

# Economics 885 – Spring 2022

## Persuasion and Information Design

<b>Instructor</b>	Arjada Bardhi
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<b>Class meetings</b>	Wednesdays 5:15 - 7:45 PM, SocSci 327
<b>Office hours</b>	Thursdays 4-6PM and by appointment
<b>Office</b>	SocSci 223 / Zoom

### Course description

This module surveys recent developments in information design and Bayesian persuasion, as well as the wider tradition of persuasion models in economic theory. Starting with classic results in information theory, the module covers both the concavification approach and the posterior-mean approach to information design. We delve into static and dynamic models of persuasion, the foundations of information design in games, the presence of competition, commitment, and informational frictions in information design, as well as a variety of applications. The module is intended primarily for PhD students interested in information economics who are transitioning into doing research in the topic. The course is therefore reading-intensive and oriented towards open research questions.

### Grading policy

Assessment will be based on class presentations/handouts (45%), one problem set (15%), and a 5-7 page referee report (40%). Active participation during lectures and class presentations is strongly encouraged. The problem set is due at **5PM on April 13**. The referee report is due at **5PM on April 26**.

### Tentative schedule of topics

Articles marked with (\*\*\*) will be covered in lectures and those marked with (\*\*) will be assigned for student presentations. Students are strongly encouraged to go over the Week 0 readings before the start of the module—these readings will be referred to throughout the module as well.

### Week 0: Background reading

McCloskey, Donald and Arjo Klamler. “One Quarter of GDP is Persuasion.” *American Economic Review P&P* 85(2): 191-195, 1995.

Bergemann, Dirk and Stephen Morris. “Information Design: A Unified Perspective.” *Journal of Economic Literature* 57(1): 1-57, 2019.

Kamenica, Emir. “Bayesian Persuasion and Information Design.” *Annual Review of Economics* 11: 249-72, 2019.

Hörner, Johannes and Andrzej Skrzypacz, “Learning, Experimentation and Information Design.” Working paper, August 2016.

Forges, Franoise. “Games with Incomplete Information: From Repetition to Cheap Talk and Persuasion.” *Annals of Economics and Statistics* 137 (2020): 3-30.

### **Week 1 (Mar 2): Blackwell informativeness and the concavification approach**

Blackwell, David. “Comparison of Experiments.” In *Proceedings of the Second Berkeley Symposium on Mathematical Statistics and Probability*. 1951.

Crémer, Jacques. “A Simple Proof of Blackwell’s ‘Comparison of Experiments’ Theorem.” *Journal of Economic Theory* 27.2 (1982): 439-443.

de Oliveira, Henrique. “Blackwell’s Informativeness Theorem Using Diagrams.” *Games and Economic Behavior* 109 (2018): 126-131. (\*\*)

Green, Jerry and Nancy Stokey. “Two Representations of Information Structures and Their Comparisons.” *Institute for Mathematical Studies in the Social Sciences* Technical Report No. 271, (1978). (\*\*)

Kamenica, Emir and Matthew Gentzkow. “Bayesian Persuasion.” *American Economic Review* 101(6): 1283-1309, 2011. (\*\*)

Rayo, Luis and Ilya Segal. “Optimal Information Disclosure.” *Journal of Political Economy* 118(5): 949-87, 2010. (\*\*)

### **Week 2 (Mar 17\*): Information design under exogenous constraints**

Babichenko, Yakov, Inbal Talgam-Cohen, and Konstantin Zabarnyi. “Bayesian Persuasion under Ex Ante and Ex Post Constraints.” *Proceedings of the AAAI Conference on Artificial Intelligence* Vol. 35. No. 6. 2021.

Brocas, Isabelle and Juan D. Carrillo. “Influence Through Ignorance.” *The RAND Journal of Economics* 38(4): 931-47, 2007. (\*\*)

Degan, Arianna, and Ming Li. “Persuasion with Costly Precision.” *Economic Theory* 72.3 (2021): 869-908.

Doval, Laura, and Vasiliki Skreta. “Constrained Information Design: Toolkit.” ArXiv e-prints (2018): arXiv-1811.

