

# Undergraduate course: Decision Making

Course description, course schedule, and reading list

Feb 8, 2022

Instructor: Geoffrey Miller, Ph.D., [gfmiller65@gmail.com](mailto:gfmiller65@gmail.com)

## Official course description

This course introduces advanced undergraduate students to the psychology of decision-making, including theoretical foundations (such as expected utility theory, rational choice theory, risk analysis, evolutionary biology, and game theory), and empirical decision-making research (from cognitive psychology, evolutionary psychology, social psychology, consumer psychology, animal behavior, and behavioral economics). It will consider general heuristics and biases across domains, but also domain-specific decisions in traditional contexts such as food choice, habitat choice, mate choice, parental choice, social exchange, and public goods. Finally, it will explore how decision-making processes work in modern domains such as personal decision apps, career choices, life goals, public health, machine learning, and global catastrophic risks. It will consider a range of decision-making systems, from simple animals to modern humans, from individuals to families to corporations, and from evolved natural minds to artificial decision systems in autonomous vehicles, trading bots, and artificial intelligence systems.

## Informal course description

We're making decisions all the time – mostly small decisions, like what to eat for lunch, or which Douyin video to watch, but some big decisions, like which career to pursue, and who to marry. Individual decisions are where you have the most control and leverage over your own life. Collective decisions at the level of families, companies, and nations, are where we have the most impact on the world, including our long-term future as a species.

This course focuses on human decision making processes in their evolutionary, interdisciplinary, strategic, and applied contexts. In Part 1 of this course (weeks 1-3), we will explore the evolutionary origins of decision making from animals with the simplest nervous systems, through social primates, to modern humans. We will consider formal models of decision making from rational choice theory and game theory, but also the ways that people deviate from these formal models – often in surprisingly useful and adaptive ways. In Part 2 (weeks 4-6), we'll review research on human decision making from cognitive psychology, evolutionary psychology, and social psychology, including the fascinating work on cognitive biases, risk perception, adaptive heuristics, ecological rationality, person perception, and moral judgment. In Part 3 (weeks 7-10), we'll explore decision making in four key domains of life: survival and food, mating and reproduction, money and business, and social groups. In Part 4 (weeks 11-14), we'll apply these decision-making insights to understand practical issues in artificial intelligence and autonomous vehicles, health and medicine, well-being and career choice, and the long-term future of humanity.

My goal is for this to be one of the most intellectually stimulating, emotionally engaging, and personally relevant courses you've ever taken. If you do the readings, pay attention in class, and engage with other students in discussion forums, you'll get a whole new set of insights, strategies, and tactics that will help you make better decisions in your own life – including choosing a mate, choosing a career, choosing healthy habits, and choosing the most effective ways to help others and to protect humanity from existential threats.

## Course schedule and reading list

Note: readings include actual page counts and word counts of text to read (excluding references, etc), and expected reading times, based on average college-level reading speeds.

### Part 1: Theoretical foundations

#### **Week 1: Introduction to decision theory and decision-making research**

Required reading:

- Rothman, J. (2019). The art of decision-making. *The New Yorker* (Jan 21) (8 pages; 4,600 words; 25 minutes)
- Milkman, K. L., Chugh, D., & Bazerman, M. H. (2009). How can decision making be improved? *Perspectives on Psychological Science*, 4(4), 379-383. (4 pages; 3,200 words; 18 minutes)
- Bruch, E., & Feinberg, F. (2017). Decision-making processes in social contexts. *Annual Review of Sociology*, 43, 207-227. (15 pages; 8,800 words; 49 minutes)

Total: 3 papers; 27 pages; 16,600 words; 92 minutes

Optional reading:

- Mishra, S. (2014). Decision-making under risk: Integrating perspectives from biology, economics, and psychology. *Personality and Social Psychology Review*, 18(3), 280-307. (22 pages; 18,600 words; 103 minutes)

#### **Week 2: Evolutionary theory and animal decision-making**

Required reading:

- Stevens, J. R. (2008). The evolutionary biology of decision making. In C. Engel & W. Singer (Eds.), *Better than conscious? Decision making, the human mind, and implications for institutions* (pp. 285-304). Cambridge, MA: MIT Press. (18 pages; 6,800 words; 38 mins)
- Budaev, S., et al. (2019). Decision-making from the animal perspective: Bridging ecology and subjective cognition. *Frontiers in Ecology and Evolution*, 7: 164 (9 pages; 7,200 words; 40 mins)

