

# Decisions, Big & Small -- Spring 2021

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**Time:** Tuesdays and Thursdays, 10:30-11:45

**Location:** Online, via Zoom, (see Canvas)

**Instructor:** Tomer Ullman ([tullman@fas.harvard.edu](mailto:tullman@fas.harvard.edu))

**Student Hours:** Thursday 4:30-5:30pm and by appointment

(see Canvas)

(Please review the email policy below when scheduling)

**Sections:** TBA

**Teaching Fellows and sections:**

**Simge Topaloglu** ([sit591@g.harvard.edu](mailto:sit591@g.harvard.edu))

Section time: TBA

Section location: online

Office hours: TBA

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**Overview:** Life is full of decisions, but not all decisions are made equal. Choices can be big and consequential (should I focus on my success, family, or passion), or small and everyday (going out, or staying in). This course will introduce you to the cognitive science of judging and choosing. You will learn about rational planning, the kind a perfect intelligence might carry out; Common simplifications and shortcuts that non-perfect humans use, and how these may actually be appealing approximations for any decision-making system; Regret over choices taken and not taken; Making decisions with others, Transformative decisions, the ones that change who you are as a person. As we cover these topics, we will consider how to apply the insights from the psychology of decision making to your own ordinary and extraordinary choices.

**Textbook:** The course does not have a specific textbook. Reading materials from textbooks, books, articles, journals, and so on will be made available online.

**Objectives:** The main objective is to acquaint the students with the basic tenants of different approaches and models to decision making, relevant for their future research in cognitive science and psychology, as well as in their daily life. Students should also gain an appreciation for outstanding debates regarding optimal decision making, boundedly rational decision making, and deviations from optimality.

**Website:** We will make use of Canvas, and it will contain readings, announcements, links, assignments, and grades.

**Accessibility:** Any student needing academic adjustments or accommodations is requested to present a letter from the Accessible Education Office (AEO) and speak with Collin Conwell by the second week of classes. Failure to do so may result in our being unable to respond to your needs in a timely manner. All discussions will remain confidential, although AEO may be consulted to discuss appropriate implementation.

### **Grading and Requirements:**

Discussion Posts and Replies: 24%

Final Paper: 30%

Final exam: 30%

Attendance and participation: 16%

#### Grading Scale:

A: 100-90

B+: 89-86

B: 85-80

C+: 79-76

C: 75-70

D: 69-62

F: 61 and below

Exams: The exam is close-booked, and will contain a sample of the material in class. The exam will consist of a mixture of mostly multiple-choice questions and some short-answer questions. The exam will be given during exam period and last approximately three hours.

Discussion posts: 24% of your grade will be based on your participation in online discussion outside of class, specifically Posts and Replies. Questions based on the readings and lecture will be put on Canvas weekly, and you will have the option of posting your thoughts on the relevant question. These questions are meant to be relatively open-ended, without a strict 'correct/incorrect' response.

Posts: A good Post is one that engages thoughtfully with the material of that week, by raising points not covered, weakness and strengths of different viewpoints, outside empirical evidence, suggestions for new studies, and so on. You are expected to make at least 3 Posts throughout the term of around 150-400 words each, but can make up to 6 (grading will be based on the top 3 Posts).

Replies: In addition to making posts of your own, you will be asked to reply to other people's points. A Reply can be shorter or longer than the original Post, but should engage with it *thoughtfully* and *respectfully*. A reply that amounts to "Yeah!" or "Says you!" is not a good reply. As with Posts, you are expected to make at least 3 Replies throughout the term, but can make up to 6 (grading will be based on the top 3 Posts).

Final Paper: Final papers will consider a decision that you made during the term, had to make before it, are about to make, or a decision made by a friend. By 'consider', we mean you should explain the ins-and-outs of your decision in light of the topics covered in class, but using additional readings related to the topics of choice. The paper does not have to consider *all* the material covered, you can view your decision through the lens of just one topic, but again you are expected to consider additional resources. You can choose to explain how this topic was relevant, or alternatively why it wasn't and what can be done about that. You are also encouraged to think empirically, and propose new ways of examining (either in the lab or using data from outside the lab) decisions like the main one in your paper. Papers should be between 4-6 pages long, including a reference section. Draft papers can be submitted 2 weeks before the end of class, and will receive feedback on what can and should be improved, and what grade can be expected based on the draft.

