Game theory and applications

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1 Introduction

Game theory provides analytical tools designed to help us understand strategic interactions among rational decision-makers. Agents are said to be *rational* because they pursue well defined objectives, and interactions are *strategic* because they take into account the behavior of other decision-makers. Game theory has been successfully applied in economics, finance, political science, law, and biology. Today, game theory is a crucial instrument in the toolbox of anyone interested in multi-person interactions taking place in markets, firms, and other institutions.

This course aims to provide an overview of advanced topics in Game Theory. We focus our attention on the design of mechanisms, design of information, and applications to economics. The course familiarizes students with cutting edge topics in mechanism and information design.

2 Lectures and Readings

1. **Part I: Mechanism Design**

   (a) **Lecture 1:** Optimal auctions and revenue equivalence

      i. Myerson, R. B. (1981): Optimal Auction Design. Mathematics of Operation Research, 6(1).
      ii. Myerson, R. B., and M. A. Satterthwaite (1983): Efficient Mechanisms for Bilateral Trading. Journal of Economic Theory.
      iii. Crawford, V. P., & Sobel, J. (1982). Strategic information transmission. Econometrica: Journal of the Econometric Society, 1431-1451.
      iv. Paul Klemperer (1999). Auction Theory: A Guide to Literature. Journal of Economic Surveys 13(3): 227-286.

v. Bulow, J.and Roberts, J. (1989): The Simple Economics of Optimal Auctions," The Journal of Political Economy.

vi. Ausubel, L. M., and P. Milgrom (2006): The Lovely but Lonely Vickrey Auction. Combinatorial Auctions.

vii. Bulow, J., and P. Klemperer (1994): Auctions Versus Negotiations. American Economic Review.

viii. Gershkov, A., Moldovanu, B., Strack, P., Zhang, M. (2021). A theory of auctions with endogenous valuations. Journal of Political Economy.

ix. Pavan, A., I. Segal, J. Toikka (2014). Dynamic Mechanism Design: A Myersonian Approach. Econometrica

x. Loertscher, S., Ellen V. Muir (2022). Monopoly Pricing, Optimal Randomization, and Resale. Journal of Political Economy.

(b) **Lecture 2:** Risk aversion, affiliation, resale, and common values

i. Akbarpour, M., Li, S. (2020). Credible auctions: A trilemma. Econometrica, 88(2), 425-467.

ii. Bergemann, D., B. Brooks, and S. Morris (2017): First-Price Auctions With General Information Structures: Implications for Bidding and Revenue. Econometrica.

iii. Carroll, G., and I. Segal (2018): Robustly optimal auctions with unknown resale opportunities. Review of Economic Studies.

iv. Cramton, P. (2013): Spectrum Auction Design. Review of Industrial Organization.

v. Cremer, J., and R. P. McLean (1988): Full Extraction of the Surplus in Bayesian and Dominant Strategy Auctions. Econometrica.

vi. Deb, R., and M. Pai (2017): Discrimination via Symmetric Auctions. American Economic Journal: Microeconomics.

vii. DeMarzo, P. M., I. Kremer, and A. Skrzypacz (2005): Bidding with Securities: Auctions and Security Design. American Economic Review.

viii. Milgrom, P., and R. Weber (1982): A Theory of Auctions and Competitive Bidding. Econometrica.

ix. Bergemann, D., Brooks, B., Morris, S. (2020). Countering the winner's curse: Optimal auction design in a common value model. Theoretical Economics.

(c) **Lecture 3:** Redistributive market design

i. Dworczak, P., S. Kominers, and M. Akbarpour (2021): Redistribution Through Markets. Econometrica.

ii. Che, Y. K., Gale, I., Kim, J. (2013). Assigning resources to budget-constrained agents. Review of Economic Studies.

iii. Akbarpour, M., Dworczak, P., Kominers, S. D. (2022). Redistributive allocation mechanisms. Working paper.

iv. Akbarpour, M., Budish, E. B., Dworczak, P., Kominers, S. D. (2022). An economic framework for vaccine prioritization. Quarterly Journal of Economics.

