Topics we covered in PSY102: Introduction to Cognitive Psychology

Perception:

- What are issues that artificial intelligence has with perception that we can solve? (e.g., inverse problem, blurred/hidden objects, viewpoint invariance, the ambiguity of perception)
- How does perception depend on a person's knowledge about characteristics of the environment? (e.g., top-down vs. bottom-up, unconscious inference & the likelihood principle, Bayesian priors/likelihood, statistical regularities, Gestalt principles)
- How does the brain become tuned to respond best to things that are likely to appear in the environment? (e.g., Greebles and experience dependent plasticity, what/where streams)
    - Article: Gruters, K. G., Murphy, D. L. K., Jenson, C. D., Smith, D. W., Shera, C. A., & Groh, J. M. (2018). The eardrums move when the eyes move: A multisensory effect on the mechanics of hearing. Proceedings of the National Academy of Sciences, 115(6), E1309–E1318. https://doi.org/10.1073/pnas.1717948115..
    - Science News: Dean & Yong coverage of Gruters article

Attention:

- Is it possible to focus attention on just one thing, even when there are lots of other things going on at the same time? (e.g., cocktail party effect, selective attention, early/late selection models, dichotic listening)
- Under what conditions can we pay attention to more than one thing at a time, and what are basic properties of attention? (e.g., Stroop effect, perceptual load, basic properties of attention like overt/covert, top-down vs. bottom-up, endogenous vs. exogenous cueing, arousal/attention relationship, attentional capture, shared attention - Kang & Wheatley)
- What does multitasking research suggest about our ability to multitask? (e.g., mind-wandering, dual-tasking, task-switching, working memory capacity, Middlebrooks, Seli, Wechsler articles)
- Is it true that we're not paying attention to a large fraction of the things that are happening in our environment? (e.g., change blindness, inattentional blindness, neglect syndrome)
- How do we experience the world coherently? (e.g., Treisman's feature integration theory, the binding problem, visual search tasks (single feature & conjunction search))
    - Article: Kang, O., & Wheatley, T. (2017). Pupil dilation patterns spontaneously synchronize across individuals during shared attention. Journal of Experimental Psychology: General, 146(4), 569–576. https://doi.org/10.1037/xge000027
    - Article: Middlebrooks, C. D., Kerr, T., & Castel, A. D. (2017). Selectively Distracted: Divided Attention and Memory for Important Information. Psychological Science, 28(8), 1103–1115. https://doi.org/10.1177/0956797617702502.
    - Article: Wechsler, K., Drescher, U., Janouch, C., Haeger, M., Voelcker-Rehage, C., & Bock, O. (2018). Multitasking During Simulated Car Driving: A Comparison of Young and Older Persons. Frontiers in Psychology, 9. https://doi.org/10.3389/fpsyg.2018.00910.
    - Article: Seli, P., Carriere, J. S. A., Wammes, J. D., Risko, E. F., Schacter, D. L., & Smilek, D. (2018). On the Clock: Evidence for the Rapid and Strategic Modulation of Mind Wandering. Psychological Science, 29(8), 1247–1256. https://doi.org/10.1177/0956797618761039.
    - Podcasts: Buying Attention & Life, Interrupted

Emotion:

- What are emotions? (e.g., subjective experience, functional significance, physiological patterns, conspecifics/behavior/facial expressions)
- How can we measure emotion? (e.g., experience sampling, emotion induction, affect induction via facial expressions on neutral images and testing how emotion & perception interact, going to tribes that have no familiarity with Western culture & seeing how they perceive our emotional expressions, stress responses, startle reflexes, eye blinks and pupil dilation, annoying but not painful shocks)
- What are different theories of emotion? How are emotions generated? (e.g., dimensional perspectives on emotion vs. categorical perspective on emotion (universal), discrete emotion hypothesis, psychological constructionist view of emotion (Siegel/MacCormack vs. Kragel), James-Lange theory, Panksepp/rat basic emotions, Cannon-Bard theory, Schacter & Singer on appraisal)
- How do we regulate & manage our emotion? (e.g., Gross's model of emotion regulation; d'Arbeloff)
    - Article: Kragel, P. A., Knodt, A. R., Hariri, A. R., & LaBar, K. S. (2016). Decoding Spontaneous Emotional States in the Human Brain. PLOS Biology, 14(9), e2000106. https://doi.org/10.1371/journal.pbio.2000106
    - Article: Siegel, E. H., Wormwood, J. B., Quigley, K. S., & Barrett, L. F. (2018). Seeing What You Feel: Affect Drives Visual Perception of Structurally Neutral Faces. Psychological Science, 29(4), 496–503. https://doi.org/10.1177/0956797617741718

