

Quiz #5

Name: _____

1. Name two heuristics we studied, and describe a hypothetical example of someone making an error in judgment when using each of those heuristics. [2 pt; DM Day 2]

1. Events that are more easily remembered as judged as more probable
2. Strong correlation between two events appears to exist, but doesn't.
3. Probability that A is a member of class B is determined by how well properties of A resemble properties usually associated with B.
4. Relative proportions of different classes in the population.
5. Probability of conjunction of two events (A and B) cannot be higher than the probability of single constituents.
6. The larger the number of individuals drawn from a population, the more representative the group will be of the entire population.
7. Tendency for people to generate and evaluate evidence and test their hypotheses in a way that is biased towards their own opinions & attitudes
8. Selectively looking for information that conforms to a hypothesis and overlooking information that argues against it.

9. Availability heuristic - Easily remembered event is less probable
10. Illusory correlation - There is no correlation, or it is weaker than it appears to be.
11. Representativeness heuristic - Presence of similar properties doesn't predict membership in class B.
12. Base rate - Base rate information is not taken into account.
13. Conjunction rule - Higher probability is assigned to the conjunction.
14. Law of large numbers - It is assumed that a small number of individuals accurately represents the entire population.
15. Myside bias (type of confirmation bias) - People let their own opinions and attitudes influence how they evaluate evidence needed to make decisions.
16. Confirmation bias - There is a narrow focus only on confirming information.

There are more we went over, like peak-end effect, loss aversion, and anchoring heuristic. And I could write more here, but we went over this in the review session as well.

2. "If it is the last day of class (LDOC), all Duke students are drunk." Based on the above statement, please evaluate the *deductive inferences* below, by labeling each one as either valid or invalid. [2 pts; DM Day 3]

If p (LDOC), then q (drunk).

valid "It is LDOC; therefore all Duke students are drunk" *p, therefore q (Syllogism 1)*

valid "Not all Duke students are drunk; therefore, it is not LDOC" *not q, therefore not p (Syllogism 2).*

invalid "All Duke students are drunk; therefore, it is LDOC" *q, therefore p.*

invalid "It is not LDOC; therefore, not all Duke students are drunk" *not p, not q.*

3. One of our section themes was about how we can change people's minds. Draw on your readings, podcasts/other SciComm articles, and class discussions to describe two distinct findings about what psychology suggests is the answer to this question [2 pts; DM Day 2]

Stanley et al. (2019): present people with opposing reasons if issue is not too polarizing

Podcast: → STORY-TELLING (Uri Hasson story), synchronization of brains, synchronization was important for INFLUENCE (connecting back to our third day of class on shared attention!!), getting us to *feel* what the story-teller wanted us to feel; → story of positive feedback in the hospital (to get the medical staff to wash hands before/after); → change people's behavior with fear? She mentions when people are stressed out (tapping into their mindset) and when you're trying to get someone to not do something (inaction)

Pennycook and Rand (2018): make sure people are thinking analytically

Can't change people's minds when the issue is something polarizing (like vaccination)

4. One of our class activities focused on applying the decision-making research that we discussed over the course of three days to Science Communication. Describe one concrete application of the research to how you approach Science Communication [1 pt; DM Day 3]

-Students can talk about the motivated reasoning paper, making sure to incorporate opposing reasons (i.e., how we've discussed thinking about the long-term validity or limitations behind any research covered).

-Students can talk about the anchoring heuristic, and how if you are going to provide people with a number, know that they are going to use that number as a reference point for judging what's in the piece.

-Students can talk about the law of large numbers and we'll make errors by assuming people have representative populations, so as a SciComm person, you will need to address whether the population is actually representative and allows for generalizable findings.

-Students can discuss the representativeness heuristic & making sure to actually provide a base rate so that people aren't relying just on their descriptions of claims (like how often do people get into accidents generally + accidents on a scooter, before you report that scooters are dangerous)

-Students can talk about how people usually read papers and articles with a confirmation bias in mind, so they'll have to take into account when communicating controversial science that some people will already have made up their minds and they'll have to tread carefully to convince others.

-They could talk about the peak-end effect and the way stories are organized around peaks and ends anyway (giving the bottom line and so what early and then cycling back at the end to give people a sense of the thematic conclusion). Really, most of the heuristics and decision-making research we discussed can be used or thought of in relation to story-telling.

5. We can reduce errors in eyewitness testimony by doing all of the following EXCEPT [1 pt; False Memory]
- A. Using a sequential line-up instead of a simultaneous line-up, since a simultaneous line-up encourages eyewitness to make relative judgments
 - B. Ensuring that the individual administering the line-up does not know if the suspect is in the line-up, preventing the likelihood of confirmation feedback bolstering eyewitness confidence
 - C. **Pointing out that someone who looks familiar is likely familiar for a reason, irrespective of whether you actually know why they look familiar**
 - a. **This would be an error in eyewitness testimony due to familiarity, and that would mean that you're encouraging them to rely on a familiarity bias even if you're experiencing a source monitoring error.**
 - D. Informing the witness that the suspect may or may not be in the line-up and including people who look similar to the suspect so that there will be fewer misidentification errors of innocent people
6. Which of the following statements on studying false memory is NOT true? [1 pt; False Memory]
- A. Researchers can study false memory by presenting participants with a list of words that are semantically related and then look for whether participants added in non-studied words that are thematically consistent with the others
 - B. Researchers can study false memory by testing whether participants notice details inconsistent with an older memory (e.g., childhood) and suggestively questioning participants about what they witnessed
 - C. Researchers can study false memory by investigating the conditions under which participants might witness a crime or be subjected to as suspects, such as sleep deprivation and highly arousing scenarios
 - D. **Researchers can study false memory by taking participants to the scene of a new memory they hope to implant and asking them whether they've been there before**
 - a. **All the discussions about implanting false memories have had to do with procedures aimed at implanting realistic details. But none have involved taking participants to the actual scene. They had photographs of people in a hot air balloon, journals about when they got lost in a shopping mall, long interviews with psychologists about memories of their childhood, but not once was it in the same context as the implanted memory.**

