

General Education I066: Rationality
Spring 2020, Tues & Thurs 1:30-2:45
Harvard University

Description: The nature, psychology, and applications of rationality.

Rationality is, or ought to be, the basis of everything we think and do. Yet in an era with unprecedented scientific sophistication, we are buffeted by fake news, quack cures, conspiracy theories, and “post-truth” rhetoric. How should we reason about reason? Rationality has long been a foundational topic in the academy, including philosophy, psychology, AI, economics, mathematics, and government. Recently, discoveries on how people reason have earned three Nobel Prizes, and many applied fields are being revolutionized by rational, evidence-based, and effective approaches.

Part I: The nature of rationality. Tools of reason, including logic, statistical decision theory, Bayesian inference, rational choice, game theory, critical thinking, and common fallacies.

Part II: The cognitive science of rationality, including classic research by psychologists and behavioral economists. Is *Homo sapiens* a “rational animal”? Could our irrational heuristics and biases be evolutionary adaptations to a natural information environment? Could beliefs that are factually irrational be socially rational in a drive for individual status or tribal solidarity? Can people be cured of their irrationality?

Part III: Rationality in the world. How can our opinions, policies, and practices be made more rational? Can rational analyses offer more effective means of improving the world? Examples will include journalism, climate change, sports, crime, government, medicine, political protest, social change, philanthropy, and other forms of effective altruism. These topics will be presented by guest lecturers, many of them well-known authors and public figures.

For the capstone project, students will select a major national or global problem, justify the choice, and lay out the most rational means to mitigate or solve it.

Instructor:

Steven Pinker
Johnstone Family Professor
Department of Psychology
William James Hall 970
x5-0831
pinker@wjh.harvard.edu

Office Hours:

Thurs, 5-6pm and by appointment. Professor Pinker is happy to meet with any student for any reason. Please send him an email if you would like to set up an appointment or have a question. All emails will be answered within 24 hours.

Lectures:

Tuesday & Thursday 1:00–2:45, Science Center D

Course Web Site:

<https://canvas.harvard.edu/courses/65690>

This site will contain the class handouts, copies of the lecture slides, assignments, information about sections and exams, and links to relevant sites.

Head Teaching Fellow:

Mattie Toma

Dept. of Economics

mattie.toma@gmail.com

Office hours: Tues, 3-4 pm, and by appointment; William James Hall 968.

Sections:

One 1-hour discussion section. Sections will begin meeting the week of February 3.

Readings:

1. Warburton, N. 2007. *Thinking from A to Z*. Available at The Coop.
2. Pinker, S. 2018. *Enlightenment Now: The Case for Reason, Science, Humanism, and Progress*; selected chapters. Available at The Coop and other new and used booksellers. (For the curious: A list of reviews of the book, and Prof. Pinker’s reply to them, may be found here: <https://quillette.com/2019/01/14/enlightenment-wars-some-reflections-on-enlightenment-now-one-year-later/>).
3. Journal articles, book chapters, Web articles, and online exercises, linked in this syllabus or available on the Canvas site.

Library Systems Consultant:

Librarians from the Harvard College Library System are familiar with the course requirements and will introduce you to the library resources that will help you with assignments. The course liaison is **TBA**.

Requirements and Grading:

Ten weekly short (<1 page) assignments, due in section, @ 2 points:	20%
Section participation:	10%
Early Midterm exam, in-class, Feb. 25:	15%
Capstone project:	
Proposal and justification, due April 16:	10%.
Final project, due May 4:	20%.
Final exam, May 11, 2PM:	25%

Notes on grading:

- The grades of students will be adjusted to equalize the grading policies across TFs; that is, no student will be penalized for having a tougher grader.

- According to program guidelines, Gen Ed courses should be “as rigorous as any other in the college, with commensurate expectations for student workload, class time, and grading.” The distribution of grades will be similar to those of other major courses.
- Students whose grades fall close to the dividing line between two letter grades will be given the higher grade if, in the opinion of the TF, they have performed well in sections and assignments.

Accessibility:

Any student needing academic adjustments or accommodations should present a letter from the Accessible Education Office (AEO) and **speak with the Head TF by February 10th**. All discussions will remain confidential.

Policies:

Late papers: Weekly response papers that are late will get a grade of zero. Other late assignments will be subject to a late penalty of ten percentage points (about a letter grade) per day. A little arithmetic will show that getting a zero for a response paper, or losing points for an assignment, will have a good chance of lowering your letter grade for the course as a whole.

The late penalty will be waived only in cases of sickness, inescapable conflicts, or other emergencies, and only with a letter from your Resident Dean.

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.