- Article: d'Arbeloff, T. C., Kim, M. J., Knodt, A. R., Radtke, S. R., Brigidi, B. D., & Hariri, A. R. (2018). Microstructural integrity of a pathway connecting the prefrontal cortex and amygdala moderates the association between cognitive reappraisal and negative emotions. Emotion, 18(6), 912–915. https://doi.org/10.1037/emo0000447.
- Article: MacCormack, J. K., & Lindquist, K. A. (2019). Feeling hangry? When hunger is conceptualized as emotion. Emotion, 19(2), 301–319. https://doi.org/10.1037/emo0000422.
- Podcast: The creation of emotions
- Science News: Chen (2018) (covering hangry article in NPR), Strickland (2016) (covering Kragel in CNN)

Language:

- How do we understand individual words, and how are words combined to create sentences? (e.g., universality & creativity of language, early perspectives on language, psycholinguistics, phonemes, morphemes, lexicon, phonemic restoration effect, word superiority effect, speech segmentation, word frequency effect, lexical decision task)
- How can we understand sentences that have more than one meaning? (e.g., lexical ambiguity, semantics/syntax dissociations like Wernicke's/Broca's aphasias, N400 vs. P600 ERPs, garden path sentences, temporal ambiguity, parsing by syntax vs. interaction of syntax/semantics)
- How do we understand stories? (e.g., inferences, situation models, predicting based on context and knowledge, simulations of words leading to same brain activity, conversations and language structured as Old/New, syntactic priming)
- Does language affect the way a person perceives colors? (e.g., Russian v. English blue)
- How do we acquire language & study language when we're pre-verbal (e.g., Yu/Bergelson)
  - Article: Bergelson, E., & Aslin, R. N. (2017). Nature and origins of the lexicon in 6-mo-olds. Proceedings of the National Academy of Sciences, 114(49), 12916–12921. https://doi.org/10.1073/pnas.1712966114.
  - Yu, C., Suanda, S. H., & Smith, L. B. (2019). Infant sustained attention but not joint attention to objects at 9 months predicts vocabulary at 12 and 15 months. Developmental Science, 22(1), e12735. https://doi.org/10.1111/desc.12735.
  - Science News: Gutman (2017) (covering Bergelson in Atlantic), Hayakawa & Marian (SciAm perspective on bilingual research since that wasn't going to be covered)

Working-memory & short-term memory:

- Why can we remember a telephone number long enough to place a call, but then we forget it almost immediately? (e.g., the modal model of memory (sensory memory/STM/LTM), control processes like rehearsal, measuring the capacity and duration of each memory process (e.g., partial/whole report; digit spans; chunking), persistence of vision, proactive/retroactive interference)
- How is memory involved in processes such as doing a math problem? (e.g., why we actually prefer the term working memory vs. short-term memory (Yin article), what was wrong with dory in finding nemo, Baddeley's working memory models, phonological similarity effect, phonological loop, articulatory rehearsal & suppression, visuospatial sketch pad, episodic buffer, word length effect, visual imagery, central executive)
- What is the evidence for/against brain training? (e.g., Kable article)
  - Article: Kable, J. W., Caulfield, M. K., Falcone, M., McConnell, M., Bernardo, L., Parthasarathi, T., … Lerman, C. (2017). No Effect of Commercial Cognitive Training on Brain Activity, Choice Behavior, or Cognitive Performance. Journal of Neuroscience, 37(31), 7390–7402. https://doi.org/10.1523/JNEUROSCI.2832-16.2017
  - Article: Yin, S., Sui, J., Chiu, Y.-C., Chen, A., & Egner, T. (2019). Automatic Prioritization of Self-Referential Stimuli in Working Memory. Psychological Science, 30(3), 415–423. https://doi.org/10.1177/0956797618818483
  - Science News: Noe (2017) (covering Kable article in NPR), Duong (2019) (covering Yin article for Duke press release)