Total: 2 papers; 27 pages; 14,000 words; 78 minutes

Optional reading:

- De Petrillo, F., & Rosati, A. G. (2021). Variation in primate decision-making under uncertainty and the roots of human economic behavior. *Phil. Trans. Royal Society B: Biological Sciences*, 376, 1819. (8 pages; 6,000 words; 33 mins)
- Mendelson, T. C., et al. (2016). Cognitive phenotypes and the evolution of animal decision making. *Trends in Ecology & Evolution*, 31(11), 850-859. (9 pages; 5,800 words; 32 minutes)

#### **Week 3: Game theory and strategic decision-making**

Required reading:

- Alexander, S. (2012). Introductory essays on game theory. Less Wrong Blog. (23 pages; 11,500 words; 64 minutes)
- Van Dijk, E., & De Dreu, C. K. W. (2021). Experimental games and social decision making. *Annual Review of Psychology*, 72, 415-438. (18 pages; 10,700 words; 59 minutes)

Total: 2 papers; 41 pages; 22,200 words; 123 minutes

Optional reading:

- Brown, J. S. (2016). Why Darwin would have loved evolutionary game theory. *Proc. Royal Society B - Biological Sciences*, 283(1838), 20160847. (7 pages; 6,600 words; 37 minutes)
- Thielmann, I., et al. (2021). Economic games: An introduction and guide for research. *Collabra-Psychology*, 7(1), 19004. (20 pages; 18,000 words; 100 minutes)

## **Part 2: Empirical foundations**

### **Week 4: Cognitive psychology: heuristics and biases**

Required reading:

- Tversky, A., & Kahneman, D. (1974). Judgement under uncertainty – heuristics and biases. *Science*, 185(4157), 1124-1131. (9 pages; 8,200 words; 46 minutes)
- Tversky, A., & Kahneman, D. (1981). The framing of decisions and the psychology of choice. *Science*, 211(4481), 453-458. (6 pages; 6,400 words; 36 minutes)
- Slovic, P. (1987). Perception of risk. *Science*, 236, 280-285. (6 pages; 5,100 words; 28 minutes)

Total: 3 papers; 21 pages; 19,700 words; 110 minutes

Optional reading:

- Chater, N., et al. (2020). Probabilistic biases meet the Bayesian brain. *Current Directions in Psychological Science*, 29(5), 506-512. (6 pages; 3,800 words; 21 minutes)
- Wang, X. T., et al. (2016). Not all risks are created equal: A twin study and meta-analysis of risk taking across seven domains. *J. of Experimental Psychology: General*, 145(11), 1548-1560. (11 pages; 9,100 words; 51 minutes)

### **Week 5: Evolutionary psychology: primate decisions, error management, ecological rationality**

Required reading:

- Santos, L. R., & Rosati, A. G. (2015). The evolutionary roots of human decision making. *Annual Review of Psychology*, 66, 321-347. (21 pages; 11,600 words; 64 minutes)
- Johnson, D. D. P., et al. (2013). The evolution of error: Error management, cognitive constraints, and adaptive decision-making biases. *Trends in Ecology & Evolution*, 28(8), 474-481. (7 pages; 6,000 words; 33 minutes)
- Todd, P. M., & Gigerenzer, G. (2007). Environments that make us smart: Ecological rationality. *Current Directions in Psychological Science*, 16(3), 167-171. (5 pages; 3,300 words; 18 minutes)

Total: 3 papers; 33 pages; 20,900 words; 116 minutes

Optional reading:

- Bruner, J., Calegari, F., & Handfield, T. (2020). The evolution of the endowment effect. *Evolution and Human Behavior*, 41, 87-95. (7 pages; 8,600 words; 48 minutes)
- Cosmides, L., & Tooby, J. (2013). Evolutionary psychology: New perspectives on cognition and motivation. *Annual Review of Psychology*, 64, 201-229. (24 pages; 15,000 words; 83 minutes)
- Li, N. P., et al. (2018). The evolutionary mismatch hypothesis: Implications for psychological science. *Current Directions in Psychological Science*, 27(1), 38-44. (5 pages; 3,000 words; 17 minutes)