Collaboration: You are permitted (indeed, encouraged) to discuss the content of your assignment with other students, and to make suggestions about sources. You are also permitted to show a draft of your work to other students for general feedback about coherence and style (e.g., “This claim doesn’t seem to follow logically,” or “This paragraph is hard to understand”). You are also encouraged to solicit feedback on writing style, unclear wording, and errors in spelling, punctuation, and grammar. However, this feedback should consist of the reader pointing out problems to you and offering guidance on how to fix them, including editing one or two paragraphs as an example. But it may *not* consist of another person (including a fellow student, friend, parent, significant other, teaching assistant, tutor, or counselor) reworking or editing your draft by adding, deleting, or rewriting sentences, or by fixing errors in spelling, punctuation, or grammar. Finally, you are *not* permitted to share or divide up the work of finding, reading, and summarizing sources. And you are *not* permitted to collaborate on the planning, researching, or writing of papers with similar content.

Midterm: An absence from the in-class midterm exam will ordinarily be excused only if you are ill on the day of the exam *and* present a signed form from Harvard University Health Services to your House Dean or the Assistant Dean of Freshman, who then provides a letter of excuse to the Head TF. In either case, the Head TF will ensure that you are not penalized for your absence.

Except in highly unusual circumstances, we do not administer make-up exams for other reasons, such as students traveling on the date of the exam. Please check the schedule for your extracurricular activity and ensure that you will be able to take the midterm exam on **February 25**.

Goals of the Course:

Rationality falls within the **Ethics and Civics** category of the General Education requirement.

Here is how Harvard College explains its General Education requirement:

Focusing on urgent problems and enduring questions, Gen Ed courses are unusually explicit in connecting the subjects students study to the people they will become and the world beyond the classroom. Transcending disciplinary divisions, these courses demonstrate the value of embedding what students will learn in their concentrations within the broader context of the liberal arts.

This course is designed to satisfy all these goals.

Rationality is the quintessential **enduring question**, having been a central question in philosophy since the ancient Greeks. Today research on rationality takes place at some of the most exciting frontiers of knowledge, including behavioral economics, judgment and decision-making, and Artificial Intelligence.

Rationality is an **urgent problem**, as we grapple with an apparent surge of irrational beliefs in popular culture, individual choices, and politics—paradoxically, at the same time that many fields are striving to become *more* rational, including policy (Nudge), crime (Compstat), development aid (Randomistas), sports (Moneyball), reporting (Politifact), polling (538.com), health (Quality-Adjusted Life Years), psychotherapy (Feedback-informed treatment), forecasting (prediction markets & tournaments), and philanthropy (Effective Altruism).

I hope to connect rationality to the **people you will become and the world beyond the classroom**. The course will introduce you to tools for rational thinking that have been honed for millennia (including logic, statistics, and game theory), while alerting you to the fallacies, biases, and cognitive illusions that we are all prey to. I hope these will help you to become more rational in your own thinking and choices, and more effective at solving problems in your professional life and at your efforts to improve the world.

This course **transcends disciplinary divisions** with a vengeance. You will be exposed to ideas from philosophy, psychology, computer science, statistics, mathematics, and economics, and how they are being applied to medicine, government, history, journalism, climate science, crime, and philanthropy.

Parts of the Course:

Lectures: You must attend all the lectures; as a rule, recordings of the lectures will not be available. Anything explained in a lecture may be on the weekly assignments or midterm and final exam. We try to back up lecture material with the readings and online resources, but cannot guarantee complete coverage.

All the lectures have handouts, posted on the course website. They are intended to spare you from having to write down every diagram and term mentioned in the lecture; they are not a substitute for attending the lecture and taking notes.

Readings: The readings complement and reinforce the content of the lectures, but neither is a substitute for the other. Unofficial College and Gen Ed guidelines call for 100–200 pages of reading a week. We have kept the assignments well within that range. They include the clearest pedagogical sources we could find for the technical material, some lively and vivid explanations of the concepts, explorations of controversies, and a few classic articles.

For students whose curiosity (or confusion) about the subject matter outruns the assigned readings, we have also suggested a variety of online resources, including articles, book excerpts, and Web sites. They are often an excellent starting point for your capstone project.

While we encourage you to explore related Youtube videos and TED talks, they cannot substitute for the deeper intellectual engagement that comes from reading well-crafted text.

Discussion sections: Also required. The purpose of the section is *active learning* of the content from the preceding week's lecture and readings. Sections give you the opportunity to probe and clarify your understanding of concepts and terms introduced in the lectures and readings, to ask questions, and to argue the issues. Sections may include review of problems in the assignments, new problems and exercises, and debate and discussion of the content (some of the course topics are controversial, and you will no doubt have opinions on them). Ten percent of your grade will come from section participation. In addition, your Teaching Fellow will get to know you in the sections, will be your main contact with the subject, and will influence your final grade and other decisions.

Weekly assignments. These brief (< 1-page) assignments will be released every Thursday, and may include simple problems, instructions to seek examples of irrationality from the news and everyday life, questions about the readings, and invitations to reflect and respond to the course contents.