Long-term memory: Structure:

- How does damage to the brain affect the ability to remember what has happened in the past and the ability to form new memories of ongoing experiences? (e.g., serial position curve: primacy & recent effects - MTL lesions vs. delay vs. presenting the list of words more slowly, decay of LTM, retrograde vs. anterograde amnesia, declarative vs. nondeclarative memories, our giant LTM structure - episodic, semantic, priming, procedural, conditioning definitions, double dissociations, episodic v. semantic, episodic v. priming, episodic v. procedural, STM vs. LTM, measuring LTM in healthy patients)
- How do the different types of memory interact in our everyday experience (e.g., segmenting memories via Ben-Yakov & Uitvlugt articles; the semanticization of episodic memories over time, imagining the future)
  - Article: Uitvlugt, M. G., & Healey, M. K. (2019). Temporal Proximity Links Unrelated News Events in Memory. Psychological

Science, 30(1), 92–104. https://doi.org/10.1177/0956797618808474.
- Article: Ben-Yakov, A., & Henson, R. N. (2018). The Hippocampal Film Editor: Sensitivity and Specificity to Event Boundaries in Continuous Experience. Journal of Neuroscience, 38(47), 10057–10068. https://doi.org/10.1523/JNEUROSCI.0524-18.2018.
- Science summary: Williams et al. (2019) (covering Ben-Yakov article as a student written Journal Club)
- Science News: Shute (2014) (introducing idea of memory as being constructive, where we update memories)

Long-term memory: Encoding, retrieval, consolidation:

- How do we store information in long-term memory? (e.g., encoding, maintenance vs. elaborative rehearsal, levels of processing theory, generation, self-reference effect, organization, retrieval cues, testing effect)
- What are some techniques we can use to help us get information out of long-term memory when we need it? (e.g., retrieval, different memory paradigms (recognition, cued recall, free recall), encoding specificity, state-dependent learning, transfer-appropriate processing; Vaz article)
- How is it possible that a lifetime of experiences and accumulated knowledge can be stored in neurons? (e.g., consolidation: standard model, multiple traces, long-term potentiation, synaptic vs. systems, repetition suppression, propanolol, reconsolidation)
- How can the results of memory research be used to create more effective study techniques? (e.g., self-reference effect, organization, testing effect/retrieval practice, encoding specificity, transfer-appropriate processing, spaced learning/distributed practice, visual imagery, elaboration, generation, avoid illusion of learning)
    - Article: Vaz, A. P., Inati, S. K., Brunel, N., & Zaghloul, K. A. (2019). Coupled ripple oscillations between the medial temporal lobe and neocortex retrieve human memory. Science, 363(6430), 975–978. https://doi.org/10.1126/science.aau8956
    - Science summary: Gelinas (2019) (covering Vaz article in Science)

Autobiographical Memory:

- What kinds of events from their lives are people most likely to remember? (e.g., properties of autobiographical memory like its multidimensional nature, reminiscence bump & self-image, cognitive, and cultural life script hypotheses)
- Is there something special about memory for extraordinary events? (e.g., memory & emotion interactions, flashbulb memories, repeated recall, narrative rehearsal hypothesis)
- What do we mean when we say memory is constructive? (e.g., fictional first memories, Stanley, Rubin, updating our memories & consolidation & reconsolidation like in previous chapters on memory)
- How do people differ in their autobiographical memory recall? (e.g., severely diminished vs. highly superior autobiographical memory profiles)
    - Article: Rubin, D. C., Deffler, S. A., & Umanath, S. (2019). Scenes enable a sense of reliving: Implications for autobiographical memory. Cognition, 183, 44–56. https://doi.org/10.1016/j.cognition.2018.10.024.
    - Article: Stanley, M. L., Parikh, N., Stewart, G. W., & De Brigard, F. (2017). Emotional intensity in episodic autobiographical memory and counterfactual thinking. Consciousness and Cognition, 48, 283–291. https://doi.org/10.1016/j.concog.2016.12.013
    - Science News: Leung (2019) (suggesting we could help Alzheimer's patients with a mobile app mimicking the hippocampus)
    - Podcast: A highly superior memory
    - Also later on in the week, podcast on Radio Replay: Looking Back (regret in autobio memory/relation to Stanley article & thinking about memory as being constructive)