2. **Part II: Information Design**

   (a) **Lecture 1:** Cheap Talk, Bayesian Persuasion and Concavification.

      i. Crawford, V. P., & Sobel, J. (1982). Strategic information transmission. Econometrica: Journal of the Econometric Society, 1431-1451.

      ii. Kamenica, E., & Gentzkow, M. (2011). Bayesian persuasion. American Economic Review, 101(6), 2590-2615.

      iii. Gentzkow, M., & Kamenica, E. (2016). A Rothschild-Stiglitz approach to Bayesian persuasion. American Economic Review, 106(5), 597-601.

      iv. Gentzkow, M., & Kamenica, E. (2014). Costly persuasion. American Economic Review, 104(5), 457-62.

      v. Bergemann, D., & Morris, S. (2016). Information design, Bayesian persuasion, and Bayes correlated equilibrium. American Economic Review, 106(5), 586-91.

      vi. Bergemann, D., & Morris, S. (2019). Information design: A unified perspective. Journal of Economic Literature, 57(1), 44-95.

      vii. Kolotilin, A., Mylovanov, T., Zapechelnyuk, A., & Li, M. (2017). Persuasion of a privately informed receiver. Econometrica, 85(6), 1949-1964.

      viii. Mathevet, L., Perego, J., & Taneva, I. (2020). On information design in games. Journal of Political Economy, 128(4), 1370-1404.

      ix. Kolotilin, A. (2018). Optimal information disclosure: A linear programming approach. Theoretical Economics, 13(2), 607-635.

   (b) **Lecture 2:** Costly Information Acquisition and Rational Inattention.

      i. Sims, C. A. (2003). Implications of rational inattention. Journal of monetary Economics, 50(3), 665-690.

      ii. Mackowiak, B., Matejka, F., & Wiederholt, M. (2021). Rational inattention: A review.

      iii. Matejka, F., & McKay, A. (2015). Rational inattention to discrete choices: A new foundation for the multinomial logit model. American Economic Review, 105(1), 272-98.

      iv. Caplin, A., Dean, M., & Leahy, J. (2019). Rational inattention, optimal consideration sets, and stochastic choice. The Review of Economic Studies, 86(3), 1061-1094.

v. Yang, M. (2015). Coordination with flexible information acquisition. Journal of Economic Theory, 158, 721-738.

vi. Caplin, A., Dean, M., & Leahy, J. (2022). Rationally inattentive behavior: Characterizing and generalizing Shannon entropy. Journal of Political Economy, 130(6), 1676-1715.

vii. Bizzotto, J., Rüdiger, J., & Vigier, A. (2020). Testing, disclosure and approval. Journal of Economic Theory, 187, 105002.

(c) **Lecture 3:** Information Design in Advertising.

i. Anderson, S. P., & Renault, R. (2006). Advertising content. American Economic Review, 96(1), 93-113.

ii. Choi, M., Dai, A. Y., & Kim, K. (2018). Consumer search and price competition. Econometrica, 86(4), 1257-1281.

iii. Iyer, G., & Singh, S. (2022). Persuasion contest: Disclosing own and rival information. Marketing Science.

iv. Hwang, I., Kim, K., & Boleslavsky, R. (2019). Competitive advertising and pricing. Unpublished.

v. Choi, M., Kim, K., & Pease, M. (2019, May). Optimal information design for search goods. In AEA Papers and Proceedings (Vol. 109, pp. 550-56).

vi. Dogan, M., & Hu, J. (2022). Consumer search and optimal information. The RAND Journal of Economics.

vii. Petrikait?, V. (2018). Consumer obfuscation by a multiproduct firm. The RAND Journal of Economics, 49(1), 206-223.

viii. Anderson, S. P., & Renault, R. (2009). Comparative advertising: disclosing horizontal match information. The RAND Journal of Economics, 40(3), 558-581.

3 Grading, Requisites and Other Considerations

Lectures: We will meet every Tuesday 14:30-17:00. Attendance is mandatory.

Workload: The course will have two problem sets. Students are expected to read recent papers before lectures. Students will present two recent papers from the reading list. Students are expected to carefully read the papers. Guidance to prepare the presentations will be given.

Grading: The final grade will be computed as

$$FG = \frac{1}{4}\Big(\text{PROBLEM SET 1}+\text{PROBLEM SET 2}+\text{PRESENTATION 1}+\text{PRESENTATION 2}\Big)$$

Requisites: Intermediate game theory (IN3202 or IN701)