Early Midterm exam. The midterm will cover the “tools of reason” introduced in the first third of the course. If you can understand all of the concepts listed on the final page of each lecture handout, together with the entries in *Thinking from A to Z*, you should do well. It will consist of a mixture of multiple-choice and short-answer (1-pgh) questions.

Final Exam: A cumulative exam, which will cover the tools of reason from the first third of the course, the heuristics, biases, illusions, and explanations from the second, and major ideas from each of the applied domains in the third. Like the midterm, a mixture of multiple-choice and short-answer questions.

Capstone Project. Here's where you put it all together and make the course relevant to your intellectual, political, and professional passions. We will ask you to assemble a short list of national or global problems, rigorously assess their impact on well-being, and choose one you can argue is particularly important. You will present these analyses in a first submission, due around two weeks before the end of classes. For the final version, submitted during Reading Period, you will explore the problem in depth using the tools of rationality and sources of irrationality covered in the course: why the problem remains unsolved (explaining, if relevant, how cognitive biases and other forms of irrationality may have exacerbated the problem or hindered solutions), how to mitigate or solve it most effectively. These may be taken from the topics covered in the third segment of the course—climate, crime, medicine, war, policy, oppression, poverty, public health—or one of your own choosing. You will be encouraged to identify an existing organization or philanthropy that you think is best dealing with the problem today.

Each assignment will be explained in a more detailed handout and by your TF.

How to Get the Most from Gen Ed I066:

It would be hypocritical for us to advocate rationality in every walk of life except how best to learn in this very course. Here are some tips on how to get the most from this course, based on our experience with the practices of more and less successful students in the past, and on research in cognitive psychology on attention, memory, and learning.

1. Show up for the lectures. This should be obvious, but many Harvard students treat lectures as optional, hoping to make up what they've missed from handouts, readings, and notes taken by other students. The lectures are not optional.
2. Give the lectures your undivided attention. We do not recommend having a laptop open during the lectures. As the Muppets and the M&Ms in the movie trailers point out, it's distracting to the other people in the room, which is why we ask students who for whatever reason feel they must use a laptop or smartphone to sit in the back four rows. If you are among them, turn off your Web browser and email program, and don't turn them on again until the lecture is over. This also may sound obvious, but many people believe in a myth called "multitasking." Research in cognitive psychology shows that the brain is incapable of processing two streams of verbal material simultaneously.
3. Take notes on paper with a pen or pencil, rather than by typing into a computer file. Several studies have shown that people remember material better this way, probably because they can more easily use spatial and visual resources of a 2-D page to organize the material, rather than relying only on strings of text. These resources include arrows, circling, underlining, text size, comments on diagrams, and so on. A major reason we provide handouts with diagrams, bullet points, and white space is so that you can annotate the handout yourselves; the handout is not a set of crib notes or a supplementary textbook.
4. For similar reasons, you should take your own notes; the notes of another student will reflect that student's assumptions, background knowledge, habits and styles, and idiosyncratic associations, which can differ dramatically from your own.
5. As you read and study, actively organize the material in your mind; don't try to pound it in through repetition. Make a set of notes; don't use a highlighter. Organize the material hierarchically into a list of ideas, with each major idea expanded into a list of subsidiary ideas. Close the book and see if you can recall the material, as if trying to explain it to someone else. Actually try to explain it to someone else.
6. Distribute your learning over time. Don't cram or binge-read in an all-nighter or a marathon session. When you do, everything will tend to run together in your mind.
7. Aim at a deep understanding of the ideas, not a superficial familiarity with the words and phrases. (The multiple-choice questions in particular try to distinguish these two levels of acquaintance with the material.) Can you paraphrase the material using different words from those in the text, lecture, or reading? As you're reading, do you find yourself muttering, "I *think* I understand this"? If you do, it means you don't understand it.
8. Ask and discuss. If you think you don't understand something, it's not a failing; it's an opportunity to learn it. Ask your fellow students. Ask your TF in section, or during their office hours. Ask your professor, particularly after the lecture, during his office hours, or in an email. Follow through with the optional readings, or with readings from the Web or library.
9. Read the assignments carefully. We mean what we say in them, and we grade according to how well the students carry out the terms of the assignments.

Schedule of Lectures and Readings

Part I: The Nature of Rationality; Tools of Reason

Tues, Jan. 28: Course introduction. Phenomena of rationality and irrationality. Deductive, inductive, practical, and moral reason. Normative and descriptive models. Course content, goals, and expectations. Preview of the celebrity guest lecturers.

Thurs, Jan. 30: Rationality itself. Why follow reason? Why adhere to objectivity, truth, the existence of a real world? Non-rational versus irrational thoughts. Can morality be grounded in reason? Should we ever be irrational? Possible examples: Discounting the future; Paradoxical tactics; Rational ignorance; Taboo.