7. Compare and contrast what the Pennycook and Rand (2018) (lazy, not motivated reasoning), Fazio et al. (2015) (illusory truth), Grinberg et al. (2019) (fake news on twitter) and Vosoughi et al. (2018) (spread of true and false news) papers suggest to us about misinformation. What makes misinformation spread or makes people believe in misinformation? Give at least two examples. [2 pt; Misinformation]

- Novelty (cc: Vosoughi) – people want to be the ones to share something new
- Age (cc: Grinberg) – older folks were more exposed to fake news in the 2016 election
- Political identity (cc: Grinberg) – conservatives were more exposed to fake news in the 2016 election
- Pennycook and Rand: people who have more analytic thinking end up being able to differentiate between fake and true news more easily
- Illusory truth: people tend to think that things that are more familiar to them are true. They rely on a fluency heuristic.

8. We've read about some suggestions for how to combat misinformation, via Lazer et al. (2018) (scientists summarizing psychology of fake news) and Lombrozo (2018) (interview with one of those scientists). What is one concrete suggestion made for how to combat misinformation? [1 pt; Misinformation]

- Finland: creating a critical thinking program
- Lombrozo: creating a lab culture where people will challenge others in a comfortable way
- Lazer et al. (2018): making lawsuits possible, government interventions, industry-academia partnerships, & more research on fact-checking; individual-level doesn't seem like it'll work as well
- Grinberg recommended watching the folks who spread so much fake news and pairing them with fact checkers, preventing a certain number of posts each day, etc.

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Quiz #4
Name: _____

1. Describe two explicit effects or trends that we went over in class or in the papers that you read that are consistent with the idea that memory is a constructive process. What does it mean for memory to be constructive, and what are two effects/trends that point to its constructive nature? [2 pt; LTM processes/Autobiographical Memory]

Memory being constructive means that each memory is a combination of someone's knowledge, experiences, and expectations. Shute (2014) went over the idea of how our memories are constantly updated whenever we retrieve them. Retrieval as an act brings the information into our working memory, and we piece together the memory from the details we brought. However, this process also allows for new details to be reconsolidated into the memory. We talked about several effects that demonstrate how memories are constructive. For instance, in the podcast about highly superior autobiographical memory, the girl talks about carriages and cars and things that she wouldn't

have known about at the time, but clearly through rehearsal she has put together the details of the memory. We went over two papers that were also examples of constructive memory: Stanley et al. (2017), Rubin et al. (2019). We talked about propranolol and studies on consolidation, etc. We talked about fictional first memories.

2. Which of the following about proposed explanations for the reminiscence bump is NOT accurate? [1 pt; Autobiographical Memory]
- A. The self-image hypothesis suggests that the reminiscence bump occurs because assuming our identities will lead to enhanced memory.
 - B. The cognitive hypothesis suggests that the reminiscence bump occurs because encoding is enhanced during periods of rapid change that are followed by stability.
 - C. **The narrative rehearsal hypothesis suggests that the reminiscence bump occurs because the repeated viewing or rehearsal of events through media such as television promotes greater recall.**
Narrative rehearsal was an explanation for flashbulb memories, not the reminiscence bump
 - D. The cultural life script hypothesis suggests that the reminiscence bump occurs because our life stories are easier to remember when they fit with cultural expectations.

3. What is one difference between the behavior who have highly superior and severely deficient autobiographical memory? [1 pt; Autobiographical Memory]

HSAM: very detailed memories of mundane events; possibly superior recall and possibly constantly constructing and reminiscing on her memories; also experiences a lot of issues associated with having so many memories (like anxiety, asking people for advice, and they won't remember, but she remembers), etc.

SDAM: impaired episodic retrieval, particularly for visual information; learning and memory were otherwise intact, as long as tasks could be accomplished by non-episodic processes. Delayed complex figure recall was poor, production of internal details on autobiographical memories really terrible

4. Which of the following statements about proposed approaches to categorizing items is NOT accurate? [1 pt; Categorization/Knowledge]
- A. High-prototypicality items are responded to more quickly than low-prototypicality items, most likely due to priming.
 - B. Determining an item's category membership can allow you to make inferences about that item's other characteristics without having to observe those characteristics yourself.
 - C. The definitional approach is not likely to be used, because it is too strict to map onto the real world.
 - D. **Exemplar categorization probably tends to occur for categories with many members, whereas prototype categorization probably occurs for categories with fewer members.**

5. Pick a category of objects. Describe one difference between how a semantic category network approach and a connectionist model approach would represent the stored knowledge [1 pt; Categorization / Knowledge].

If we take the example from class about birds, we know that the semantic category network would organize knowledge about birds in a hierarchical fashion, such that animals goes to birds and birds go to robins, etc. and there'd be shared properties (cognitive economy) at the bird level that is inherited by the branches below (robins, canaries, etc.). Meanwhile, concepts or categories are organized in a distributed fashion in the connectionist model such that the pattern of activation across a number of nodes (or neurons) is going to represent each concept. There are, of course, many other examples for how they might differ; this is just one, and anything reasonable works here.

