

Psychology and Economics

14.13 Final Exam Review

Alex Olssen and Aaron Goodman

MIT

Final: Overview

- Remember: the class is pass/fail. Try your best but do NOT stress about or lose sleep over this exam.
- You will do fine and pass as long as you answer all questions and get at least some of the questions almost right.
- Exam will be posted on on Tuesday (May 19) at 8:00 am EST.
 - You administer the exam online yourself.
 - You pick your own three-hour window to complete the exam, starting at 8:00 am EST.

What resources are you allowed to use while taking the exam?

- You can use notes from lectures, psets, etc.
- You CANNOT consult or receive help from others while taking the exam (online, in person, or any other way).
- You CANNOT find try to answers to your the questions online other than the Learning Modules website (e.g. ask you CANNOT ask question on Piazza or try to google questions or answers).
- You CANNOT watch lecture videos during the exam.
- Support animals are fine!
- Honor code: we trust you to stick to those rules.

Final: Three types of questions

(I) True/false/uncertain

- State true, false, or uncertain
- Always explain answer carefully
- Need to provide intuition.
- Using math might be helpful but you always need to provide a verbal explanation.

(II) Multiple choice

- Pick correct answers, no further explanation needed

(III) Pset-style questions

- Similar to problem set questions
- Some algebra involved
- Always explain your answers carefully.

Final: How to best prepare?

- What materials are you responsible for?
 - ALL lectures (for first half, you might find the midterm review slides and videos useful)
 - ALL recitations (recitations 6 and 7 covered the midterm review)
 - ALL problem sets
 - Readings (starred or non-starred) cited in class are only relevant to the extent that they appear in lectures and/or recitation.
- How to get ready?
 - Study lecture and recitation slides carefully
 - Psets and solutions: make sure you understand and can solve psets on your own.
 - Great resource to practice: previous psets and exams
 - Readings (starred or non-starred) may help you deepen your understanding of the material but we won't ask about details of those readings that beyond what was covered in class.
- Please ask questions on Piazza!

Beliefs: Attention and Salience

- Standard model of consumer choice assumes full information
- How can we measure the impact of attention?
- In DellaVigna's simple model, what does θ measure?
- How do Chetty et al. test for the effect of salience? What would the standard model predict in the Chetty study?
- How does salience affect the welfare effects of taxation?

Beliefs: Example of True/False/Uncertain Question

Statement: *Because people are inattentive, the government should make sure that all taxes are always very salient*

False. Why?

- The government does not want *all* taxes to be very salient
 - Sometimes taxes are used to correct externalities; these should be salient
 - Taxes are also used to raise revenue. These taxes create deadweight loss. Increasing salience will likely increase deadweight loss.

Beliefs: Anticipatory Utility

- Standard model assumes that consumers get utility from outcomes (or consumption)
- What are examples of situations where beliefs affect utility?
- What empirical evidence do we have that utility from beliefs affect choice of consumption timing? How about information acquisition choice?
- How can we incorporate anticipatory utility in a simple model?
 - What does it mean to be information averse?
 - What does it mean to be information loving?
- How might anticipatory utility affect information acquisition choices? How might it affect belief manipulation?
- Optimal expectations trade off anticipatory utility vs value of knowledge⁸
 - What are pros and cons?

Beliefs: Example of True/False/Uncertain Question

Statement: *Utility from beliefs and present bias may each explain why many people under-invest in preventative health care (e.g. cancer screening or dentist visits).*

True. Why?

- Present bias: unpleasant investment today, but benefits only in the future
- Utility from beliefs: people make themselves believe that they are healthier than they really are. Test results (e.g. cancer tests or dentist visits) can make it difficult to maintain false beliefs, so people avoid them.

Beliefs: Bayesian Learning

- What is Bayes rule? How do we use it?
- Common deviations from bayes rule
 - Base–Rate Neglect
 - One in a hundred people have HIV, and we have a test for HIV that is 99% accurate. If a person tested positive, what's the probability that she has HIV?
 - Gambler's Fallacy
 - You toss a coin 20 times. The first 19 times are tails. What's the probability that the final toss is also tails?
 - Hot–Hand Fallacy
 - Opposite of the Gambler's Fallacy
 - What aspect of the context might lead to Gambler's Fallacy or Hot–Hand Fallacy?

