bride wear a purple (rather than white) bridal dress can be enough to change how we think about unrelated issues. Oyserman (2019) reviews this work on cultural fluency and reasoning and will join this class for discussion. Less surprising, having reason to distrust others directs our attention to how things may be different from what they seem. Mayo (2015) reviews this work.

Required
Mayo, R. (2015). Cognition is a matter of trust: Distrust tunes cognitive processes. *European Review of Social Psychology*, *26*(1), 283-327.

Oyserman, D. (in press). Cultural fluency, mindlessness, and gullibility. In R. Baumeister & J. Forgas (Editors), *The Social Psychology of Gullibility*. London: Routledge.

Presentations
Mourey, J., Lam, B., & Oyserman, D. (2015) Consequences of cultural fluency. *Social Cognition, 33 (4), 308-344. doi: 10.1521/soco.2015.33.4.308*.

Recommended
Mayo, R., Alfasi, D., & Schwarz, N. (2014). Distrust and the positive test heuristic: Dispositional and situated social distrust improves performance on the Wason rule discovery task. *Journal of Experimental Psychology: General, 143(3),* 985-990. -- DOI 10.1037/a0035127

Oyserman, D. & Yan. V. X. (2018). Making meaning: a culture-as-situated cognition approach to the consequences of cultural fluency and disfluency. In S. Kitayama and D. Cohen (Eds.), *Handbook of cultural psychology* (pp 536-565). NY: Guilford Press.

2/19   President's Day; no class

2/26   #6 Truth in a polarized world
This week we explore a special aspect of biased cognition, namely how issue polarization affects reasoning.

Required
tbd

Presentations

Recommended

3/04   #7 Naïve realism, bias blind spot, and humility
People experience their own construals of the world as real – the world is the way I see it! If others see it differently, they are either ill informed, ill intentioned, or dumb. Ross & Ward (1996) discuss this "naïve realism". In contrast, we easily notice bias in others' construals, even when none may be there. Pronin (2007) reviews this work. These regularities are anathema to "intellectual humility", which asks us to acknowledge our limitations and be open-minded to other perspectives.

Required
Pronin, E. (2007). Perception and misperception of bias in human judgment. *Trends in Cognitive Sciences, 11*(1), 37-43.

Ross, L. & Ward, A. (1996). Naïve realism in everyday life: Implications for social conflict and misunderstanding. In E. S. Reed, E. Turiel, & T. Brown (eds.), *Values and knowledge.* New York: Psychology Press.

Recommended
Pronin, E., Gilovich, T., & Ross, L. (2004). Objectivity in the eye of the beholder: divergent perceptions of bias in self versus others. *Psychological Review, 111(3),* 781-799.

3/11-15   Spring Recess

3/18   #8 Debiasing and mental correction
The readings under #7 highlighted that people are usually not aware of biases in their judgment. But even when they become aware (usually, by having their attention drawn to bias), their attempts to correct for bias are rarely successful. This is a large, and often atheoretical, literature. Wilson & Brekke (1994) deserve credit for the first systematic review and Larrick (2004) summarizes the traditional approaches. Wegener and colleagues (2012) offer an update. Schwarz et al (2007) show that some of the conceptual mess is due to ignoring the role of metacognitive experiences in judgment (plenty of this piece is redundant with things discussed earlier) and Lewandowsky et al (2012) extend the debiasing discussion to how to correct the influence of misinformation.

Required
Wegener, D. et al. (2012). The metacognition of bias regulation. In P. Brinol & K.G. DeMarree (eds.), *Social metacognition* (pp. 81-99). New York: Psychology Press.

Presentations
Sanna, L. J., Schwarz, N., & Small, E. (2002). Accessibility experiences and the hindsight bias: I-knew-it-all-along versus it-could-never-have-happened. *Memory and Cognition, 30*, 1288–1296. doi:10.3758/BF03213410

Stapel, D. A., Martin, L. L., & Schwarz, N. (1998). The smell of judgments: What instigates correction
processes in social judgment? *Personality and Social Psychology Bulletin, 24*, 797–806. doi:10.1177/0146167298248002

Recommended
Larrick, R. P. (2004). Debiasing. In D. J. Koehler & N. Harvey (Eds.), *Blackwell handbook of judgment and decision making* (pp. 316–338). Oxford, England: Blackwell. doi:10.1002/9780470752937.ch16

Lewandowsky, S., Ecker, U. K. H., Seifert, C., Schwarz, N., & Cook, J. (2012). Misinformation and its correction: Continued influence and successful debiasing. *Psychological Science in the Public Interest, 13,* 106-131. -- DOI 10.1177/1529100612451018