6. Describe what expected utility theory predicts and two explicit effects or trends that we went over in class or that were in the papers you read that are inconsistent with people acting in line with an expected utility theory. [2 pt; Decision-making]

Expected utility theory suggests that people are going to try to maximize their utility (in many cases: money). We went over several examples of people acting inconsistently with expected utility theory: choosing the bowl with a worse odds of getting the red pill; gambling; the ultimatum game; temporal discounting; and other effects that suggest things BEYOND greatest amount of money can impact decision-making (risk, framing effect, expected and incidental emotions). Even the papers talk about how other factors can impact our decision-making (e.g., the severity of a crime impacting how much the phrase "innocent until proven guilty" is actually true for some folks; implicit norms impacting how much we report/not report robbers, etc.).

7. Check **all** the statements that are **true** about the findings of Pearson et al. (2018) (crimes), Rubin et al. (2019) (scenes), Stanley et al. (2017) (counterfactuals), and Pryor et al. (2019) (norms) [2 pt; readings]

- A. **Pearson et al. (2018) suggests that innocent until proven guilty is not entirely accurate because of the cognitive biases that we hold about crimes of different severity.**
- B. Pryor et al. (2019) suggests that people follow arbitrary norms because they use the percentage of people who are similarly-minded as an anchor to guide their hypothetical decisions on reporting / not reporting a robber.
This study sought to rule out an anchoring heuristic explanation of the effects with Experiment 2 which changed the percentage that participants saw as part of the implicit norm that was being created.
- C. Stanley et al. (2017) suggests that counterfactual simulations of negative autobiographical memories had no effect on their emotional intensity.
The counterfactual simulations definitely had an effect on emotional intensity.

D. Rubin et al. (2019) suggests that all the qualities we typically associate with autobiographical memory, such as reliving, vividness, and belief, are due, in large part, to our ability to imagine the spatial layout of the scene being recalled.

Quiz 3

Name: _____

1. Of the following two excerpts, which corresponds to the opening paragraph of a science news article and which corresponds to the opening paragraph of a scientist summary or perspective article? When identifying the identity of each excerpt, make sure to give at least two concrete examples for *why* you think that is the identity of the piece. [2 pts; Science Communication]

Excerpt 1 (Source [1](#)):

One of the most deep-seated misconceptions about the human psyche is that men are simple and women are complicated (1). Gender psychology scholars trace this belief back to at least the 19th century, when the long-standing view that women were inferior versions of men started to fall out of favor (2). In response, biological theories on the sexes were restructured into a narrative that characterized the emergent psychological properties of the female brain—“sensitivity, perceptual acumen, and emotionality”—as not lesser than, but complementary to, those of men's brains (1). This framed women as a disordered, unstable yin to men's rational, orderly yang, thus preserving the patriarchy. So-called scientific explanations of why women's mental proclivities deviated from men's relied heavily on the purported influence of reproductive physiology on the female mind (3). More than 100 years later, this idea still shapes not just how society perceives women but also how biomedical scientists approach animal research.

Excerpt 2 (Source [2](#)):

The male mind is rational and orderly while the female one is complicated and hormonal. It is a stereotype that has skewed decades of neuroscience research towards using almost exclusively male mice and other laboratory animals, according to a new study.

Scientists have typically justified excluding female animals from experiments – even when studying conditions that are more likely to affect women – on the basis that fluctuating hormones would render the results uninterpretable. However, according to Rebecca Shansky, a neuroscientist at Northeastern University, in Boston, it is entirely unjustified by scientific evidence, which shows that, if anything, the hormones and behaviour of male rodents are less stable than those of females.

Space to write:

Excerpt 1: scientist summary; Excerpt 2: science communication. 1 point is that most scientist summaries have a lot of in-text citations, where science communication articles do not. There is more jargon in Excerpt 1 than there is in Excerpt 2, suggesting that it's been written for a more scientific than general audience (e.g., ‘psychology scholars; emergent psychological properties)—she also seems to be *talking* about the relevance of the work in a way that scientists would care about but maybe not others (how biomedical scientists approach animal research; is that the hook? Or is the sexism the hook?). Finally the SciComm piece also quotes the author of the first Excerpt, which makes it clear that it's covering a piece rather than summarizing literature. The SciComm piece also starts off much shorter, because it knows it has to get to the point ASAP, whereas the scientist summary piece/perspective wants to make the point to be covered.

Any reasonable answer would be accepted with proof.

2. You are a developmental researcher and hypothesize that 1-year olds are capable of detecting semantic violations in spoken language. In your experiment, you are recording EEG from 1-year olds who are seated in front of two speakers (left and right) that alternately play spoken sentences. The left speaker plays regular sentences while the right speaker plays sentences entailing semantic violations. Which of the following findings would support your hypothesis? [1 pt; Language]

- A. The infants spend more time orienting toward the left than toward the right speaker, and they display a suppressed N400 ERP to the semantic violations
- B. The infants attend equally to both speakers but show a larger N400 ERP to the semantic violations
- C. The infants spend more time orienting toward the right than toward the left speaker, and they display an enhanced N400 ERP to the regular sentences compared to the semantic violations
- D. The infants spend more time orienting toward the right than toward the left speaker, and they display an enhanced N400 ERP to the semantic violations

3. During our discussion on language, we went over several examples of how context might affect the processing and perception of language. Describe two behavioral effects and what role context plays [2 pt; Language].

Phonemic restoration effect: even though you hear white noise or a cough in the middle of someone saying a particular phoneme in a word, you can still infer what the word is.