Gentzkow Matthew, and Emir Kamenica. “Costly Persuasion.” *American Economic Review* 104(5): 457-462, 2014. (\*\*)

Glazer, Jacob and Ariel Rubinstein. “On Optimal Rules of Persuasion.” *Econometrica* 72(6): 1715-1736, 2004.

Le Treust, Maël, and Tristan Tomala. “Persuasion with Limited Communication Capacity.” *Journal of Economic Theory* 184: 104940, 2019.

Levy, Gilat, Ins Moreno de Barreda, and Ronny Razin. “Persuasion with Correlation Neglect: A Full Manipulation Result” *American Economic Review: Insights*. Forthcoming, 2022. (\*\*)

Lipnowski, Elliot, Laurent Mathevet, and Dong Wei. “Attention Management.” *American Economic Review: Insights* 2(1) 17-32, 2020. (\*\*)

Tsakas, Elias, and Nikolas Tsakas. “Noisy Persuasion.” *Games and Economic Behavior* 130: 44-61, 2021.

### **Week 3 (Mar 23): Competition and commitment in persuasion**

Au, Pak Hung, and Keiichi Kawai. “Competitive Information Disclosure by Multiple Senders.” *Games and Economic Behavior* 119: 56-78, 2020. (\*\*)

Best, James, and Daniel Quigley. “Persuasion for the Long Run.” Available at SSRN 2908115 (2020).

Board, Simon and Jay Lu. “Competitive Information Disclosure in Search Markets.” *Journal of Political Economy* 126(5): 1965-2010, 2018.

Felgenhauer, Mike, and Elisabeth Schulte. “Strategic Private Experimentation.” *American Economic Journal: Microeconomics* 6.4 (2014): 74-105. (\*\*)

Gentzkow, Matthew and Emir Kamenica. “Competition in Persuasion.” *Review of Economic Studies* 84: 300-22, 2017. (\*\*)

Gentzkow, Matthew and Emir Kamenica. “Bayesian Persuasion with Multiple Senders and Rich Signal Spaces.” *Games and Economic Behavior* 104: 411-429, 2017.

Guo, Yingni, and Eran Shmaya. “Costly Miscalibration.” *Theoretical Economics* 16(2): 477-506, 2021.

Li, Fei, and Peter Norman. “Sequential Persuasion.” *Theoretical Economics* 16(2): 639-675, 2021.

Lipnowski, Elliot and Doron Ravid. “Cheap Talk with Transparent Motives.” *Econometrica* 88(4): 1631-1660, 2020.(\*\*)

Lipnowski, Elliot, Doron Ravid, and Denis Shishkin. “Persuasion via Weak Institutions.” *Journal of Political Economy*. Forthcoming, 2021.

Milgrom, Paul and John Roberts. “Relying on the Information of Interested Parties.” *The RAND Journal of Economics* 17(1): 18-32, 1986. (\*\*)

### **Week 4 (Mar 30): Posterior-mean approach and persuasion with private information**

Alonso, Ricardo, and Odilon Câmara. “On the Value of Persuasion by Experts.” *Journal of Economic Theory* 174: 103-123, 2018.

Dworczak, Piotr and Giorgio Martini. “The Simple Economics of Optimal Persuasion.” *Journal of Political Economy* 127(5): 1993-2048, 2019. (\*\*)

Guo, Yingni, and Eran Shmaya. “The Interval Structure of Optimal Disclosure.” *Econometrica* 87(2): 653-675, 2019.

Gentzkow, Matthew, and Emir Kamenica. “A Rothschild-Stiglitz Approach to Bayesian Persuasion.” *American Economic Review* 106(5): 597-601, 2016. (\*\*)

Hedlund, Jonas. “Bayesian Persuasion by a Privately Informed Sender.” *Journal of Economic Theory* 167: 229-268, 2017. (\*\*)

Kolotilin, Anton. “Optimal Information Disclosure: A Linear Programming Approach.” *Theoretical Economics* 13(2): 607-35, 2018.