## **Policies**

**Academic integrity:** This course adheres to the university's standards regarding academic integrity. Suspected cheating or plagiarism will be referred to the Honor Council of Harvard College, as is required by the university. Students are responsible for knowing what constitutes plagiarism; please refer to the [Harvard Guide to Using Sources](#) for a detailed description of the different types of plagiarism.

**Lectures and attendance:** You are expected to attend the lectures. All lectures will be recorded and have associated handouts on Canvas, but this is not the same as attending the lecture and participating in exercises and discussions. Students that cannot attend the class due to time zone differences should write to the TF or instructor to accommodate. As a general rule, office hours will not be for answering questions that could easily be answered by attending the class.

**Attention splitting and note taking:** Students are highly encouraged to treat the lecture as though it is happening in person in front of them, meaning that cell-phones are turned away, the lecture is taking up the full screen, and note taking is happening separately. We will obviously not be enforcing this, but we strongly encourage you to create an environment that will work best for your own learning and retention.

**Email Policy and scheduling meetings:** Professor Ullman is happy to meet with any student for any reason, and you are encouraged to come to student hours. When asking to meet at an alternate time outside student hours, please include three proposed times and a description of the reason for meeting. Questions having to do with the syllabus or assignments are best shared with the class, and so it is better to ask these during or right after class.

## **Schedule:**

*(readings in parenthesis. Note that readings are subject to change, especially as the class progresses)*

### **Prologue**

**Thursday Jan 21st:** Shopping week live event: Introduction to the course; The first decision; Optimal stopping. <- while not "officially" part of the course any student thinking of taking the class is strongly encouraged to attend, including those who are quite sure they're going to take it.

*(For more information on optimal stopping see "Algorithms to Live By", Chapter 1, Christian and Griffiths. Students do not have to read this before the first day of class)*

### **ACT I: The Decision-Making Machine**

**Tuesday Jan 26<sup>th</sup>:** How Should a Balance Beam Decide; Costs and Rewards; Decisions as Weighing of Options under Uncertainty; Signal Detection Theory

*(A decision-making theory of visual detection, Tanner and Swets 1954)*

**Thursday Jan 28<sup>th</sup>:** How Should a Balance Beam Decide; Costs and Rewards; Decisions as Weighing of Options under Uncertainty; Signal Detection Theory

*(A decision-making theory of visual detection, Tanner and Swets 1954)*  
*(The forgotten history of signal detection theory, introduction)*  
*("I had a funny feeling in my gut", interview with Petrov)*

**Tuesday Feb 2<sup>nd</sup>:** How Should a Robot Decide; The Fundamental Equation of AI; Expected Utility; Simple Choices

*(Artificial Intelligence, a Modern Approach, 3rd edition, Chapter 16: up until 16.3.2)*  
*(Skim Bernoulli, D. (1738). Exposition of a new theory on the measurement of risk.)*  
*(skim the wiki page [https://en.wikipedia.org/wiki/Von\\_Neumann-Morgenstern\\_utility\\_theorem](https://en.wikipedia.org/wiki/Von_Neumann-Morgenstern_utility_theorem))*

**Thursday Feb 4<sup>th</sup>:** How Should a Robot Decide; The Fundamental Equation of AI; Expected Utility; Simple Choices

*(Artificial Intelligence, a Modern Approach, 3rd edition, Chapter 16: up until 16.3.2)*  
*(Skim Bernoulli, D. (1738). Exposition of a new theory on the measurement of risk.)*  
*(skim the wiki page [https://en.wikipedia.org/wiki/Von\\_Neumann-Morgenstern\\_utility\\_theorem](https://en.wikipedia.org/wiki/Von_Neumann-Morgenstern_utility_theorem))*

**Tuesday Feb 9<sup>th</sup> :** The Ant and the Wind; Waiting for the World to Decide; the Accumulation of Evidence; Drift Diffusion and Sequential Sampling