Speech segmentation: we're able to break a stream of sounds into words because we infer based on the context what the speaker meant to say.

Word superiority effect: we can recognize letters more quickly when they're in a word than when they are presented in isolation or in a non-word.

Lexical ambiguity: words can have multiple meanings, but some words are used more frequently than others, so we infer based on the context and frequency of word usage in that context what meaning of the word is appropriate for that context.

4. Based on the findings of Bergelson and Aislin (2017) and Yu et al. (2019) on how 6-month-olds and 9-month-olds understand language, what might you recommend to parents? That is, what can parents do to better help their infants understand what the parents are saying? Point out something directly related to the paper you discuss as evidence for that piece of advice. [1 pt; Language]

Bergelson and Aislin (2017) find that object co-presence is correlated with children's comprehension of language; in other words, children won't understand words unless they've seen the object and possibly had an interaction with the object in their environment. Therefore, parents should make sure that if they want their child to learn a particular word, they should have some physical representation of the word for the child to associate with the word.

Yu et al. (2019) point out how joint attention and sustained attention are both predictive of vocabulary sizes at 12 and 15 months, but that sustained attention is the stronger predictor of later vocabulary size. Parents could disambiguate instances in which they are naming an object. They could make sure that they are looking at the object they name and drawing their child's attention to give a good "learning moment," and when their child has sustained attention to an object, they could name that particular object. This will help the child remember the vocabulary word later on.

5. Compare and contrast Atkinson and Shiffrin's short-term memory model against Baddeley's revised (i.e., later) working memory model. What is different and what is similar? Give at least two concrete examples. [2 pt; Working Memory]

In both models, what is in working memory or short-term memory is encoded into long-term memory, and what is in long-term memory can be instantiated in short-term memory/working memory. Similarly, both models discuss sensory memory – in Atkinson, this is all one type of memory, whereas in Baddeley, there are separate processors (phonological loop, visuospatial sketch pad). In both models, there are ways for "control processes" to affect short-term or working memory; in Atkinson, control processes are how you're rehearsing information to maintain it in STM, while in Baddeley's model, the central executive is managing the information from LTM and phonological loop/visuospatial sketch pad. Many of the differences are thus in the actual execution of the two models (i.e., having separate processors for different types of sensory memory; focusing on short-term memory vs. working memory).

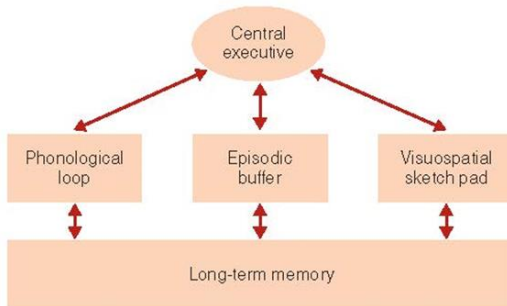
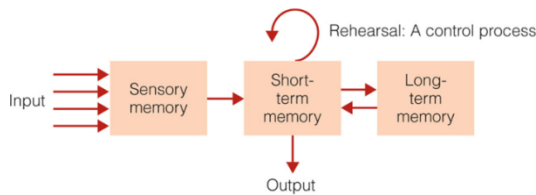


Figure 5.21 Baddeley's revised working memory model, which contains the original three components plus the episodic buffer. © Cengage Learning



6. If Peyton Manning, a professional football player, wanted to remember his 16-digit credit card number, which of the following memory techniques would you recommend? [1 pt; Working memory]

- A. He should think of the numbers as a sequence of football statistics.
- B. He should picture each of the numbers in his head printed in a bright color.
- C. He should first memorize a few other sequences of 16 digits to gain some practice.
- D. He should visualize the front of his credit card showing a picture of him dribbling a basketball.

7. You have administered a word-list (e.g., barricade, trout, etc.) free recall task to a group of normal control subjects and a group of amnesiacs with MTL lesions. Which of the following statements is most accurate? [1 pt; Working Memory/LTM]

- A. The controls will show the best recall for the most recent items on the list, and the worst recall for the earliest items on the list
- B. If the controls are distracted between list-learning and recall, they will not demonstrate a recency effect
- C. Because of their MTL lesions, amnesiacs will show no recency effect
- D. All of the above

8. You are conducting a memory experiment where you manipulate the *level of encoding* of word stimuli. In the “shallow” encoding condition, subjects have to indicate whether words are printed in lower or upper case letters (a non-semantic task), and in the “deep” encoding condition they have to indicate for each word whether it refers to a living or a non-living thing (a semantic task). After this encoding phase, you perform two memory tests: a standard recognition memory test to probe declarative memory, and a stem-completion test to probe for priming (e.g., _S S _ S S _ _). What is the most likely result? [1 pt; LTM]

- A. The shallow encoding condition would produce greater declarative memory but less priming effects than the deep encoding condition
- B. The shallow encoding condition would produce equal declarative memory as the deep encoding condition but greater priming effects
- C. The shallow encoding condition would produce worse declarative memory but greater priming effects than the deep encoding condition
- D. The shallow encoding condition would produce worse declarative memory than the deep encoding condition, but priming effects would be about the same for the two conditions

9. You are now cognitive psychology scholars, well versed in memory research. What advice would you give to a Duke freshman on how to study most effectively? Provide at least two concrete tips based off behavioral effects that we discussed in class or were mentioned in either your textbook or academic readings [2 pt; LTM processes].

Elaborative Rehearsal, Levels of Processing, Self-reference, Organization, Testing Effect/Retrieval Practice, Encoding Specificity, State-dependent Learning, Transfer-appropriate processing – we went over all of these in class.