Kolotilin, Anton, Tymofiy Mylovanov, Andriy Zapechelnyuk, and Ming Li. “Persuasion of a Privately Informed Receiver.” *Econometrica* 85(6): 1949-64, 2017. (\*\*)

Kolotilin, Anton and Andriy Zapechelnyuk. “Persuasion Meets Delegation.” Working paper, February 2019.

Rothschild, Michael, and Joseph E. Stiglitz. “Increasing Risk: I. A Definition.” *Journal of Economic Theory* 2(3): 225-243, 1970. (\*\*)

Zapechelnyuk, Andriy. “Optimal Quality Certification.” *American Economic Review: Insights* 2(2): 161-76, 2020.

### **Week 5 (Apr 6): Information design in games**

Bergemann Dirk, and Stephen Morris. “Information design, Bayesian persuasion, and Bayes correlated equilibrium.” *American Economic Review* 106(5): 586-91, 2016.

Bergemann, Dirk, and Stephen Morris. “Bayes Correlated Equilibrium and the Comparison of Information Structures in Games.” *Theoretical Economics* 11 (2): 487-522, 2016. (\*\*)

Bergemann, Dirk, Alessandro Bonatti, and Alex Smolin. “The Design and Price of Information.” *American Economic Review* 108(1): 1-48, 2018. (\*\*)

Bergemann, Dirk, Benjamin Brooks, and Stephen Morris. “The Limits of Price Discrimination.” *American Economic Review* 105(3): 921-957, 2015. (\*\*)

Bergemann, Dirk, Benjamin Brooks, and Stephen Morris. “First-Price Auctions with General Information Structures: Implications for Bidding and Revenue.” *Econometrica* 85 (1): 107-43, 2017.

Forges, Franoise. “Five Legitimate Definitions of Correlated Equilibrium in Games with Incomplete Information.” *Theory and Decision* 35(3): 277-310, 1993.

Mathevet, Laurent, Jacopo Perego, and Ina Taneva. “On Information Design in Games.” *Journal of Political Economy* 128(4): 1370-1404, 2020. (\*\*)

### **Week 6 (Apr 13): Dynamic information design**

Best, James, and Daniel Quigley. “Persuasion For the Long Run.” Available at SSRN 2908115 (2020). (\*\*)

Doval, Laura, and Jeffrey C. Ely. “Sequential Information Design.” *Econometrica* 88(6): 2575-2608, 2020. (\*\*)

Ely, Jeffrey. “Beeps.” *American Economic Review* 107(1): 31-53, 2017. (\*\*)

Ely, Jeffrey, Alex Frankel, and Emir Kamenica. “Suspense and Surprise.” *Journal of Political Economy* 103(1): 215-60, 2015. (\*\*)

Georgiadis, George, and Balazs Szentes. “Optimal Monitoring Design.” *Econometrica* 88(5): 2075-2107, 2020.

Henry, Emeric and Marco Ottaviani. “Research and Approval Process: The Organization of Persuasion.” *American Economic Review* 109:911-55, 2019. (\*\*)

Kremer, Ilan, Yishay Mansour, and Motty Perry. “Implementing the ‘Wisdom of the Crowd’.” *Journal of Political Economy* 122(5): 988-1012, 2014.

Orlov, Dmitry, Andrzej Skrzypacz, and Pavel Zryumov. “Persuading the Principal to Wait.” *Journal of Political Economy* 128(7): 2542-2578, 2020.(\*\*)

Smolin, Alex. “Dynamic Evaluation Design.” *American Economic Journal: Microeconomics* 13(4): 300-331, 2021.

### **Week 7 (Apr 20): Persuasion through narratives**

Bénabou, Roland, Armin Falk, and Jean Tirole. “Narratives, Imperatives, and Moral Reasoning.” National Bureau of Economic Research, No. w24798, 2018.