*(Smith, P. L., & Ratcliff, R. (2004). Psychology and neurobiology of simple decisions. Trends in neurosciences, 27(3), 161-168.)*  
*(Ratcliff, R., Smith, P. L., Brown, S. D., & McKoon, G. (2016). Diffusion decision model: Current issues and history. Trends in cognitive sciences, 20(4), 260-281.)*

**Thursday Feb 11<sup>th</sup>:** The Ant and the Wind; Waiting for the World to Decide; the Accumulation of Evidence; Drift Diffusion and Sequential Sampling

*(Smith, P. L., & Ratcliff, R. (2004). Psychology and neurobiology of simple decisions. Trends in neurosciences, 27(3), 161-168.)*  
*(Ratcliff, R., Smith, P. L., Brown, S. D., & McKoon, G. (2016). Diffusion decision model: Current issues and history. Trends in cognitive sciences, 20(4), 260-281.)*

**Tuesday Feb 16<sup>th</sup>: Transition/game/simulation**

### **ACT II: The Machine Breaks Down**

**Thursday Feb 18<sup>th</sup>:** The Battle-cry of Behavioral Economics: Prospect Theory

*("Thinking, Fast and Slow", prospect theory, Daniel Kahneman)*  
*"Prospect Theory: An Analysis of Decision under Risk"*

**Tuesday Feb 23<sup>rd</sup>:** Silly Utility: More Prospect theory and the Endowment effect

*("Thinking, Fast and Slow", prospect theory, Daniel Kahneman)*  
*"Prospect Theory: An Analysis of Decision under Risk"*  
*"Misbehaving", Thaler)*

**Thursday Feb 25<sup>nd</sup>:** Would you Bet Your Life on a Vaccine? The Epidemic and its Moral, Probability weighting, Framing

*("Frames and reality" by Kahneman)*

**Tuesday Mar 2<sup>nd</sup>:** Nudges

*"Nudge" by Sunstein,*

*Nudges that fail*

*Nudges in perspective*

<https://bppblog.com/2017/06/02/much-ado-about-nudging/>

<https://www.nytimes.com/2010/05/16/magazine/16Sunstein-t.html>

**Thursday March 4<sup>th</sup>:** Decisions for My Future Self; The Effect of Time on Decisions; Hyperbolic Discounting  
*(TBD)*

**Tuesday March 9<sup>th</sup>:** The Future as it Might have Been: Regret; Sunk cost; Counterfactuals; Action and inaction

1. "Keeping Score" from *Thinking Fast and Slow* <--- Briefly covers regret, sunk cost, and some counterfactual reasoning. Short and to the point.
2. "Sunk cost" from *Misbehaving* <--- Another short, relevant chapter
3. "How things might be different" <--- chapter from Ruth Byrne's book *"The Rational Imagination"*. a bit longer and more academic than the first two. If you don't have time for all of it, maybe read the first few pages and the summary. Consider the relevance of 13 year old book that starts with "Suppose you hear about a new disease..."

Bonus (Bonus)

1. *The Simulation Heuristic* (1982) <--- Short classic paper on imagining how things could have gone otherwise; there's been a lot more work since and the main results are summarized in the book chapters above but still, worth reading.
2. *Counterfactual Thought* (2016) <--- Recent-ish review by Byrne, who wrote the book above, with updated findings and a more 'scholarly' treatment than her book.
3. *Counterfactual Thinking* (1997) <--- Older work by Roese but also a good review, especially with regards to counterfactuals and negative events.
4. *Inaction effect and regret* (2002) <--- a two-for-one (inaction AND regret), sensitivity of regret to prior
5. *The Psychology of Doing Nothing* (2003) <--- more of a meta-point about why we chose to do nothing rather than something. The answer is: There are several answers.
6. *Regret and elation in action and inaction* (1987) <--- Older paper but worth considering the flip-side of regret

*Not a scholarly paper but an interesting first-person perspective on what it's like to "lose" (in the sense of not winning as much as you thought you would), the intense regret that comes with that, and trying to pull through:*

"I Lost on Who Wants to Be a Millionaire and it Almost Destroyed me"