Some from the readings that we did not get to by then:

- spaced/distributed practice
- elaboration, generation, relating words to survival value, visual imagery
- sleep
- avoiding the illusion of learning

10. Similarly, now that you know some research on working and long-term memory, how would you apply this research to your Science Communication pieces? Give at least one concrete point based off something different than what you might mention in #9 [1 pt; LTM].

The idea here behind these questions is to ask students to apply the material to what they would do, making it more relevant for them so that they will remember the material better.

For example, students could discuss organization and how having a meaningful framework for the research paper that they will cover will help their readers remember the paper better.

Because short-term memory is only 15-20 seconds, that means that shorter sentences will work in their favor. Specifically, people can only hold a certain amount of information in their mind, so long sentences make people work harder and are harder to remember.

Students could discuss the self-reference effect, making information meaningful to their readers, so that they will remember the information better. This could be an application of the Yin et al. (2019) paper (prioritization in working memory) or just generally as we discussed in LTM.

Visual imagery: students could talk about how they need to reduce jargon down to images or stories that people can picture in their mind, as these kinds of stories are better remembered.

11. We talked on our first day of class about how all models are wrong, but some are useful. Describe two sources of evidence for two different branches in our current model of long-term memory structure, which make this model a useful model of LTM [2 pt; LTM].

Students can talk about any of the following:

- Episodic vs. Semantic: K.C. vs. Italian Woman
- Episodic vs. Procedural: H.M./Clive vs. Parkinson's
- Episodic vs. Priming: Developmental & MS
- STM vs. LTM: HM/Clive vs. K.F.; recency vs. primacy

Bonus Point—

12. In Bergelson and Aslin (2017), the authors discuss performance differences for 6-month-olds who are asked to identify semantically related and unrelated words. One of the limitations the authors identify is that the performance difference they observe could be the result of two factors: competition or underspecification. The infants could know something about tested words, but couldn't overcome competition between activation of related concepts ("car" leads to looking at a car, but also activating 'stroller' to a similar degree, so that means poorer performance), OR the infants could tell apart unrelated vs. related items, but not really know what belongs in particular categories ("car" isn't referring to juice, but is stroller in the "car" category?). How might you tell the difference between the 2 possible explanations in a follow-up experiment? [bonus point; Language]

The authors mention how in older participants, they use "pointing", overt (touch or click) target selection, or cleaner eye movements, but how this is not possible in 6-month-olds. They suggest that neural recordings or reaching tasks could be useful. One has to consider the constraints of infants and how much they can actually move.

So, one could imagine that if you're trying to see if there's greater competition between related concepts or if there's a lack of concept differentiation, you could look at neural activation in EEG or fMRI. You could see if responses are more similar in baby brains for these semantically related objects; can you actually "classify" based on activation patterns whether the baby sees the stroller in the "car" category? Does the baby's brain activate for semantic violations for the words that are related but don't fit the context (e.g., N400)?

Generally, I gave credit to anyone trying to come up with an idea so long as it was reasonable and based in something we had discussed.

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Quiz #2

Name: _____

Title: "Hyperscans" Show How Brains Sync as People Interact

Lead: Social neuroscientists ask what happens at the level of neurons when you tell someone a story or a group watches movies

Opening paragraphs: The vast majority of neuroscientific studies contain three elements: a person, a cognitive task and a high-tech machine capable of seeing inside the brain. That simple recipe can produce powerful science. Such studies now routinely yield images that a neuroscientist used to only dream about. They allow researchers to delineate the complex neural machinery that makes sense of sights and sounds, processes language and derives meaning from experience.

But something has been largely missing from these studies: other people. We humans are innately social, yet even social neuroscience, a field explicitly created to explore the neurobiology of human interaction, has not been as social as you would think. Just one example: no one has yet captured the rich complexity of two people's brain activity as they talk together. "We spend our lives having conversation with each other and forging these bonds," neuroscientist Thalia Wheatley of Dartmouth College says. "[Yet] we have very little understanding of how it is people actually connect. We know almost nothing about how minds couple." (From:

<https://www.scientificamerican.com/article/hyperscans-show-how-brains-sync-as-people-interact/>)

1. Describe at least one principle of Science Communication that this headline, lead sentence, and opening paragraph(s) get right and one principle that they get wrong. [2 pt; SciComm]

- + It discusses a kind of "paradigm shift" – it sets up, here's what they did in the past, but here's how they're changing in the future
- + Does a pretty good job of actually summarizing a broad literature in relatable terms
- Is "hyperscans" necessary as part of the title? Is the article only about hyperscans? These opening paragraphs don't suggest so; suggests broader swath of literature
- Generally has some jargon, like neurons, hyperscans
- Although the paradigm shift is nice, it's assuming people care enough about the first image about boring cognitive tasks in the scanner. One question is: could we have started this by just mentioning that other people were missing from the scanner? Or is that loss of contrasting imagery crucial?
- It also gets some things wrong. The opening paragraph talks about an fMRI scanner, clearly, but then the lead sentence refers to neurons. MRI activity does not reflect neuronal activity.

+/- accepted various answers as long as they were justified by any of the SciComm principles we have discussed

2. "Perceiving machines" are used by the U.S. Postal service to "read" the addresses on letters and sort them quickly to their correct destinations. Sometimes, these machines cannot read an address, because the writing on the envelope is not sufficiently clear for the machine to match the writing to an example it has stored in memory. Human postal workers are much more successful at reading unclear addresses, most likely because of [1 pt; Perception/Attention]

A. Bottom-up processing

B. Top-down processing

- a. Basic idea in this question is that the machines can't read the addresses because the sensory input is too blurred. So, what's different about humans? If it's unclear for the machine, it's likely unclear (sensory-wise) for a human, BUT humans have many expectations about what addresses should look like and what streets are in their neighbors, etc. So

your top-down expectations of what the unclear handwriting could be allows you to perform better than the machine here.