Eliaz, Kfir, and Rani Spiegler. “A Model of Competing Narratives.” *American Economic Review*, 110(12), 3786-3816, 2020. (\*\*)

Eliaz, Kfir, Ran Spiegler, and Heidi C. Thyssen. “Strategic Interpretations.” *Journal of Economic Theory* 192 (2021): 105192. (\*\*)

Eliaz, Kfir, Ran Spiegler, and Yair Weiss. “Cheating with Models.” *American Economic Review: Insights* 3.4 (2021): 417-34. (\*\*)

Galperti, Simone. “Persuasion: The Art of Changing Worldviews.” *American Economic Review* 109(3): 996-1031, 2019. (\*\*)

Mullainathan, Sendhil, Joshua Schwartzstein, Andrei Shleifer. “Coarse Thinking and Persuasion.” *Quarterly Journal of Economics* 123(2), 577-619, 2008.

Schwartzstein, Joshua, and Adi Sunderam. “Using Models to Persuade.” *American Economic Review* 111.1 (2021): 276-323. (\*\*)

## Further readings

### More on persuasion by multiple senders

Au, Pak Hung, and Keiichi Kawai. “Competitive disclosure of correlated information.” *Economic Theory* 72.3 (2021): 767-799.

Boleslavsky, Raphael, and Christopher Cotton. “Limited Capacity in Project Selection: Competition through Evidence Production.” *Economic Theory* 65(2): 385-421, 2018.

Li, Fei, and Peter Norman. “On Bayesian Persuasion with Multiple Senders.” *Economics Letters* 170: 66-70, 2018.

Wu, Jiemei. “Non-Competing Persuaders.” *European Economic Review* 127 (2020): 103454.

### Information design in auctions and contests

Boleslavsky, Raphael and Christopher Cotton. “Grading Standards and Education Quality.” *American Economic Journal: Microeconomics* 7(2): 248-279, 2015.

Bergemann, Dirk, Benjamin Brooks, and Stephen Morris. “Revenue guarantee equivalence.” *American Economic Review* 109.5 (2019): 1911-29.

Brooks, Benjamin, and Songzi Du. “Optimal Auction Design with Common Values: An Informationally Robust Approach.” *Econometrica* 89.3 (2021): 1313-1360.

Halac, Marina, Elliot Lipnowski, and Daniel Rappoport. “Rank Uncertainty in Organizations.” *American Economic Review* 111.3 (2021): 757-86.

Zhang, Jun, and Junjie Zhou. “Information disclosure in contests: A Bayesian persuasion approach.” *The Economic Journal* 126.597 (2016): 2197-2217.

### Persuasion with heterogeneous beliefs / ambiguity

Alonso, Ricardo, and Odilon Câmara. “Bayesian Persuasion with Heterogeneous Priors.” *Journal of Economic Theory* 165: 672-706, 2016.

Beauchne, Dorian, Jian Li, and Ming Li. “Ambiguous Persuasion.” *Journal of Economic Theory* 179 (2019): 312-365.

de Clippel, Geoffroy, and Xu Zhang. “Non-Bayesian Persuasion.” Working paper, 2019.

Dworczak, Piotr, and Alessandro Pavan. “Preparing for the Worst but Hoping for the Best: Robust (Bayesian) Persuasion.” (2020).

Hirsch, Alexander V. “Experimentation and Persuasion in Political Organizations.” *American Political Science Review* 110(1): 68-84, 2016.

Kartik, Navin, Frances Xu Lee, and Wing Suen. “Information Validates the Prior: A Theorem on Bayesian Updating and Applications.” *American Economic Review: Insights* 3(2): 165-82, 2021.

### Persuasion of groups

Alonso, Ricardo and Odilon Camara. “Persuading Voters.” *American Economic Review* 106 (11): 3590-605, 2016.

Bardhi, Arjada, and Yingni Guo. “Modes of Persuasion Toward Unanimous Consent.” *Theoretical Economics* 13(3): 1111-1149, 2018.

Caillaud, Bernard and Jean Tirole. “Consensus Building: How to Persuade a Group.” *American Economic Review* 97(5): 1877-1900, 2007.

Chan, Jimmy, Seher Gupta, Fei Li, and Yun Wang. “Pivotal Persuasion.” *Journal of Economic Theory* 180: 178-202, 2019.