-Pinker, S. 2018. *Enlightenment Now*, beginning of chapter 21, “Reason,” pp. 351-355. Beginning of chapter 23, “Humanism,” pp. 410–419.

-Sotala, K. 2010. What cost for irrationality? *Less Wrong*,

<https://www.lesswrong.com/posts/ujTE9FLWveYz9WTxZ/what-cost-for-irrationality>.

-Warburton, N. 2007. *Thinking from A to Z*, “Absurd Consequences” through Gobbledygook.”

-Nagel, T. 1997. *The Last Word*, chaps. 1, “Introduction” and 2, “Thought from the Outside.”

-Singer, P. 2011. *The Expanding Circle*, chap. 4, “Reason.”

[Note: Peter Singer is the renowned philosopher who is often considered the originator of effective altruism, a major theme of the last part of the course.]

Other resources:

-Pinker, S. & Goldstein, R. N. 2012. The long reach of reason: An animated Socratic dialogue. TED talk,

https://www.google.com/search?q=pinker+goldstein+ted&rlz=1C1GCEJ_enUS856US858&oq=pinke+goldstein+TED&aqs=chrome.0.0.3366j0j7&sourceid=chrome&ie=UTF-8. Professor

Pinker and his wife, the philosopher and novelist Rebecca Newberger Goldstein, turned into cartoons debating the role of reason in moral progress.

-A poster showing 24 formal and informal fallacies, overlapping those explained in *Thinking from A to Z*, has been compiled by The School of Thought, and may be found on the Canvas site in large and small sizes. These and other posters and card decks on fallacies and biases may be downloaded from yourlogicalfallacyis.com.

-A collection of tools and mini-courses may be found on the site *Clearer Thinking*,

<https://www.clearerthinking.org/tools-and-mini-courses>.

- *LessWrong.com* is a forum for the “Rationality community,” an informal network of bloggers who seek to call attention to biases and fallacies and apply reason more rigorously (sometimes to what may seem like extreme lengths).

-The *Stanford Encyclopedia of Philosophy* <https://plato.stanford.edu/> has explanations of just about every concept and topic in philosophy, together with philosophically relevant topics in psychology, economics, and other fields, written by real philosophers. For this course and for academic work in general, it’s more suitable than *Wikipedia*.

Tues, Feb. 4: Logic and logical thinking. Formal logic. Valid and sound arguments. Do humans think logically? Is rationality the same as logic? What is intuition? Wittgenstein, family

resemblance categories, fuzzy logic. Will AI make reasoning obsolete? Symbolic computation, constraint satisfaction, neural networks, Deep Learning.

- Warburton, N. 2007. *Thinking from A to Z*, “Humptydumptying” through “Zigzagging.” Pay special attention to these entries: Affirming the antecedent; Affirming the consequent; Antecedent; Argument; Assumption; Conclusion; Conditional statements; Consequent; Consistency; Contradiction; Contraries; Deduction; Denying the antecedent; Denying the Consequent; Enthymeme; Family resemblance; Formal fallacy; Iff; *Modus ponens*; *Modus tollens*; Necessary and sufficient conditions; *Non sequitur*; Paradox; Premises; Some/All confusion; Sound argument; Supposition; Validity.
- Pinker, S. 2007. *How the Mind Works*. Excerpts on fuzzy and logical thinking from chap. 5, “Good Ideas,” pp. 306–314 and 333-338.

Other resources:

- Pinker, S. 2007. *How the Mind Works*. Chap. 2, “Thinking Machines,” is an accessible explanation of how logical reasoning can be implemented in brains and computers: both classical symbolic reasoning (also known as GOFAI, or “Good Old-Fashioned AI”) and fuzzy, family-resemblance, probabilistic reasoning (connectionism, neural nets, deep learning). Bonus: an exploration of consciousness, both the “easy” (information access) and “hard” (sentience) problems.
The rest of Chap. 5, “Good Ideas,” is an exploration of human reasoning: not just logic and categorization but mathematics, probability, analogy, creativity, and genius.
- Priest, G. 2017. *Logic: A very short introduction*. The basics up to the cutting edge in 152 pages. Oxford University Press’s “Very Short Introduction” series is an excellent way to learn about almost any subject.

Thurs, Feb. 6: Probability and randomness. Randomness and illusions of non-randomness. A priori versus a posteriori probability. Sampling and the Laws of Large and Small Numbers. Conditional probabilities and their hazards. The gambler’s fallacy. The birthday paradox. Poisson processes. The hot-hand fallacy and the hot-hand fallacy fallacy.