- C. Their in-depth understanding of principles of perception
- D. Repeated practice at the task

3. Imagine that U.S. lawmakers are considering changing the driving laws and that you have been consulted as an attention expert. Given the principles of divided attention, in which of the following conditions would a person have the most difficulty with driving and therefore pose the biggest safety risk on the road? [1 pt; Attention]

- A. When the driver has to drive work early in the morning
- B. When the driver is stuck in stop-and-go traffic
- C. When the driver has to park in a crowded parking garage
- D. When the driver is driving an unfamiliar vehicle that is more difficult to operate**

- a. The idea here is that whatever is the most difficult will result in the worst divided attention while driving. Here, driving an unfamiliar vehicle that's more difficult to operate adds undue burden on you while you're driving, which makes driving as a behavior less automatic and causes a greater division of your attentional resources.

4. With practice, people can become better at a task, which, over time, means performing the task is automatic. Previous research by Schneider and Shiffrin established that "automatic processing" happens without intention and only uses some of a person's cognitive resources. How the switch to "automatic" happens is still being researched, but this is why driving is often considered a (relatively) automatic behavior.

Now let's apply that concept to the papers on attention that you've read. [3 pts; Attention]

- A) If you're driving and music is playing, what does the Middlebrooks et al. paper suggest would happen to your driving performance? Now, one limitation of the Middlebrooks paper was that folks were told to ignore the different types of music. What would happen to your cognitive or driving performance if you *couldn't* ignore the music—say, it was an audiobook you've wanted to listen to, and it captures your attention; what then?

-If you're driving and music is playing, Middlebrooks: nothing would be wrong. In this study, they found no differences for people listening to unfamiliar or familiar music. As noted here, people in that study, however, were told to ignore the different types of music.

-What happens when you can't ignore the music? Basically, this is about all the deficits on multitasking that we discussed. From the Wechsler paper: you'd veer more, your speed would vary a lot, you wouldn't be driving that efficiently. Cognitively, you'd be impaired too, remembering various locations that you pass less, etc.

- B) If you're driving and no one is around, and the next curve in the road isn't for some time, what does the Seli et al. paper (clock) suggest you may do until you reach the next curve? How would you test this?

-The basic finding in the Seli paper was that people strategically mind wander until then. The comment on driving being automatic is so that folks assume that it is an "easy task." So, you're doing an easy task, no need to pay attention until the next curve in the road, so you'll mind wander until then. Seli measures this with mind-wandering probes (self-report). I accepted answers about EEG/eye-tracking as measures of mind-wandering too, although we did not really discuss these as much in depth and what that would involve.

- C) Are any of your hypotheses qualified by the population tested? For instance, would any of your hypotheses depend on certain demographic or psychological characteristics of who was driving?

This was a call back to the Wechsler paper: there, the older population performed much worse than the younger population when they were asked to multitask. Other possible answers could have also included things like working memory capacity, high media multitaskers – these weren't discussed as in depth as the Wechsler paper, though, but still these are individual differences that are known to impact multitasking.

- D) "Life, Interrupted" discussed the idea of "deep work." Let's say that researchers are interested in understanding the different attentional states that might underlie "deep" vs. superficial work. What is one of the two paradigms that you learned about that researchers could use to investigate how people shift their attention between tasks? What behavior might you expect a participant to show?

Everyone got this question incorrect to some degree, so I scrapped the question. We did two demos on task-switching & dual-tasking (<https://nbrosowsky.github.io/online-psychology-demos/task-switching/index.html>, https://psych.hanover.edu/JavaTest/CLE/Cognition_js/exp/dualTask.html), and on the podcast, the host does a dual-tasking experiment when he visits the lab where they're doing neurostimulation work to see whether they can improve multi-tasking. In task-switching, you're slower and less accurate when a task switches from the previous trial than when it remains the same; in dual-tasking, the difficulty of the primary task will influence your performance on the secondary task. Any mention of the Wechsler paper – how participants were doing a reasoning task, memory task, or typing task – while driving, and then what behavior resulted (e.g., worse driving while multitasking) would have also been an acceptable answer.

5. Identify a problem with defining emotion by just one of the four criteria that comprise its main components. Draw on your readings, podcast, and class discussion to give an example of why that criterion cannot define emotion alone. [1 pt; Emotion]

Emotions can be defined by subjective experience, functional significance, physiological patterns, or facial expressions.

Examples of why any one of these could not give you the full picture:

- physiology: someone's heart could be pounding, but that tells you nothing about the emotion experienced (e.g., is it fear? Some kind of anticipation? General exertion?)
- Facial expressions: on the "Creation of Emotions" podcast, Lisa Feldman Barrett explicitly discusses how people can have different facial expressions to mean different emotions, like crying could be considered 'happy' or 'sad'
- Functional significance: would we ever be able to know whether disgust, fear, etc. have a purposeful role for us? Sometimes we experience emotions and if the only purpose was their functional significance, why would we have mood disorders?
- Subjective experience can't be enough. People aren't always accurate at reporting their emotions and may experience bias (see Kragel paper, figure from 2nd experiment showing almost all positive emotions). Also why Kragel wanted to see if you could use physiology to characterize states in the brain.