[http://www.slate.com/articles/arts/culturebox/2015/02/who\\_wants\\_to\\_be\\_a\\_millionaire\\_i\\_lost\\_on\\_the\\_show\\_and\\_it\\_almost\\_destroyed.html](http://www.slate.com/articles/arts/culturebox/2015/02/who_wants_to_be_a_millionaire_i_lost_on_the_show_and_it_almost_destroyed.html)

**Wednesday March 11<sup>th</sup>:** Regret  
(See previous readings)

**Tuesday March 16<sup>th</sup>:** wellness day, no classes

**Thursday March 18<sup>th</sup>:** Counterfactuals, action and inaction

**Intermission**

**Tuesday March 23<sup>rd</sup>:** The Value of Life, Taboo Tradeoffs

(Chapter 5-6 from *Choice and Consequence* by Schelling -- "The life you save could be your own" and "strategic relationships in dying", "value of life" 1991,  
*Button button Twilight Zone* episode,  
VSL paper,  
Thaler and Rosen 1976,  
"What's bad is easy: Taboo values, affect, and cognition" (2007)

**ACT III: The Machine Reflects**

**Thursday March 25<sup>th</sup>:** Commitment devices, Kavka's poison, Odysseus and the Ropes,

(More Schelling, more *Breakdown of Will*)  
- Kavka, G. S. (1983). *The toxin puzzle*. *Analysis*, 43(1), 33-36,  
- Rogers, T., Milkman, K. L., & Volpp, K. G. (2014). *Commitment Devices: Using Initiatives to Change Behavior*. *Journal of the American Medical Association (JAMA)*, 311(20), 2065-2066.  
- <https://www.stickk.com/>, etc  
- *The Odyssey*  
"carrots and sticks", Ian Ayres  
Meta-preferences by Frankfurt, also by Hirschman)

**Tuesday, March 30<sup>th</sup>:** The Decisions of Others

(level-k reasoning and the beauty pageant, NYT implementation,  
Golden balls,  
Some game theory,  
Inverse planning  
Wisdom of crowds  
Bonus: Bayesian democracy paper by McCoy and Prelec)

**Thursday, April 1<sup>st</sup>:** What to Do when you can Do Anything; Action Set Selection

(Phillips and Cushman,  
'Radical freedom'  
Overton window)

**Tuesday, April 6<sup>th</sup>:** What is this Worth Anyway? The construction of Value and Preference

(Ariely, D., Loewenstein, G., & Prelec, D. (2006). *Tom Sawyer and the construction of value*. *Journal of Economic Behavior & Organization*, 60(1), 1-10.

'Predictably irrational' by Arieli, a chapter or two

'The construction of preference', Lichtenstein and Slovic, a chapter or two)

**Thursday, April 8<sup>th</sup>:** The story of your life, narrative self and experiencing self

(*"Thinking, Fast and Slow"*, Part V: "Life as a story", Daniel Kahneman)

**Tuesday, April 13<sup>th</sup>:** Big Decisions; Hard Decisions; Transformative Decisions

(Paul, L. A. (2015). *What you can't expect when you're expecting*. *Res Philosophica*, 92(2), 149-170.

Ullmann-Margalit, E. (2006). *Big decisions: opting, converting, drifting*. *Royal Institute of Philosophy Supplements*, 58, 157-172.

S.D. Levitt, *Heads or Tails: The Impact of a Coin Toss on Major Life Decisions and Subsequent Happiness*, *National Bureau of Economic Research*, 2016, No. w22487.

**Thursday April 15<sup>th</sup>:** wellness day, no classes

**Tuesday, April 20<sup>th</sup>:** Big decisions, hard decisions, transformative experience (Guest Lecture, Prof Laurie Paul)

(*"The art of decision making"* Rothman, *New Yorker*  
LA Paul, *Transformative experience*, chapter 1)

**Thursday April 22<sup>nd</sup>:** Closing Points, Reflections by Students

**Tuesday April 27<sup>th</sup>:** Closing Points, Reflections by Students

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**If there is time:**

inside and Outside Framing; the Planning Fallacy, optimism bias

(*"Thinking, Fast and Slow"*, inside/outside view, Daniel Kahneman)

*"Intuitive Prediction: Biases and Corrective Procedures," Management Science* 12 (1979): 313–27, Kahneman and Tversky)