- Hastie, R. & Dawes, R. 2010. *Rational choice in an uncertain world: The psychology of judgment and decision making*. “Appendix: Basic principles of probability theory,” pp. 331–356.
- Gardner, M. 1972. Why the long arm of coincidence is usually not as long as it seems. *Scientific American*.

Other resources:

- Grasple <https://www.grasple.com> is an interactive learning site with easy modules on basic concepts in probability and statistics. If you have not taken a course on probability theory, we recommend working through <https://www.grasple.com/statistics/probability>. You must register for a (free) account; the privacy policy can be found here: <https://www.grasple.com/privacy>
- Krämer W. & Gigerenzer, G. How to confuse with statistics. *Statistical Science*, 20 (3), 223-230. A deeper look into conditional probability, why people find the concept difficult, and how to convey it more effectively.

Tues, Feb. 8: Bayesian reasoning. Inductive reasoning and Bayes’ theorem. Applications. Relevance to scientific and common-sense reasoning. Failures of Bayesian reasoning: Conservatism; Base-rate neglect; Forbidden base rates.

-“Bayes rule: Guide.” *Arbital.com*, https://arbital.com/p/bayes_rule/?l=1zq. Recommended path: “I want the basics, but I’m also interested in reading more...”

-Gigerenzer, G. 2011. What are natural frequencies? *British Journal of Medicine*.

Other resources:

-For a different intuitive explanation of Bayes’ Theorem, see Yudkowsky, E. 2003. An intuitive explanation of Bayes’s Theorem. *Less Wrong*.

<https://www.lesswrong.com/posts/XTXWPOSEgoMkAupKt/an-intuitive-explanation-of-bayes-s-theorem>

-For a deeper dive, select “I’d like to read everything” in the *Arbital* tutorial.

Thurs, Feb. 13: Signal Detection Theory/Statistical Decision Theory. Integrating the costs & benefits of hits, misses, false alarms, and correct rejections into statistical decisions. Sensitivity vs. Response Bias. Applications in engineering, perception, medicine, law. Null hypothesis significance testing and the difference between statistical significance and Bayesian posterior probability.

-Swets, J. A., Dawes, R. M. & Monahan, J. 2000. Better decisions through science. *Scientific American*.

-Gray, P. & Bjorklund, D. F. 2014. *Psychology, Seventh Edition*. “Statistical Appendix,” pp. A-1–A-9; “Statistical Methods in Psychology,” pp. 41–52.

-If you have not taken statistics, we recommend working through the *Grasple* modules “Inferential Statistics—Foundations,” “Statistical Tests,” “Null-hypothesis statistical testing,” “NHST Procedure,” and “Statistical significance.”

<https://www.grasple.com/statistics/statistics>

Other resources:

-For a deeper explanation of the relation between Signal Detection Theory (aka the Neyman-Pearson framework) and Null Hypothesis Significance Testing (NHST), and a scathing critique of NHST as it is practiced in the social sciences, see:

Gigerenzer, G., Krauss, S., Vitouch, O. 2004. The Null Ritual. In D. Kaplan, Ed., *The Sage Handbook of Quantitative Methodology for the Social Sciences*, available on the Canvas site.

Tues, Feb. 18. Correlation and causation. Nominal, ordinal, interval, & ratio scales. Contingencies, comparisons, correlations. Regression to the mean. Simple vs. multifactorial Analysis of Variance; simple vs. multiple regression. Clinical vs. statistical prediction. Main effects and interactions. Randomization, experimental and natural. Causal networks.

-If you are unfamiliar with regression and correlation, take the *Grasple* modules “Relations (interval/ratio)” and “Regression”: <https://www.grasple.com/statistics/statistics>

-Pinker, S. 2011. *The Better Angels of Our Nature*, excerpt from “The Long Peace” on multiple regression analyses of war, pp. 278–294.

Other resources:

-Though everyone knows that correlation does not imply causation, very few people, including social scientists and statisticians, have a clear idea of what “causation” means. For an accessible exploration of the concept of causation, see:

-Pinker, S. 2007. *The Stuff of Thought: Language as a Window into Human Nature*, chap. 4, “Oomph: Thoughts on Causality,” pp. 208–218. Available on the Canvas site.

-The confusion within statistics and science on how to understand and measure causality has begun to change with the groundbreaking work of Artificial Intelligence researcher Judea

Pearl. For an older introduction to his work, see his lecture “The Art and Science of Cause and Effect,” available on the Canvas site. For a new, accessible, and comprehensive discussion, see his 2018 bestseller *The Book of Why: The New Science of Cause and Effect*, particularly the introduction, “Mind Over Data,” and first chapter, “The Ladder of Causation.” Available on Reserve.

Thurs Feb. 20: Rational Choice Theory and Game Theory. Axioms of rational choice and Expected Utility Theory. Violations of Expected Utility Theory. Bounded rationality and satisficing. Risk aversion. Intransitive preferences and money pumps. Game Theory. Stag Hunts and Schelling points. Rock-paper-scissors. Volunteer’s Dilemma. Prisoners’ Dilemma. Tragedy of the Commons.