## **Week 6: Social psychology: person perception, stereotype accuracy, moral judgment**

### Required reading:

- Bonnefon, J. F., et al. (2017). Can we detect cooperators by looking at their faces? *Current Directions in Psychological Science*, 26(3), 276-281 (5 pages; 2,900 words; 16 minutes)
- Goodwin, G. P. (2015). Moral character in person perception. *Current Directions in Psychological Science*, 24(1), 38-44. (5 pages; 3,700 words; 21 minutes)
- Jussim, L. (2015). Stereotype (in)accuracy in perceptions of groups and individuals. *Current Directions in Psychological Science*, 24(6), 490-497. (7 pages; 4,200 words; 28 minutes)
- Hinds, J., & Joinson, A. (2019). Human and computer personality prediction from digital footprints. *Current Directions in Psychological Science*, 28(2), 204-211. (6 pages; 3,700 words; 21 minutes)

Total: 4 papers; 23 pages; 14,500 words; 86 minutes

### Optional reading:

- Haidt, J. (2013). Moral psychology for the twenty-first century. *J. of Moral Education*, 42(3), 281-297. (14 pages; 6,800 words; 38 minutes)
- Uhlmann, E. L., et al. (2015). A person-centered approach to moral judgment. *Perspectives on Psychological Science*, 10(1), 72-81. (8 pages; 6,000 words; 33 minutes)

## **Part 3: Domain-specific decision making**

## **Week 7: Survival decisions: predation risk, foraging strategies, and food choice**

### Required reading:

- Doherty, J. F., & Ruehle, B. (2020). An integrated landscape of fear and disgust: The evolution of avoidance behaviors amidst a myriad of natural enemies. *Frontiers in Ecology and Evolution*, 8, 564343. (6 pages; 4,600 words; 26 minutes)
- Rosati, A. G. (2017). Foraging cognition: Reviving the ecological intelligence hypothesis. *Trends in Cognitive Sciences*, 21(9), 691-702. (10 pages; 6,600 words; 37 minutes)
- Rozin, P. (2015). Psychology and physiology of food preferences. In J. D. Wright (Ed.), *International Encyclopedia of the Social & Behavioral Sciences* (2<sup>nd</sup> Ed., Vol. 9) (pp. 296-299). Elsevier. (4 pages; 3,300 words; 18 minutes)
- Wang, X. T. (2018). Resource signaling via blood glucose in embodied decision making. *Frontiers in Psychology: Hypothesis and Theory*, 9, e1965. (9 pages; 6,200 words; 34 minutes)

Total: 4 papers; 29 pages; 20,700 words; 115 minutes

### Optional reading:

- De Petrillo, F., & Rosati, A. G. (2019). Ecological rationality: Convergent decision-making in apes and capuchins. *Behavioural Processes*, 164, 201-213. (10 pages; 10,000 words; 56 minutes)
- Mobbs, D., et al. (2018). Foraging for foundations in decision neuroscience: Insights from ethology. *Nature Reviews Neuroscience*, 19(7), 419-427. (7 pages; 6,800 words; 38 minutes)
- Todd, P. M., & Hills, T. T. (2020). Foraging in mind. *Current Directions in Psychological Science*, 29(3), 309-315. (5 pages; 3,400 words; 19 minutes)

## **Week 8: Reproductive decisions: mate choice and family planning**

### Required reading:

- Miller, G. F., & Todd, P. M. (1998). Mate choice turns cognitive. *Trends in Cognitive Sciences*, 2(5), 190-198. (8 pages; 6,800 words; 38 minutes)
- Buss, D. M., & Foley, P. (2020). Mating and marketing. *J. of Business Research*, 120, 492-497. (6 pages; 5,900 words; 33 minutes)
- Zhang, L. C., et al. (2021). Intention to have a second child, family support, and actual fertility behavior in current China: An evolutionary perspective. *American J. of Human Biology*, DOI: 10.1002/ajhb.23669. (10 pages; 6,800 words; 38 minutes)

Total: 3 papers; 24 pages; 19,500 words; 108 minutes

### Optional reading:

- Gith, E., & Bokek-Cohen, Y. (2019). Choosing genes without jeans: Do evolutionary psychological mechanisms have an impact on thinking distortions in sperm donor preferences among heterosexual sperm recipients? *Human Fertility*, DOI 10.1080/14647273.2019.1700560. (7 pages; 5,200 words; 29 minutes)
- Guo, Q., Li, Y., & Yu, S. (2017). In-law and mate preferences in Chinese society and the role of traditional cultural values. *Evolutionary Psychology*, 15(3): 1474704917730518 (10 pages; 8,600 words; 48 minutes)
- Ryan, M. J. (2020). Darwin, sexual selection, and the brain. *Proc. National Academy of Sciences*, 118(8), e2008194118. (7 pages; 6,400 words; 36 minutes)

