

COGS 180: Homework 6 (Neuroscience)

Due Saturday, Feb 14 @ 11:59pm

Total estimated time to complete: 3-5 hours

Instructions (PLEASE READ)

1. Please duplicate this entire assignment in your own Google Drive and write your answers in the box below each question.
2. Save this document as a PDF (File → Download → PDF in Google Docs) and submit it on [Gradescope](#)
3. Please tag all pages with answers on Gradescope so we can easily grade your work!
Remember that all homeworks are completion grades, given that you put in clear effort!
 - Answer keys of the homework will be released on the Friday of the following week.

Requesting Feedback

NOTE from Prof. Lai: Homework is graded for completion in this course because my goal is to support a low-stress learning process, rather than to make you worry about grades and “point-grubbing.” However, we also recognize that timely, personalized feedback can be more helpful than simply releasing answer keys at a delay.

Going forward, the TAs and I would like to provide more targeted feedback, especially on homework problems that you find confusing.

Please use this space to briefly describe any questions or points of confusion (and, if relevant, which problem number) that you’d like the TAs to directly address via Gradescope when returning your homework.

If you don’t have questions, you may also leave this portion blank and/or delete it entirely.

Concepts - Neuroscience (2pts)

Estimated time to complete: 1-2 hours

Each question is worth 0.5 points (graded for effort completion). We expect about 3-4 thoughtful sentences for each answer! The answers to this week’s material may require deeper thinking and extrapolation from lecture content.

1. Identify at least 4 key elements needed to study decision making in the brain. For each, explain why it’s important in 1-2 sentences.

Please type your answer in here

2. What makes it difficult to understand how the brain encodes decisions? Discuss each of the following:
- behavioral task limitations
 - recording constraints (what you can/can't measure)
 - correlation vs. causation
 - confounds (attention, arousal, movement)

Please type your answer in here

3. Choose one specific experimental finding that we discussed in class this week that stood out to you.
- Briefly describe the question, the method, and the key result, then explain why it was compelling to you.
 - If you were to conduct a follow-up experiment to the study, what would you do?

Please type your answer in here

4. What are some of the benefits and limitations of studying decision making in humans vs. animals in terms of (i) the precision of the available methods and (ii) the conclusions you can draw in terms of ecological validity/translation.
- Do you think we can claim that these animals are truly "making decisions"? Defend your answer by defining what you mean by decision.

Please type your answer in here

Revisiting Your Learning Goals (1pt)

Estimated time to complete: 30 mins

In lieu of a coding exercise this week, we will be revisiting your learning goals that you wrote in Homework 1! You'll reflect on your progress so far, consider what's been helping (or getting in the way), and—if you'd like—revise your goals or your plan for reaching them by the end of the quarter.

Please fill out this "[Revisiting Your Learning Goals](#)" Google Form.

These points will be reflected separately in the gradebook (i.e., Homework 6 in Gradescope will be worth 4 points, and this feedback form will be worth 1pt for a total of 5pts)

Paper Analysis (2pts)

Estimated time to complete: 3 hours (give yourself ample time to read the paper)

Please choose one of the following papers to read. Each paper explores how neural correlates of decision making were discovered in the brains of humans and animals. You'll notice that some of the papers include computational models that we've discussed in the past few weeks!

I recommend skimming the abstracts first to get a sense of each paper's topic and approach, then selecting the one you'd like to focus on:

- [How the brain integrates costs and benefits during decision making](#) (Basten et al., 2010)
- [The neural correlates of subjective value during intertemporal choice](#) (Kable & Glimcher et al., 2007)
- [The neural basis of loss aversion in decision-making under risk](#) (Tom et al., 2007)
- [Cortical substrates for exploratory decisions in humans](#) (Daw et al., 2006)
- [Neural basis of a perceptual decision in the parietal cortex \(area LIP\) of the rhesus monkey](#) (Shadlen & Newsome, 2001)

After reading the paper, answer at least five (5) of the following questions for full credit.

 A friendly reminder: copy-and-pasting responses from an AI chatbot as your own work violates academic integrity and may result in penalties!

1. In 1-2 sentences, what was the main idea or question in this paper? What were the authors trying to explain, test, or measure?
2. How did the authors investigate this question? In your own words, describe one study / experiment that the authors conducted. Include a figure (optional) if it helps you explain the study.
3. In your own words, what are the main finding(s)? (If there are many, pick 1-2 to elaborate on). Include a figure if it helps you explain the results in your own words.
4. How convincing are the authors' conclusions? Cite specific evidence from the paper, and discuss key strengths and weaknesses (design, measures, analysis, generalizability) that affect your confidence in the claims.
5. If you could extend this study, what would you change or add (e.g., a new condition, different population, alternative measure)? What would you predict, and why?
6. What questions do you still have after reading this paper?
7. Why are these findings important? How, if at all, do they change the way we should think about decision making?

Please answer at least 5 of the above questions here.

We're looking for thoughtful answers (at least 2–3 sentences per question) that show you took the time to read carefully and understand the paper. Go beyond restating results—briefly explain the authors' logic, how the evidence supports their claims, and any

implications or limitations you noticed.