-Hastie, R. & Dawes, R. 2010. *Rational choice in an uncertain world: The psychology of judgment and decision making*, chap. 11, “A rational decision theory.” 237-270.

-Alexander, S. 2012. Introduction to Game Theory: Sequence Guide, particularly Sections 1–6, <https://www.lesswrong.com/posts/QxZs5Za4qXBegXCgu/introduction-to-game-theory-sequence-guide>.

Other resources:

- For another introduction to the theories of Rational Choice and Expected Utility, see Briggs, R. A., "Normative Theories of Rational Choice: Expected Utility", *The Stanford Encyclopedia of Philosophy*. <https://plato.stanford.edu/entries/rationality-normative-utility>.

-Poundstone, W. 1992. *Prisoner's dilemma: John von Neumann, game theory and the puzzle of the bomb*. A clear and entertaining presentation on game theory and its founder.

-*Slate Star Codex* <https://slatestarcodex.com/> is an anagram of “Scott Alexander,” the author of the tutorial recommended above and a prominent member of the “rationality community.” This deep and witty blog covers diverse topics in social science, medicine, events, and everyday life.

Tues, Feb. 25: Midterm exam.

Part II: The Cognitive Science of Rationality

Thurs, Feb. 27. Heuristics, biases, and cognitive illusions. Representativeness. The Law of Small Numbers. The gambler’s fallacy. Base-rate neglect. The conjunction fallacy. Availability. Illusions of risk and danger. Anchoring and adjustment. Prospect theory.

-Tversky, A., & Kahneman, D. (1974). Judgment under uncertainty: Heuristics and biases. *Science*, 185, 1124-1131.

-Tversky, A., & Kahneman, D. (1981). The framing of decisions and the psychology of choice. *Science*, 211, 453-458.

-Slovic, P. (1987). Perception of risk. *Science*, 236, 280-285.

Other resources:

-A poster showing “24 cognitive biases stuffing up your thinking” has been compiled by The School of Thought, and may be found on the Canvas site in large and small sizes. These and other posters and card decks on fallacies and biases may be downloaded from yourbias.is

-Lewis, M. 2016. *The Undoing Project: A Friendship That Changed Our Minds*. This book, whose author will give a guest lecture later in the semester, tells the historical and personal story of

the revolution in cognitive psychology and behavioral economics fomented by Amos Tversky and Daniel Kahneman.

Tues, Mar. 3: Human rationality reconsidered. Ecological and evolutionary rationality.

Alternative definitions of probability. Random sampling assumption. Assumptions of a stable world. Conversation and implicature.

- Pinker, S. 2007. *How the Mind Works*, chap. 5, "Good Ideas," section on ecological intelligence, pp. 299–306.
- Gigerenzer, G. (1991). How to make cognitive illusions disappear: Beyond "heuristics and biases." *European Review of Social Psychology*, 2, 83-115.
- Kahneman, D., & Tversky, A. (1996). On the reality of cognitive illusions: A reply to Gigerenzer's critique. *Psychological Review*, 103, 582-591.
- Gigerenzer, G. (1996). On narrow norms and vague heuristics: A reply to Kahneman and Tversky. *Psychological Review*, 103, 592-596.

Thurs, Mar. 5: Reasoning as argument. Human gullibility vs. epistemic vigilance.

Guest lecturer: Hugo Mercier, Research Scientist, Institut Jean Nicod.

- Mercier, H., & Sperber, D. (2011). Why do humans reason? Arguments for an argumentative theory. *Behavioral and Brain Sciences*, 34, 57-111. [Articles in this journal, which appear with two dozen short commentaries and the authors' response, are an excellent way to become immersed in a topic.]
- Mercier, H. (2017). How Gullible are We? A Review of the Evidence from Psychology and Social Science. *Review of General Psychology*, 21(2), 103-122.

Tues, Mar. 10: Debiasing. Guest lecturer: Carey Morewedge, Professor, Boston University.

-[Readings TBA]

Thurs, Mar. 12: Political and social bias. Motivated reasoning. Biased evaluation. Cultural and identity-protective cognition. Tragedy of the belief commons. Political ideology and viewpoint diversity.

- Pinker, S. 2018. *Enlightenment Now*, chapter 21, "Reason."
- Duarte, J. L., Crawford, J. T., Stern, C., Haidt, J., Jussim, L., & Tetlock, P. E. (2015). Political diversity will improve social psychological science. *Behavioral and Brain Sciences*, 38.