Denter, Philipp, Martin Dumav, and Boris Ginzburg. “Social connectivity, media bias, and correlation neglect.” *The Economic Journal* 131.637 (2021): 2033-2057.

Heese, Carl, and Stephan Laueremann. “Persuasion and Information Aggregation in Elections.” No. 112. ECONtribute Discussion Paper, 2021.

### **Persuasion in coordination/global games**

Goldstein, Itay, and Chong Huang. “Bayesian Persuasion in Coordination Games.” *American Economic Review* 106.5 (2016): 592-96.

Inostroza, Nicolas and Alessandro Pavan. “Persuasion in Global Games with Application to Stress Testing.” Working paper, January 2018.

Li, Fei, Yangbo Song, and Mofei Zhao. “Global Manipulation by Local Obfuscation.” Working paper, October 2019.

### **Pricing and information**

Boleslavsky, Raphael, Ilwoo Hwang, and Kyungmin Kim. “Competitive advertising and pricing.” Emory University and University of Miami (2019).

Ravid, Doron, Anne-Katrin Roesler, and Balzs Szentes. “Learning before trading: on the inefficiency of ignoring free information.” *Journal of Political Economy* 130.2 (2022).

Roesler, Anne-Katrin and Balázs Szentes. “Buyer-Optimal Learning and Monopoly Pricing.” *American Economic Review* 107(7): 2072-80, 2017.

Smolin, Alex. “Disclosure and Pricing of Attributes.” Available at SSRN 3318957 (2020).

### **Persuasion and networks**

Candogan, Ozan. ”Persuasion in networks: Public signals and k-cores.” Proceedings of the 2019 ACM Conference on Economics and Computation. 2019.

Egorov, Georgy, and Konstantin Sonin. “Persuasion on Networks.” No. w27631. National Bureau of Economic Research, 2020.

Galperti, Simone and Jacopo Perego. “Belief Meddling in Social Networks: An Information-Design Approach.” Working paper, February 2019.

Murphy, Kevin M., and Andrei Shleifer. “Persuasion in Politics.” *American Economic Review* 94.2 (2004): 435-439.

### **Persuasion in science**

Banerjee, Abhijit V., Sylvain Chassang, Sergio Montero, and Eric Snowberg. "A theory of experimenters: Robustness, randomization, and balance." *American Economic Review* 110.4 (2020): 1206-30.

Di Tillio, Alfredo, Marco Ottaviani, and Peter Norman Srensen. "Persuasion Bias in Science: Can Economics Help?" *Economic Journal* 127.605 (2017).

Frankel, Alex and Maximilian Kasy. "Which Findings Should be Published?" *American Economic Journal: Microeconomics*, Forthcoming, 2022.

Yoder, Nathan. "Designing Incentives for Heterogeneous Researchers." Available at SSRN 3154143 (2020).

### **Empirical/experimental evidence of persuasion**

DellaVigna Stefano, and Matthew Gentzkow. "Persuasion: Empirical Evidence." *Annual Review of Economics* 2: 643-69, 2010.

Jun, Sung Jae and Sokbae Lee. "Identifying The Effect of Persuasion." Working paper, January 2018.

Allcott, Hunt and Matthew Gentzkow. "Social Media and Fake News in the 2016 Election." *Journal of Economic Perspectives* 31(2): 211-236, 2017.

Hagmann, David and George Loewenstein. "Persuasion with Motivated Beliefs." Working paper, December 2018.

Brocas, Isabelle, Juan D. Carrillo, and Thomas R. Palfrey. "Information Gatekeepers: Theory and Experimental Evidence." *Economic Theory* 51(3): 649-676, 2012.

### **Persuasion in legal arguments**

Benson, Robert W. and Joan B. Kessler. "Legalese v. Plain English: An Empirical Study of Persuasion and Credibility in Appellate Brief Writing." *Loyola of Los Angeles Law Review* 301, 1987.

Callander, Steven and Tom Clark. "Precedent and Doctrine in a Complicated World." *American Political Science Review* 111(1):184-203, 2017.

Carpenter, Jacob M. "Persuading with Precedent: Understanding and Improving Analogies in Legal Argument."