Behavioral and Experimental Economics: An Introduction

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References

- We will start with Camerer (2003)

- Colin F. Camerer (2003), "*Behavioral Game Theory*", Princeton University Press
  – Do you guys want to order jointly?

- Topic today: BGT, Chapter 1 - Introduction

Outline: BGT, Ch. 1: Introduction

1. What is Game Theory Good For?
2. Three Examples:
   1. Ultimatum Bargaining
   2. Continental Divide
   3. Beauty Contests
3. Experimental Regularity & Beh. Game Th.
4. Conclusion
- Appendix: Basic Game Theory
- Appendix: Experimental Design

What is Game Theory?

- Game Theory is about what happens when people---or genes, or nations---interact.
  – Strategies, Players, Utility
  – Von Neumann and Morgenstern (1944)
  – Nash Equilibrium (Nash, PNAS, 1950)
  – Types (Harsanyi, MS, 1967-68)
- The power of game theory is its generality and mathematical precision

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What is Game Theory?

- *Game*: A taxonomy of strategic situations
- Analytical Game *Theory*:
  – A mathematical derivation of what players with different cognitive capabilities are likely to do in games.
- Possible Problems:
  – Highly mathematical
  – Based on introspection and guesses, not observations about how people actually play

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What is Behavioral Game Theory?

- Von Neumann and Morgenstern (1944):
  – Our knowledge of the relevant facts of economics is incomparably smaller than that commanded in physics at the time when mathematization of that subject was achieved… It would have been absurd in physics to expect Kepler and Newton without Tycho Brahe---and there is no reason to hope for an easier development in economics.
- BGT is about *what players actually do*.
  – Utilize results from hundreds of experiments in which people interact strategically

What is Game Theory Good For?

- Is Game Theory meant to
  - Predict what people do,
  - Explain why people act in certain ways, or
  - Advise people what to do?
- A case study on auction theory and its role in real world auctions
  - Auction Theory vs. Experimental Evidence
  - Auction Theory vs. Real world auction design

Three Examples

- Goal:
  - Show how BGT can explain what people do more accurately by extending analytical game theory to include social preferences (fairness), limited strategic thinking, and learning.
- Three Examples:
  1. Ultimatum Bargaining
  2. Continental Divide
  3. Beauty Contests

Example 1: Ultimatum Bargaining

- Photographer vs. Tourist Story
- AGT Predictions
  - Responders accept any low offer
  - Proposers offer "unfairly" (99-1, 90-10, etc.)
- Experimental Results
  - Responders reject "unfair" offers
  - Proposers often offer "fairly" (50-50)
- BGT Explanation: Negative Reciprocity

Example 1: Ultimatum Bargaining

- Responders don't maximize own earnings
  - Still thinking strategically (w/ social preferences)
- Further Investigation:
- Negative Reciprocity primitive societies under different culture of "fairness" (Ch.2)
- Knoch, …, Fehr, Science 2006
  - TMS someone's DLPFC, and s/he will accept "unfair" offers

Example 2: Continental Divide

	3	4	5	6	7	8	9	10	11	12
3	60	66	70	74	72	1	-20	-32	-41	-48
4	58	65	71	77	80	26	8	-2	-9	-14
5	52	60	69	77	83	46	32	25	19	15
6	42	52	62	72	82	62	53	47	43	41
7	28	40	51	64	78	75	69	66	64	63
8	11	23	37	51	69	83	81	80	80	80
9	-11	3	18	35	57	88	89	91	92	94
10	-37	-21	-4	15	40	89	94	98	101	104
11	-66	-49	-31	-9	20	85	94	100	105	110
12	-100	-82	-61	-37	-5	78	91	99	106	112

Example 2: Continental Divide

- Location Problem: S. Valley or Hollywood?
- AGT Predictions
  - Multiple Equilibrium: 3 or 12
- Experimental Results
  - People don't always gravitate toward Good Eq.
  - Small history accidents have a big LR impact
- BGT Explanation
  - Learning in the basin of attraction
  - Initial Conditions: Lucky 7 vs. Lucky 8?

Example 3: Beauty Contest

- Keynes (1936, p. 156)
  - It is not a case of choosing those which, to the best of one's judgment, are really the prettiest, nor even those which average opinion genuinely thinks the prettiest. We have reached the third degree, where we devote our intelligences to anticipating what average opinion expects the average opinion to be. And there are some, I believe, who practice the fourth, fifth, and higher degrees.

Example 3: Beauty Contest

- AGT Predictions
  - Unique Nash: Choose 0 (dominant solvable)
- Experimental Results
  - First-round choices around 21-40
  - Converge to 0 within 10 rounds
- BGT Explanations
  - Limited iterated reasoning (level-k models)
  - Learning Theory: Towards equilibrium

Experimental Regularity & BGT

- The goal is to _improve_ game theory by establishing regularity & inspiring new th'y.
- Why has empirical observation played a small role in game theory until recently?
- How others react to data?
  - People are confused, not motivated
  - Experimental designs are all bad
  - People were playing a different game
  - Non-rational behavior cannot be modeled

Conclusion

- AGT → Experimental Regularities → BGT
- Three Examples
- Want to see more?
  - Come next time and see more…
- Appendix: Basic Game Theory
  - Note the last section on QRE!
- Appendix: Experimental Design
  - How to design good experiments