Other resources:

- The "Reason" chapter of *Enlightenment Now* extensively cites the work of legal scholar Dan Kahan. A couple of his original papers are on the Canvas site:
 - Braman, D., Kahan, D. M., Slovic, P., Gastil, J., & Cohen, G. L. (2007). The Second National Risk and Culture Study: Making Sense of--and Making Progress In—The American Culture War of Fact. *GW Law Faculty Publications & Other Works*, 211. [18 pp]
 - Kahan, D. M., Peters, E., Dawson, E. C., & Slovic, P. (2013). Motivated numeracy and enlightened self-government. Note that in this paper, Kahan disagrees with the Nudge approach of Prof. Sunstein, who is giving a guest lecture on April 9.
- Students who are interested in political and viewpoint diversity in universities are encouraged to check out Heterodox Academy, "a non-partisan collective of professors, administrators, and graduate students committed to enhancing the quality and impact of research—and

improving education—by promoting open inquiry, viewpoint diversity, and constructive disagreement in institutions of higher learning.” <https://heterodoxacademy.org/>

Tues, Mar. 17 & Thurs, Mar. 19: Spring break.

Part III: Rationality in the World

□ **Assigned: Capstone project.**

Tues, Mar. 24. Rationality, journalism, and planning for the future. Guest lecturer: Bina Venkataraman, Editor, Editorial Page, Boston Globe.

-Venkataraman, B. (2019). *The Optimist's Telescope: Thinking Ahead in a Reckless Age*, chaps. 8, “The Games We Play,” and Coda, “Hope for a Reckless Age.”

Thurs, Mar. 26: Climate change. Guest lecturer: Solomon Goldstein-Rose, former Mass. State Representative.

-Goldstein-Rose, S. 2020. *The 100% Solution: A plan for solving climate change*, pp. 1– 46.

Tues, March 31: Rational optimism. Progress and its causes. Skepticism about progress. Dimensions of progress: Life, health, sustenance, prosperity, education. The future of progress.

-Pinker, S. 2018. *Enlightenment Now: The Case for Reason, Science, Humanism, and Progress*. chaps. 4, “Progressophobia,” 5, “Life,” 6, “Health,” 8, “Wealth,” 16, “Knowledge,” 20, “The future of progress.”

Other resources:

-Students interested in seeing dynamic data visualizations and explanations of global and national data relevant to progress are encouraged to visit these Web sites:

-*Our World in Data* (www.ourworldindata.org). This is the most comprehensive and rigorous of the sites. Its explanations of the sources of data and the history and causes of the trends are extraordinarily good. This site is highly recommended as a starting point for your capstone project.

-*Human Progress* (www.humanprogress.org). This one is less extensive and more political, advocating rational optimism from a libertarian viewpoint. It has some data sources that are not on *Our World in Data*, together with regularly updated posts on new examples of progress, and colorful histories of pioneers of progress.

-The late Hans Rosling was a TED star for his stunning data visualizations and witty commentaries on human progress and people’s misconceptions about it. Some of his talks are collected here: https://www.ted.com/playlists/474/the_best_hans_rosling_talks_yo.

Rosling’s visualizations were done in collaboration with his son Ola and daughter-in-law Anna Rosling Rönnlund, who continue his work. Their Web site *Gapminder* (www.gapminder.org) is another excellent resource, as is their recent bestseller *Factfulness*.

-The Bill and Melinda Gates Foundation is a major actor in accelerating human progress in global health and education, climate change, and other areas. Its newsletter, reports, and web site <https://www.gatesfoundation.org/> often present new data in these fronts.

-*Future Crunch* by Angus Hervey <https://futurecrun.ch/goodnews> is the best of several new sites devoted to counteracting the gloom and pessimism of the news by presenting positive and constructive developments in the world. In a similar vein, ex-Talking Head David Byrne has founded a site called Reasons to be Cheerful <https://reasonstobecheerful.world/>.

Thurs, Apr. 2: Sports. Guest lecturer: Michael Lewis, author of *Moneyball*, *The Undoing Project*, *The Fifth Risk*, & other books.

- Lewis, M. 2004. *Moneyball: The art of winning an unfair game*, chap. 4, “Field of ignorance.”
- Lewis, M. 2016. *The Undoing Project: A Friendship That Changed Our Minds*, chap. 1, “Man boobs.”

Tues, Apr. 7: Crime. Guest lecturer: Thomas Abt, Senior Research Fellow, Harvard Kennedy School of Government.

- Pinker, S. 2018. *Enlightenment Now*, section of chap. 12, “Safety,” on violent crime, pp. 167–176.
- Abt, T. 2019. We Can’t End Inequality Until We Stop Urban Gun Violence. Here’s a blueprint for cities ready to get started. *The Trace*. <https://www.thetrace.org/2019/07/we-cant-end-inequality-until-we-stop-urban-gun-violence/>.
- Obbie, M. 2019. This Man Says His Anti-violence Plan Would Save 12,000 Lives. Why aren’t more cities using it? *The Atlantic*. <https://www.theatlantic.com/politics/archive/2019/09/can-thomas-abts-bleeding-out-curb-gun-violence/596164/>

Other resources:

- Abt, T. 2019. *Bleeding Out: The Devastating Consequences of Urban Violence—and a Bold New Plan for Peace in the Streets*. Excerpt TBA.