6. First describe what two different theories of emotion predict in terms of how an emotion is generated. Then describe how you might differentiate between these two theories, i.e., what might one theory predict that the other wouldn't? You can draw on your readings, the podcast, or class discussions for this question. [2 pts; Emotion]

Multiple different comparisons could be made here.

- Discrete emotion hypothesis
- Dimensional perspective on emotion
- James-Lange theory of emotion
- Cannon-Bard
- Schacter & Singer
- Psychological Constructionist view

James-Lange: we are fearful as a consequence of the bodily changes associated with an emotion, not the other way around. The emotion is a result of the brain interpreting the *feedback* from changes in bodily states.

Cannon-Bard: Physiological changes and subjective feeling are separate and independent; An emotional stimulus is first processed by the diencephalon (thalamus/hypothalamus/etc.), which then signals to the peripheral autonomic nervous system (eliciting behavior) and to the neocortex (eliciting feelings)

Discrete emotion vs. psychological constructionist is basically one slide:

If emotions are natural kinds

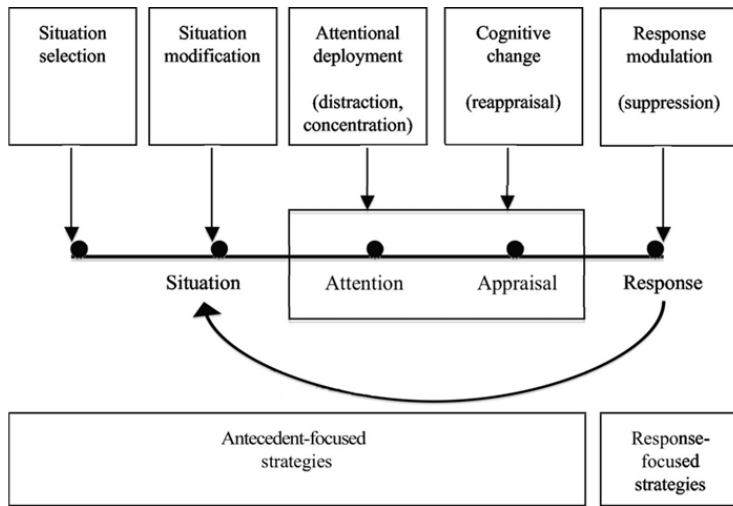
- All the features of an emotion will correlate highly in time and intensity
- A pattern for one emotion won't show up for another emotion
- These patterns will be similar across people

If emotions are constructed

- The kinds of features involved in emotion don't have to correlate
- A pattern for one emotion might be similar to another
- These patterns will be somewhat unique across people

Categorical theories regard each emotion as a separate entity and typically distinguish between a few 'basic emotions' (that are innate, pan-cultural, and evolutionarily old) and additional 'complex emotions' (that are learned, culturally shaped, evolutionarily new, e.g. 'pride'). Different categorical theories propose different numbers (and members) for the basic emotions, but most of them include anger, disgust, fear, happiness, sadness, and surprise. The universal nature of these emotions can be tested by whether people from different cultures recognize the facial expressions associated with these emotions. If a scientist approached research with a dimensional vs. categorical view of emotion, how do you think their research goals would change? Dimensional theorists are interested in uncovering neural correlates of valence and arousal, whereas categorical theorists might look for discrete neural correlates associated with each basic emotion.

7. Describe at least two possible strategies (with concrete examples and definitions) that the Gross model of emotion regulation suggests that someone could take in managing their emotions. [1 pt; Emotion]



8. Which of the below theories is best captured by the following statement: “The bodily response to an emotional stimulus precedes and informs our feelings about the stimulus”? [1 pt; Emotion]

- A. Cannon-Bard Theory
- B. Psychological Constructive Theory
- C. **James-Lange Theory**
 - a. **In the James-Lange theory, you perceive a stimulus, feel arousal/physiological changes, and say those changes = my emotion**
- D. All of the above

9. Apply either sparse, population, or specificity coding to one of the topics that we have studied so far, giving specific examples either from class discussions or your readings as to why each behavioral result might be coded in the brain that way. [bonus point; Sensory Coding]

Specificity coding: representation of a specific stimulus by firing of specifically tuned neurons specialized to just respond to a specific stimulus

Population coding: representation of a particular object by the pattern of firing of a large number of neurons

Sparse coding: when a particular object is represented by a pattern of firing of only a small group of neurons, with the majority of neurons remaining silent

The textbook also gave a couple of examples. One is that for faces, it's probably sparse coding.

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Quiz #1

Name:

1. HEADLINE: Rewarding gone wrong
LEAD: Parents and teachers naturally like to reward children at the sight of good behavior; however, rewarding can actually make children stop good behavior all together.

What is at least one principle of Science Communication that this headline + lead sentence gets right and one principle that they get wrong? [2 pt]

-The title is not particularly attention grabbing; it's short but says little about the study

-Neither the headline nor lead sentence mention or indicate in any way that this is from a scientific study, with concrete evidence

-It does seemingly get at and convey the main point about reward in adult relationships with children; it mentions the 'So What'

-Multiple answers are OK for this question so long as they are justified by what we have discussed in class and are backed by SciComm principles.