## **Week 9: Economic decisions: consumer choice, financial decisions, business strategy**

### Required reading:

- Miller, G. F. (2012). Sex, mutations, and marketing. *EMBO Reports*, 13(10), 880-884. (4 pages; 2,700 words; 15 minutes)
- Frydman, C., & Camerer, C. F. (2016). The psychology and neuroscience of financial decision making. *Trends in Cognitive Sciences*, 20(9), 661-675. (13 pages; 7,900 words; 43 minutes)
- Kahneman, D., et al. (2019). A structured approach to strategic decisions. *MIT Sloan Management Review*, 60(3), 67-73. (7 pages; 4,300 words; 24 minutes)

Total: 3 papers; 24 pages; 14,900 words; 83 minutes

### Optional reading:

- Griskevicius, V., & Kenrick, D. T. (2013). Fundamental motives: How evolutionary needs influence consumer behavior. *J. of Consumer Psychology*, 23, 372-386. (11 pages; 10,300 words; 57 minutes)
- Sokol-Hessner, P., & Rutledge, R. B. (2019). The psychological and neural basis of loss aversion. *Current Directions in Psychological Science*, 28(1), 20-27. (6 pages; 3,700 words; 21 minutes).
- Wang, X. T., et al. (2015). Sense and sensibility of ownership: Type of ownership experience and valuation of goods. *J. of Behavioral and Experimental Economics*, 58, 171-177. (6 pages; 6,800 words; 38 minutes)

## **Week 10: Group decisions: collective intelligence, tournaments, arguments, leadership**

### Required reading:

- Woolley, A. W., et al. (2015). Collective intelligence and group performance. *Current Directions in Psychological Science*, 24(6), 420-424. (4 pages; 2,700 words; 15 minutes)

- De Waal-Andrews, W., & van Vugt, M. (2020). The triad model of follower needs: Theory and review. *Current Opinion in Psychology*, 33, 142-147. (4 pages; 2,700 words; 15 minutes)
- Mercier, H., et al. (2017). Natural-born arguers: Teaching how to make the best of our reasoning abilities. *Educational Psychologist*, 52(1), 1-16. (13 pages; 11,600 words; 64 minutes)
- Tetlock, P. E., et al. (2017). Bringing probability judgments into policy debates via forecasting tournaments. *Science*, 355(6324), 481-483. (3 pages; 2,600 words; 14 minutes)

Total: 4 papers; 24 pages; 19,600 words; 109 minutes

Optional reading:

- Colman, A. M., & Gold, N. (2018). Team reasoning: Solving the puzzle of coordination. *Psychonomic Bulletin & Review*, 25(5), 1770-1783. (12 pages; 10,200 words; 57 minutes)
- Krause, J., et al. (2010). Swarm intelligence in animals and humans. *Trends in Ecology & Evolution*, 25(1), 28-34. (6 pages; 5,900 words; 33 minutes)
- Song, HQ, et al. (2018). How do young Chinese friendship groups make travel decisions? A content and interaction process analysis. *J. of Travel & Tourism Marketing*, 35(6), 772-785. (12 pages; 8,700 words; 48 minutes)

#### **Part 4: Real-world applications**

##### **Week 11: Computers: machine learning, autonomous vehicles, artificial intelligence**

Required reading:

- Howard, J. (2019). Artificial intelligence: Implications for the future of work. *American J. of Industrial Medicine*, 62(11), 917-926. (6 pages; 4,400 words; 24 minutes)
- Korteling, J. E. H., et al. (2021). Human versus artificial intelligence. *Frontiers in Artificial Intelligence*, 4, 622364. (10 pages; 9,600 words; 53 minutes)
- Awad, E., et al. (2018). The moral machine experiment. *Nature*, 563, 59-64. (5 pages; 5,200 words; 29 minutes)

Total: 3 papers; 21 pages; 19,700 words; 109 minutes

Optional reading:

- Asilomar Collective (2017). Asilomar AI Principles. (2 pages, 700 words, 4 minutes)
- Hansen, K. B. (2020). The virtue of simplicity: On machine learning models in algorithmic trading. *Big Data & Society*, 7(1), 2053951720926558. (11 pages; 8,900 words; 49 minutes)
- Silver, D., et al. (2018). A general reinforcement learning algorithm that masters chess, shogi, and Go through self-play. *Science*, 362(6419), 1140-1144. (5 pages; 3,300 words; 18 minutes)

##### **Week 12: Health: behavior change, medical diagnosis, clinical practice**

Required reading:

- Chapman, G. B. (2019). A decision-science based approach to health-behavior change. *Current Directions in Psychological Science*, 28(5), 469-474. (5 pages; 2,900 words; 16 minutes)
- Marewski, J. N., & Gigerenzer, G. (2012). Heuristic decision making in medicine. *Dialogues in Clinical Neuroscience*, 14(1), 77-89. (11 pages; 7,200 words; 40 minutes)

- Bowes, S. M., et al. (2020). Cognitive biases, heuristics, and logical fallacies in clinical practice: A brief field guide for practicing clinicians and supervisors. *Professional Psychology – Research and Practice*, 51(5), 435-445. (8 pages; 7,900 words; 44 minutes)

Total: 3 papers; 24 pages; 18,000 words; 100 minutes

Optional reading:

- Cotton, V., & Patel, M. S. (2019). Gamification use and design in popular health and fitness mobile applications. *American J. of Health Promotion*, 33(3), 448-451. (3 pages; 1,700 words; 9 minutes).
- Ludolph, R., & Schulz, P. J. (2018). Debiasing health-related judgments and decision making: A systematic review. *Medical Decision Making*, 38(1), 3-13. (8 pages; 4,500 words; 25 minutes)
- Siegel, R., & Gordon, K. (2021). Behavioral economics: A primer and applications to the UN sustainable development goal of good health and well-being. *Reports*, 4(2), 16. (10 pages; 6,000 words; 33 minutes)

### **Week 13: Happiness & Altruism: self-control, ethical decisions, and career choice**

Required reading:

- Duckworth, A. L., et al. (2018). Beyond willpower: Strategies for reducing failures of self-control. *Psychological Science in the Public Interest*, 19(3), 102-129. (17 pages; 14,100 words; 78 minutes)
- Caviola, L., et al. (2021). The psychology of (in)effective altruism. *Trends in Cognitive Sciences*, 25(7), 596-607. (9 pages; 5,500 words; 31 minutes)
- Todd, B. (2021). How to make tough career decisions. 80,000 Hours Blog. (10 pages; 4,100 words; 23 minutes)

Total: 3 papers; 36 pages; 23,700 words; 132 minutes

Optional reading:

- Lent, R. W., & Brown, S. D. (2020). Career decision making, fast and slow: Toward an integrative model of intervention for sustainable career choice. *J. of Vocational Behavior*, 120, 103448. (13 pages; 11,600 words; 64 minutes)
- Urminsky, O. (2017). The role of psychological connectedness to the future self in decisions over time. *Current Directions in Psychological Science*, 26(1), 34-39. (5 pages; 2,800 words; 16 minutes)

### **Week 14: Endurance: global catastrophic risks and future generations**

Required reading:

- Bostrom, N. (2013). Existential risk prevention as a global priority. *Global Policy*, 4(1) 15-31. (14 pages; 9,700 words; 54 minutes)
- Schubert, S., et al. (2019). The psychology of existential risk: Moral judgments about human extinction. *Scientific Reports*, 9: e15100. (5 pages; 5,600 words; 31 minutes)
- Musk, E. (2017). Making humans a multi-planetary species. *New Space*, 5(2), 46-61. (16 pages; 7,700 words; 43 minutes)

Total: 3 papers; 35 pages; 23,000 words; 128 minutes

Optional reading:

- Boston, J. (2021). Assessing the options for combatting democratic myopia and safeguarding long-term interests. *Futures*, 125, 102668. (12 pages; 8,600 words; 48 minutes)

- Scouras, J. (2019). Nuclear war as a global catastrophic risk. *J. of Benefit-Cost Analysis*, 10(2), 274-295. (20 pages; 7,900 words; 44 minutes)
- Van Lange, P. A. M., et al. (2018). Climate change: What psychology can offer in terms of insights and solutions. *Current Directions in Psychological Science*, 27(4), 269-274 (4 pages; 2,800 words; 16 minutes)