Thurs, Apr. 9: Government. Guest lecturer: Cass Sunstein, University Professor, Harvard.

- Sunstein, C. R. (2011). Empirically informed regulation. *University of Chicago Law Review*, 78(4), 1349-1429.

Other resources:

- Students interested in evidence-based policy, “nudges,” and other rational approaches to governance are encouraged to check out Apolitical, “The global learning platform for government,” <https://apolitical.co/home>

□ Due: First report, Capstone project.

Tues, Apr. 14: Violent and nonviolent political change. Guest lecturer: Erica Chenoweth, Professor, Harvard Kennedy School of Government.

- Chenoweth, E. forthcoming. Excerpt TBA.

Other resources:

- Pinker, S. 2018. *Enlightenment Now* reviews several developments in the history of nonviolence: chaps. 11, “Peace,” 13, “Terrorism,” 14, “Democracy,” 15 “Equal Rights,” pp. 214–223.
- Pinker, S. 2011. *The Better Angels of Our Nature: Why Violence Has Declined*. The historical decline of violence, completed just before Prof. Chenoweth’s groundbreaking research was published.
- The International Center on Nonviolent Conflict <https://www.nonviolent-conflict.org/> “focuses on how ordinary people wage nonviolent conflict to win rights, freedom and justice.”

Thurs, Apr. 16: Medicine. Guest lecturer: Atul Gawande, Professor, Harvard Medical School and School of Public Health, and surgeon, author, and CEO.

-Gawande. A. 2009. *The Checklist Manifesto*, pp. 15–71.

Tues, Apr. 21: Morality, rationality, and charity.

-Pinker, S. 2008. The Moral Instinct. *New York Times*,

<https://www.nytimes.com/2008/01/13/magazine/13Psychology-t.html>

-Singer, P. 1971. Famine, affluence, and morality. *Philosophy and Public Affairs*, 1, 229–243.

Available here: <https://www.utilitarian.net/singer/by/1972----.htm>.

Other resources:

Pinker, S. 2011. *The Better Angels of Our Nature*, sections on “Morality and Taboo” and

“Reason,” pp. 622–670.

Thurs, Apr 23: Effective altruism. Guest lecturer, William MacAskill, Professor, University of Oxford.

-MacAskill, W. 2018. Effective altruism. In the *Norton Introduction to Ethics*. On the Canvas site.

-Todd, B. 2017. Introducing longtermism. *80,000 Hours*, <https://80000hours.org/articles/future-generations/>.

Other Resources:

-MacAskill, W. 2016. *Doing Good Better: Effective Altruism and a Radical New Way to Make a Difference*. One of the two books credited with launching the effective altruism movement.

-Singer, P. 2015. *The Most Good You Can Do: How Effective Altruism Is Changing Ideas About Living Ethically*.

-Givewell is one of two major organizations that apply effective altruism to charitable giving:

“We search for the charities that save or improve lives the most per dollar.”

<https://www.givewell.org/>

-Giving What We Can “evaluates charities and builds a community of members donating 10% of their income to the most effective organisations in the world.”

<https://www.givingwhatwecan.org/>

-Pinker, S. 2018. *Enlightenment Now*, chap. 19, “Existential threats” argues that we should worry about nuclear war and pandemics, but not so much about AI.

Tues, Apr 28:

1. A conversation with Richard Dawkins, Professor Emeritus, University of Oxford.

2. Course conclusion: Rationality and you. Avoiding biases and fallacies in your personal life. Rationality in political action and social change. Effective altruism and choosing a career most likely to improve the world.

-Todd, B. & the 80,000 Hours team. A guide to using your career to help solve the world’s most pressing problems. <https://80000hours.org/key-ideas/>

-Yagoda, B. 2018. Your lying mind: The cognitive biases tricking your brain. *The Atlantic*.

<https://www.theatlantic.com/magazine/archive/2018/09/cognitive-bias/565775/> [A review of many of the cognitive biases and workarounds discussed in the course and how they can affect your life.]

-Alexander, S. 2018. Conflict vs. Mistake, *Slate Star Codex*.

<https://slatestarcodex.com/2018/01/24/conflict-vs-mistake/> [A perspective on social change, from a prominent member of the Rationality community.]

Other Resources:

80,000 Hours, <https://80000hours.org/>, an allusion to the number of hours in your career, is a non-profit that provides research and advice on how you can best make a difference through your career.

- DUE May 4: Capstone project.**
- Final Exam, May 11, 2PM.**