Schwarz, N., Sanna, L. J., Skurnik, I., & Yoon, C. (2007). Metacognitive experiences and the intricacies of setting people straight: Implications for debiasing and public information campaigns. *Advances in experimental social psychology,* 39, 127–161. doi:10.1016/S0065-2601(06)39003-X

Wilson, T. D., & Brekke, N. (1994). Mental contamination and mental correction: Unwanted influences on judgments and evaluations. *Psychological Bulletin, 116*, 117–142. doi:10.1037/0033-2909.116.1.117

3/25   #9 Bodily sensations as information
Issues of embodiment will have come up many times in earlier discussions and we now turn to their systematic exploration. An overview lecture will provide a short review of the history of the "body" in judgment research, summarizing key theoretical approaches. The one we focus on this week treats bodily sensations –from arousal to facial and sensorimotor feedback-- as a source of information. The readings are a bit scattered but raise all the key issues.

Topolinski (2017) reviews how oral articulation patterns can induce approach or avoidance responses that influence judgment and behavior. Strack et al (1988) present a classic study testing Darwin's facial feedback hypothesis. This study failed in a multi-lab replication effort (Wagenmakers et al., 2016) that changed a crucial element of the procedures. Noah et al.

(2018a) replicate the original finding and its nonreplication under theoretically specified conditions and show that taking an observer's perspective impairs access to one's own internal feelings (Noah et al., 2018b). Facial feedback is affected by botox injections; Neil & Chartrand (2011) illustrate the consequences. Preceding this work, Zillman and colleagues identified the influence of incidental arousal on judgment and Zillman (1978) provides a review. Many -- but not all—of these bodily feedback effects can be conceptualized in terms of feelings-as-information theory (Schwarz, 2012) and we'll discuss the pros and cons of such integrations.

Required
Section on "Bodily experience as a source of information" in Schwarz, N., Lee, S.W.S. (in press). Embodied cognition and the construction of attitudes. In D Albarracin & B. T. Johnson (Eds.), *Handbook of attitudes* (2nd ed.). New York: Taylor & Francis. [pdf]

Presentations
Neil, D. T., & Chartrand, T. L. (2011). Embodied emotion perception: Amplifying and dampening facial feedback modulates emotion perception accuracy. *Social Psychological and Personality Science, 2*, 673–678.

Noah, T., Schul, Y., & Mayo, R. (2018a). When both the original study and its failed replication are correct: Feeling observed eliminates the facial-feedback effect. *Journal of personality and social psychology*, *114*(5), 657-664.

Noah, T., Schul, Y., & Mayo, R. (2018). Thinking of oneself as an object of observation reduces reliance on metacognitive information. *Journal of Experimental Psychology: General*, *147*(7), 1023-1042.

Strack, F., Martin, L. L., & Stepper, S. (1988). Inhibiting and facilitating conditions of the human smile: A nonobtrusive test of the facial feedback hypothesis. *Journal of Personality and Social Psychology, 54,* 768–777.

Topolinski, S. (2017). Articulation patterns in names - a hidden route to consumer preference. *Journal of the Association for Consumer Research, 2 (4),* 3812-391.

Wagenmakers, E.-J., Beek, T., Dijkhoff, L., Gronau, Q. F., Acosta, A., Adams, R. B., Jr.,... Zwaan, R. A. (2016). Registered replication report: Strack, Martin, & Stepper (1988). *Perspectives on Psychological Science, 11*, 917–928. http://dx.doi.org/10.1177/1745691616674458

Zillman, D. (1978). Attribution and misattribution of excitatory reactions. In J. H. Harvey, W. I. Ickes, & R. F. Kidd (Eds.), *New directions in attribution research* (Vol. 2, pp. 335–368). Hillsdale, NJ: Erlbaum.

Recommended
Barsalou, L. W. (2008). Grounded cognition. *Annual Review of Psychology*, 59, 617–645.

Schwarz, N. (2012). Feelings-as-information theory. In P. A. M. Van Lange, A. Kruglanski, & E. T. Higgins (Eds.), *Handbook of theories of social psychology* (pp. 289–308). Thousand Oaks, CA: Sage.

Schwarz, N., Lee, S.W.S. (in press). Embodied cognition and the construction of attitudes. In D Albarracin & B. T. Johnson (Eds.), *Handbook of attitudes* (2nd ed.). New York: Taylor & Francis

Wilson, R. A., & Foglia, L. (2017). Embodied Cognition. In E.N. Zalta (ed.), *The Stanford Encyclopedia of Philosophy* (Spring 2017 Edition), https://plato.stanford.edu/archives/spr2017/entries/embodied-cognition/

4/01   #10 Mental simulation
Treating mental representations as simulations of sensory experience, Barsalou proposed a model of situated conceptualizations that assigns a central role to sensory inputs and their re-enactment. This results in surprising predictions that have been well supported and are often compatible with observations from fluency research. We review the rationale and select evidence.