2. The likelihood principle states that [1 pt]
 - a. **we perceive the object that is most likely to have caused the pattern of stimuli we have received**
 - b. we perceive size to remain the same size even when objects move to different distances
 - c. it is easier to perceive vertical and horizontal orientations
 - d. feature detectors are likely to create a clear perception of an object



3. Describe one perspective on why we perceive this mug the “wrong” way [1 pt].

- A kind of Gestalt perspective would suggest that we see what is the most simple to see and perceive on this mug, which is real words (dig bick make no sense).
- Other theories would suggest a more learning-oriented perspective:
 - You perceive the mug incorrectly because you’ve learned a particular phrase or sentence more often, so you expect to see that on the mug. Basically: expectation is shaped by experience, causing the particular perception we have. In a Bayesian view, you enter with a prior, an initial belief that the mug would say “I got a big dick” instead of “I got a dig bick.” Same with “You read that wrong” instead of “You that read wrong.” As you reread the mug, you update your prior with evidence that it instead says “I got a dig bick”. Same thing happens with the other sentences. Statistical regularity or learning perspective also would mention the likelihood of seeing one phrase (the wrong phrase) over our lifetime, which is why we expect to see it and then are startled when we realize that was incorrect.

4. Name one problem associated with the lack of open science in psychology and one solution for that problem. (1 pt)

Publication bias: the tendency to publish positive results over negative results; incentivize publishing negative results with specific journal articles dedicated to that or value null results (Registered Reports; preregistration-oriented articles). Preregistering your hypotheses also helps with publication bias (null is null despite clear hypothesis). Other problem: Not being able to reproduce results from another lab given the data – having open-source code, sharing data, analysis, code, stimuli, etc. online helps; same with reporting all the measures in a study. Publishers incentivize all the above with badges for data sharing, code sharing, preregistration. Etc. Explicitly problems from slides or lab manual:

- Publication pressure & bias
- Selection bias
- Fraud
- Failure to replicate
- Inflation (p-hacking); [demo1](#), [demo2](#)
- Questionable Research Practices (QRP)

Solutions:

- Reproducibility projects
- Crowdsourced projects
- Badges
- preregistration (Open Science Framework)
- open lab notebooks
- codebooks
- managing projects on the Open Science Framework
- Start-to-Finish Project checklists
- detailed documentation
- open materials
- cooperate with replicate studies
- changing the academic publishing system

Some solutions only fit with specific problems – the problem should match the solution.

5. Research has suggested that some areas of psychology have moved towards larger sample sizes from an online, crowdsourced, somewhat diverse Amazon Mechanical Turk database and away from standard psychology pool subjects or somewhat more diverse community-based samples. What is one problem and benefit that you see associated with this move? (1 pt)

- + online samples means you can recruit a lot of people from many different places; you're not limited to your community or psych sample
- + perhaps sample will be less WEIRD (although Amazon Mechanical Turk is still WEIRD)
- + perhaps you'll get people who are more motivated to do your study, because they're crowdsourced and specifically on that site for that purpose
- + more participants means you can replicate your study easier
- no longer controlled as much (i.e., online participants – you don't know what they're doing in addition to your study)
- psych pool studies at least are in a very specific population, so you control more for individual differences and other small measures of individual variance that could affect your results
- community samples can be really important if you're in an underserved area and can access populations not typically surveyed in psychology studies
- +/- willing to accept other answers so long as justified

6. You want to find some evidence suggesting that very young, not yet verbal infants understood a particular vocabulary word. Which of the following would be the best measure of their understanding? [1 pt]
- a. **You could track where their eyes move: do they fixate on the image that is associated with the word spoken aloud?**
 - i. This is inspired from research in Erika Bergelson's lab. The idea is that if the baby is looking to the image of the word spoken aloud, the baby recognizes the vocabulary word in the image, a visual representation of that word. If the baby doesn't know the word, there's no reason for why they'd direct their gaze to any representation of it in the environment.
 - b. You could measure their scalp EEG and see whether they show enhanced processing for the particular words you're interested in vs. non-words.
 - i. This is wrong because increased activity for words vs. non-words doesn't tell you anything about whether a baby understood *a particular word*. All it would tell you is how words are processed on a temporal scale as you hear them in real-time relative to non-words.
 - c. You could put them in an fMRI scanner to examine whether they'll show enhanced neural processing of words vs. non-words.
 - i. Same as above. Would tell you what brain regions might be involved in processing real language at a young age.
 - d. You could give them toys that represent the word and see whether they show a preference for the toy word that you're interested in.
 - i. This is too vague to ever be an answer. Preference for a toy doesn't mean anything. They could like the toy because it's bright colored or because their mom or dad gave it to them, etc.
7. The main difference between early and late selection models of attention is that in late selection models, selection of stimuli for final processing doesn't occur until the information is analyzed for [1 pt]
- a. Modality (presentation mode, like auditory vs. visual)
 - i. This is basically an early sensory memory/physical characteristic and is the same response as c and d.
 - b. **Meaning**
 - i. Late selection models basically posit that everything is processed through the meaning of the stimuli (higher level processing), at which point you've selected which stimuli are going to be processed for top-down attentional goals. Early selection models, meanwhile, posit that things are processed at their basic characteristics before being filtered and selected for higher-level processing, like meaning.
 - c. Physical characteristics
 - d. Location
8. Name one effect that we've discussed that would be an example of top-down attention and one effect that would be an example of bottom-up attention. [1 pt]

Top-down: anything that has to do with our internal goals guiding our behavior –

- conjunction search or why our eardrums move 10 ms before the eye moves (they speculate top-down) or how we're able to go back and correct our perception of the mug or the cocktail party effect, etc.
- Bottom-up: attentional capture, the "pop-out" nature of a single feature search

The Stroop effect is the conflict between top-down goals (instructed to respond to the printed ink color) and bottom-up processing (automatic tendency to read the word, due to our learned habit). Fine if this is here so long as there is an explanation of both components to the Stroop.