Beliefs: Projection Bias

- What is projection bias? What is the key factor that people incorrectly account for under projection bias? How do they make decisions?
- What does predicted utility look like with projection bias? What does α measure? Does projection bias always distort predicted utility?
- What empirical evidence supports the existence of projection bias?
- Projection bias and addiction: How can projection bias explain people taking-up addictive behaviors? How can it explain quit and recidivism cycles?
- Projection bias vs quasi-hyperbolic discounting: Both involve misprediction, so what are the differences? What would we need to distinguish them?

Beliefs: Example of True/False/Uncertain Question

Statement: *Projection bias can explain quitting and recidivism cycles among smokers.*

True. Why?

- When people have low cravings, projection bias results in the underestimating their future utility from smoking, so they are willing to quit
- In the future, when their cravings are high, their true utility from smoking is higher than they anticipated (due to projection bias), so they restart

Beliefs: Attribution Bias

- What is attribution bias? How does it differ from projection bias?
- What does predicted utility look like with attribution bias? What does γ measure? Does attribution bias always distort predicted utility?
- Predict utility of consuming c_t while in state s_t , given prior consumption experience of c_t was in state $s_{t-1}(c_t)$:

$$\hat{u}(c_t, s_t) = (1 - \gamma)u(c_t, s_t) + \gamma u(c_t, s_{t-1}(c_t))$$

where $\gamma \in [0, 1]$ is the degree of attribution bias.

- How do you solve for choices under attribution bias? What does $s_{t-1}(c_t)$ mean and why is the dependence on c_t critical?

Gender and Discrimination

- What are some empirical approaches to documenting discrimination? What are the results?
 - Correspondence studies (RCTs)
 - Quasi-experiments
- Models of discrimination:
 - Taste-based discrimination
 - Statistical discrimination
 - Inaccurate statistical discrimination
- How can we distinguish taste-based vs. statistical discrimination?
 - Look for differences in productivity (actual or beliefs)
 - If no differences in either, then discrimination is taste based

Discrimination: Example of Multiple Choice Question

Question: Sarsons (2017) studies the processing of labor market signals among surgeons. She finds that

- a Surgery outcomes get interpreted differently depending on the surgeon's gender.
- b Medical referrals to a particular surgeon drop more after a bad outcome when the surgeon is female.
- c Medical referrals to a particular surgeon drop more after a bad outcome when the surgeon is male.
- d After good outcome, referrals to female surgeons increase by more than referrals to male surgeons.
- e After good outcome, referrals to male surgeons increase by more than referrals to female surgeons.

Answer: (a), (b), (e).

- This is covered in Lecture 18
- (c) is wrong because medical referrals increase *less* after a good outcome when the surgeon is female.
- (d) is wrong because referrals double to male surgeons and increase by 70% for female surgeons

Defaults and Nudges

- What are some standard economic tools to encourage savings?
 - Employer matching
 - Financial education
 - Extra choices
- Defaults:
 - What empirical evidence do we have on effectiveness of defaults?
 - Should defaults matter in the standard model?
 - Why might they matter? What evidence do we have on the reason why defaults matter?
 - Can defaults make people worse off?
- Nudges: features of social environment that affect people's choices without imposing coercion or material incentives
 - Examples of nudges in the health domain

Discrimination: Example of Multiple Choice Question

Question: In the context of 401(k) savings plans, defaults:

- a increase participation in savings plans
- b have larger effects among richer workers
- c have effects that may be driven by present bias (+ naivete)
- d make all workers better off
- e have effects that mostly disappear after three years

Answer: (a), (c), (e)

- This is covered in Lecture 19
- (b) is wrong because the effects are larger among poorer workers
- (d) is wrong because some workers may be worse off, e.g., if the defaults are large they may result in increased credit card debt (at high interest rates)

Beliefs: Example of Long Question: Testing for Huntington's Disease

- Two periods, and relevant outcomes for Bob occur in period 2.
 - In period 2, HD-negative with probability p and HD-positive with probability $1 - p$.
 - Instantaneous utilities are $u(-)$ and $u(+)$, respectively (with $u(-) > u(+)$)
- Consider perspective of period 1. Assume:
 - (i) No discounting
 - (ii) Nothing can be done about Bob's condition.
 - (iii) The test is perfectly accurate
- Assume f is an increasing function and utility is

$$\begin{aligned} & f(p) + pu(-) + (1 - p)u(+) && \text{if he does not get tested} \\ pf(1) + (1 - p)f(0) + pu(-) + (1 - p)u(+) && \text{if he does get tested} \end{aligned}$$