Required
Section on "Mental Simulation and Representation" in in Schwarz, N., Lee, S.W.S. (in press). Embodied cognition and the construction of attitudes. In D Albarracin & B. T. Johnson (Eds.), *Handbook of attitudes* (2nd ed.). New York: Taylor & Francis.

Barsalou, L. W. (2016a). Situated conceptualization: Theory and applications. In Y. Coello & M. H. Fischer (Eds.), *Foundations of embodied cognition: Perceptual and emotional embodiment* (pp. 11–37). East Sussex: Psychology Press.

Presentations
Elder, R., & Krishna, A. (2012). The visual depiction effect: Inducing embodied mental simulation that evokes motor responses. *Journal of Consumer Research, 38(6),* 988–1003.

Larson, J. S., Redden, J. P., & Elder, R. S. (2014). Satiation from sensory simulation: Evaluating foods decreases enjoyment of similar foods. *Journal of Consumer Psychology, 24(2)*, 188–194.

Shen, H., & Sengupta, J. (2012). If you can't grab it, it won't grab you: The effect of restricting the dominant hand on target evaluations. *Journal of Experimental Social Psychology, 48*, 525–529.

Recommended
Barsalou, L. W. (1999). Perceptual symbol systems. *Behavioral and Brain Sciences, 22*, 577–660.

Barsalou, L. W. (2008). Grounded cognition. *Annual Review of Psychology*, 59, 617–645.

Barsalou, L. W. (2016b). Situated conceptualization offers a theoretical account of social priming. *Current Opinion in Psychology, 12,* 6-11.

4/08   #11 Metaphors
Lakoff's conceptual metaphor theory assumes that we think about abstract concepts in terms of more concrete experiences in other domains. The mappings are reflected in language but not driven by language; they presumably arise from (shared) sensory experience with the physical world. A burgeoning literature is compatible with the rationale but rarely provides critical tests of the rationale.

Required
Section on "Embodied Metaphors" in Schwarz, N., Lee, S.W.S. (in press). Embodied cognition and the construction of attitudes. In D Albarracin & B. T. Johnson (Eds.), *Handbook of attitudes* (2nd ed.). New York: Taylor & Francis.

Landau, M. J., Meier, B. P., & Keefer, L. A. (2010). A metaphor-enriched social cognition. *Psychological Bulletin, 136,* 1045–1067.

Presentations
Lee, S. W. S., & Schwarz, N. (2010b). Washing away postdecisional dissonance. *Science, 328*, 709.

Williams, L. E., & Bargh, J. A. (2008). Experiencing physical warmth influences interpersonal warmth. *Science,* 322, 606–607.

Zhong, C. B., & Liljenquist, K. (2006). Washing away your sins: Threatened morality and physical cleansing. *Science, 313,* 1451–1452.

Recommended
Bargh, J. A., & Shalev, I. (2012). The substitutability of physical and social warmth in daily life. *Emotion*, 12, 154–162.
Lakoff, G. (2008). The neural theory of metaphor. In W. W. Gibbs (Ed.), *The Cambridge handbook of metaphor and thought* (pp. 17–38). New York: Cambridge University Press.

Lakoff, G., & Johnson, M. (1980). *Metaphors we live by.* Chicago, IL: University of Chicago Press.

Lakoff, G., & Johnson, M. (1999). *Philosophy in the flesh: The embodied mind and its challenges to western thought*. New York: Basic Books.

Landau, M. J. (2017). *Conceptual metaphor in social psychology: The poetics of everyday life*. New York: Psychology Press

Lee, S. W. S., & Schwarz, N. (2016). Clean-moral effects and clean-slate effects: Physical cleansing as an embodied procedure of psychological separation (pp. 136-161). In R.

Duschinksy, S. Schnall, & D. Weiss (Eds.), *Purity and danger now: New perspectives*. London: Routledge.

Thibodeau, P. H., Hendricks, R. K., & Boroditsky, L. (2017). How linguistic metaphor scaffolds reasoning. *Trends in Cognitive Sciences*, *21*(11), 852-863.

4/15   #12 Flex time
I am reserving time for topics that may come up during class. We may use this flexible time here or earlier, taking advantage of the malleability of Blackboard schedules.

4/22   #13 So what? Metacognition and embodiment
We wrap up the semester by developing an outline for a research agenda at the interface of embodiment and metacognition.