Knowledge / Categorization:

- Why is it difficult to decide if a particular object belongs to a particular category, such as "chair", by looking up its definition? (e.g., uses and purpose of categorization, definitional view of categorization, prototype theory vs. exemplar theory: when to use each, what they mean, sentence verification, naming, priming, typicality effect, family resemblance hierarchical approach to categorization)
- How are the properties of various objects "filed away" in the mind? (e.g., semantic category network vs. connectionist models for stored knowledge)
- How might we try to apply this research to the real world? (e.g., concept maps)

Decision-making:

- What kinds of reasoning "traps" do people get into when making judgments? How do we change people's minds and take this research into consideration when communicating science? (e.g., motivated

reasoning, inductive reasoning, availability / representatitvenes / anchoring heuristics, confirmation bias, myside bias, law of large numbers, conjunction rule, peak-end effect, loss aversion, podcast on changing people's minds, Stanley, Pennycook & Rand, Believe comic)

- What is the evidence that people sometimes make decisions that are not in their best interests? How do other things like emotion impact our decision-making? (e.g., expected utility theory, endowment effect, delay discounting, incidental/expected emotions, risk-taking and risk-averse behaviors, framing effect, status quo bias, ultimatum game/neuroeconomics, trolley problem, dual systems, Lombrozo, Pearson, Pryor)
- What other kinds of biases or logical fallacies might people be prone to? (e.g., deductive reasoning, belief bias, conditional/categorical syllogisms, wason four-card problem & syllogisms in the real world, permission schema, Klein & O'Brein & podcast (immediacy of making decisions vs. information avoidance podcast), Levari / prevalence induces concept change)
    - Article: Pryor, C., Perfors, A., & Howe, P. D. L. (2019). Even arbitrary norms influence moral decision-making. Nature Human Behaviour, 3(1), 57–62. https://doi.org/10.1038/s41562-018-0489-y.
    - Article: Pearson, J. M., Law, J. R., Skene, J. A. G., Beskind, D. H., Vidmar, N., Ball, D. A., … Skene, J. H. P. (2018). Modelling the effects of crime type and evidence on judgments about guilt. Nature Human Behaviour, 2(11), 856–866. https://doi.org/10.1038/s41562-018-0451-z.
    - Article: Pennycook, G., & Rand, D. G. (2018). Lazy, not biased: Susceptibility to partisan fake news is better explained by lack of reasoning than by motivated reasoning. Cognition. https://doi.org/10.1016/j.cognition.2018.06.011.
    - Article: Stanley, M. L., Henne, P., Yang, B. W., & De Brigard, F. (2019). Resistance to Position Change, Motivated Reasoning, and Polarization. Political Behavior. https://doi.org/10.1007/s11109-019-09526-z.
    - Article: Levari, D. E., Gilbert, D. T., Wilson, T. D., Sievers, B., Amodio, D. M., & Wheatley, T. (2018). Prevalence-induced concept change in human judgment. Science, 360(6396), 1465–1467. https://doi.org/10.1126/science.aap8731.
    - Science News: Lombrozo (2014) (covering how neuroscience evidence is used in courtrooms)
    - Podcast: I'm Right, You're Wrong; Active Information Avoidance
    - Comic: Believe

False memory & Misinformation:

- What properties of the memory system make it both highly functional and prone to error? (e.g., memory being constructive - revisited, war of the ghosts, making inferences about what we saw or heard via schemas (e.g., office), scripts, cultural expectations (e.g., war of ghosts; list of words with common errors like *melted* instead of vanished); source monitoring errors (e.g., "becoming famous overnight", gender stereotypes, Tom Petty vs. Red Hot Chili Peppers, female/male narrator on stealing computer study), cryptoamnesia, memory modified by suggestion (e.g., hot air balloon, lost in shopping mall, Shaw and Porter), other paradigms to study false memory (deese roediger mcdermott, how misleading postevent information impacts memory - like with the robber/cop video), misinformation effect, sleep deprivation via Frenda, illusory truth effect / Fazio, how fake news spreads online and why people might believe it)
- Why is eyewitness testimony often cited as the cause of wrongful convictions? (e.g., demo with Peter coming to class, errors in perception, attentional & arousal (guns focus), familiarity (female/male teacher scenario), suggestion (confirming feedback, suggestive questioning, misleading postevent information), what should be done to address those errors (sequential lineups, blind lineups, etc.), Fraser ted talk)
- Generally thinking about recommendations for how to combat misinformation (e.g., thinking about what the articles implied on how misinformation spreads & various recs from Vosoughi, Lazer, Grinberg, Lombrozo interview)
    - Article: Frenda, S. J., Berkowitz, S. R., Loftus, E. F., & Fenn, K. M. (2016). Sleep deprivation and false confessions. Proceedings of the National Academy of Sciences, 113(8), 2047–2050. https://doi.org/10.1073/pnas.1521518113.
    - Article: Shaw, J., & Porter, S. (2015). Constructing Rich False Memories of Committing Crime. Psychological Science, 26(3), 291–301. https://doi.org/10.1177/0956797614562862.
    - Article: Fazio, L. K., Brashier, N. M., Payne, B. K., & Marsh, E. J. (2015). Knowledge does not protect against illusory truth. Journal of Experimental Psychology: General, 144(5), 993–1002. https://doi.org/10.1037/xge0000098.
    - Article: Vosoughi, S., Roy, D., & Aral, S. (2018). The spread of true and false news online. Science, 359(6380), 1146–1151. https://doi.org/10.1126/science.aap9559.
    - Article: Grinberg, N., Joseph, K., Friedland, L., Swire-Thompson, B., & Lazer, D. (2019). Fake news on Twitter during the 2016 U.S. presidential election. Science, 363(6425), 374–378. https://doi.org/10.1126/science.aau2706.
    - Podcast: Ted radio hour on Can Eyewitnesses Create Memories
    - Science Summary: Lazer, D. M. J., Baum, M. A., Benkler, Y., Berinsky, A. J., Greenhill, K. M., Menczer, F., … Zittrain, J. L.

(2018). The science of fake news. Science, 359(6380), 1094–1096. https://doi.org/10.1126/science.aao2998.
- Computer game on how social networks can propagate ideas and lead to groupthink
- Science News: Lombrozo (2018) (interview w/ psychologist from Lazer et al. (2018) article)

Collective Memory:

- What is collective memory & what can it tell us? (e.g., collective memory vs. remembering, collective memory v. history, individual vs. collective remembering, narcisstic bias in collective memory, too, via states contribution to history, our collective identity as Americans & our history, Abel article on WWII, Masswood article on collective memory of Psych exam)
- Why do we remember some core events and cultural products more than others? (e.g., Stix & Cummins - piecing together what Candia suggested about cultural & communicative memory and the decay of songs, movies, biographies, papers, and patents over time - which decays fastest, what are the components of us forgetting?)
  - Article: Maswood, R., Rasmussen, A. S., & Rajaram, S. (2019). Collaborative remembering of emotional autobiographical memories: Implications for emotion regulation and collective memory. Journal of Experimental Psychology: General, 148(1), 65–79. https://doi.org/10.1037/xge0000468.
  - Article: Abel, M., Umanath, S., Fairfield, B., Takahashi, M., Roediger, H. L., & Wertsch, J. V. (2019). Collective Memories across 11 Nations for World War II: Similarities and Differences Regarding the Most Important Events. Journal of Applied Research in Memory and Cognition. https://doi.org/10.1016/j.jarmac.2019.02.001.
  - Science News: Stix (2018) & Cummins (2018) covering the same article on how long an event can hold humanity's/society's attention

Problem Solving:

- What makes a problem hard? (e.g., Gestalt perspective on representation, restructuring, insight, obstacles to problem-solving like functional fixedness and our mental sets, information-processing approach, tower of hanoi task, & how you can get stuck in dead ends there too, how a problem is stated impacting the way you solve it, think-aloud protocol and various problems we went over as demos)
- How can analogies be used to help solve problems? (e.g., thinking about russian marriage problem as an analogy to checkerboard problem; analogical transfer, source/target problems, the ray/radiation problem related to the fortress castle problem, the effect of making problems more similar for analogical encoding, helping people recognize that the problems are actually analogies & similar techniques can be applied
- How do experts in a field solve problems differently than nonexperts? (e.g., what is expertise? How does expertise help? Knowledge, organization of knowledge, more time being specialized, Rubik's cubes videos)
- What is creativity? How can we study it? (e.g., podcast, our own definitions, divergent and convergent thinking tasks - also insight problems & all the problem-solving lit we went over)
  - Podcast: Creativity from Constraints

Learning & Motivation:

- What is curiosity? How do we typically study curiosity? What's the relationship between curiosity, memory, and well-being (Lydon, Marvin)? What are open future research questions related to curiosity? How do prediction errors relate to research on decision-making (DiMenichi)?
  - Article: Marvin, C. B., & Shohamy, D. (2016). Curiosity and reward: Valence predicts choice and information prediction errors enhance learning. Journal of Experimental Psychology: General, 145(3), 266–272. https://doi.org/10.1037/xge0000140.
  - Article: Lydon-Staley, D. M., Zurn, P., & Bassett, D. S. (2018). Inconsistent curiosity: Augmentation and blunting of curiosity in daily life and implications for well-being. PsyArXiv. https://doi.org/10.31234/osf.io/2vf94.
  - Science summary: DiMenichi, B. C., & Tricomi, E. (2016). Are You Smarter Than a Teenager? Maybe Not When It Comes to Reinforcement Learning. Neuron, 92(1), 1–3. https://doi.org/10.1016/j.neuron.2016.09.043.

Imagery:

- How do "pictures in your head" compare to your experience when you perceive an object? (imagery debate - mental scanning tasks, mental walking, spatial/depictive/analog vs. propositional/tacit knowledge explanations of imagery, fMRI + lesion + neglect studies on imagery v. perception, shared & separate mechanisms)
- How does imagery improve memory? (mnemonics: method of loci, linkwords, pegwords... and more

related to actually testing imagery: paper folding test)

Education:

- What are some fundamental findings in education research, including tips on how best to study? (e.g., Dunlosky - retrieval practice, distributed practice, elaborative interrogation, self-explanation, interleaved practice; Psych Files podcast - making study groups most effective; learning styles, active learning, text-anxiety & interventions, purpose for learning, strategic self-control, values affirmation, critical feedback, team-based learning)
- Why do professors declare laptop bans? (Sana, Ravizza, Sapiano, Lombrozo articles)
    - Article: Smith, A. M., Floerke, V. A., & Thomas, A. K. (2016). Retrieval practice protects memory against acute stress. Science, 354(6315), 1046–1048. https://doi.org/10.1126/science.aah5067
    - Article: Hard, B. M., Lovett, J. M., & Brady, S. T. (2019). What do students remember about introductory psychology, years later? Scholarship of Teaching and Learning in Psychology, 5(1), 61–74. https://doi.org/10.1037/stl0000136.
    - Article: Ravizza, S.M., Uitvlugt, M.G., and Fenn, K.M. (2017). Logged in and zoned out: How laptop internet use relates to classroom learning. Psychological Science, 28, 171-180.
    - Article: Sana, F., Weston, T., & Cepeda, N. J. (2013). Laptop multitasking hinders classroom learning for both users and nearby peers. Computers & Education, 62, 24–31. https://doi.org/10.1016/j.compedu.2012.10.003.
    - Science summary: Dunlosky et al. (2013). What works, what doesn't. Scientific American Mind, 24(4), 47 – 53.
    - Podcast: The Psych Files (How to Make Study Groups Effective)
    - Science News: Supiano, B. (2019, February 6). Should You Allow Laptops in Class? Here's What the Latest Study Adds to That Debate. The Chronicle of Higher Education. Retrieved from https://www.chronicle.com/article/Should-You-Allow-Laptops-in/245625.
    - Science News: Lombrozo, T. (2013, August 19). Stop Multitasking! It's Distracting Me (And You). Retrieved from NPR.org website: https://www.npr.org/sections/13.7/2013/08/19/213439794/stop-multitasking-it-s-for-other-people-s-good.