Long Question: Part 1

- Question: Describe Bob's utility function. What do the components containing u represent? What do the components containing f represent?
- Solution: Bob's utility function reflects anticipatory utility (or utility from beliefs).
 - The components containing u are standard and reflect the utility from outcomes (being HD positive or negative).
 - Because there is uncertainty about HD status $pu(-) + (1 - p)u(+)$ is the expected utility from outcomes
 - The components containing f reflect anticipatory utility; they depend on Bob's probability of being HD positive
 - If Bob does gets tested, his utility from beliefs will be $f(1)$ (if he tests negative) or $f(0)$ (if he tests positive)

Long Question: Part 2

- Question: Suppose that Bob's beliefs are correct (i.e., he knows the probability of being HD positive is p). Provide a simple condition that determines if Bob will get tested or not. Explain your condition. Does it depend on u ?

- Solution: Bob decides on testing to maximize his utility. He gets tested if

$$pf(1) + (1 - p)f(0) + pu(-) + (1 - p)u(+) > f(p) + pu(-) + (1 - p)u(+)$$

- Simplifying, he gets tested if

$$pf(1) + (1 - p)f(0) > f(p)$$

- The left-hand side reflects the utility of information (Bob will either know he is HD positive and get $f(1)$ or know he is HD negative and get $f(0)$)
 - The right-hand side is the utility of not getting information
 - Bob gets tested if he is information loving; this happens when f is convex and ²⁰ reflects Bob liking certainty

Long Question: Part 3

- Question: Suppose that Bob can manipulate his beliefs to make himself feel better. Would Bob want to hold correct beliefs? Why?
- Solution: No, Bob would not want to hold correct beliefs because (since f is increasing)

$$f(1) + pu(-) + (1 - p)u(+) > f(p) + pu(-) + (1 - p)u(+) \quad \text{for all } p < 1$$

- Bob's utility from beliefs is increasing in his belief that he is HD negative (f is increasing)
- Moreover, since nothing can be done for HD, having incorrect beliefs cannot lead to Bob making bad decisions that lower his utility from outcomes. Thus there are no negative consequences for Bob from believing he is HD negative with certainty.

Long Question: Part 4

- Question: A new (free) drug is invented that substantially improves the quality of life for people who are HD positive (to $u(\sim)$ with $u(-) > u(\sim) > u(+)$). The drug has to be taken in period 1 to be effective. Suppose again that Bob has **correct** beliefs. Provide a new condition that determines if Bob gets tested or not. Explain your condition. Does it depend on u ?
- Solution: Bob gets tested if

$$pf(1) + (1 - p)f(0) + (1 - p)(u(\sim) - u(+)) > f(p)$$

- Bob might get tested even if he is not information loving because $(1 - p)(u(\sim) - u(+)) > 0$
- This is because getting tested has an extra bonus here; if Bob is HD positive, then he will take the new drug and his quality of life will improve, so the choice depends on u

Long Question: Part 5

- Question: Suppose that Bob can manipulate his beliefs to make himself feel better. How might the availability of the new drug affect the beliefs that Bob would want to hold? Compare to Part 3. (Verbal intuition is sufficient)
- Solution: The key difference is that there is now a cost to Bob if he falsely believes he is HD negative with certainty
 - Bob probably no longer wants to believe he is HD negative with certainty because in that case he will not get tested, which would improve his quality of life in the case that he is indeed HD positive.
 - Bob should trade off the utility from having optimistic beliefs (that he is HD negative) against the cost of not getting tested (and hence not taking the new drug).

The End

- Don't worry too much about the exam – try your best and you'll do great!
- And even if you don't do great, you'll be fine!

MIT OpenCourseWare
<https://ocw.mit.edu/>

14.13: Psychology and Economics
Spring 2020

For information about citing these materials or our Terms of Use, visit: <https://ocw.mit.edu/terms>.