Chapter 33. The Value of Game Theory

- Précis of the Course
- The Value of Game Theory

The Course in Précis, Part One

- **Minimax** for zero sum offers clearcut answers, but
- **Non-zero sum** games are no longer Pareto optimal
- And there are often **multiple equilibria**
- and **games against nature** introduce the ambiguity
- Much effort has gone into breaking the **prisoner** out of their **dilemma**
- **Nash arbitration** offers a hard and fast rule . . .
- If only we knew how to set the **status quo**

The Course in Précis, Part Two

- **Cooperative game theory** seems to glory in multiple and conflicting approaches
- Can’t we keep it simple using only the **characteristic function**?
- **Shapley** offers a single and clear line of reasoning affording a **value** for payoff
- But **Banzhaf** offers a different alternative
- Cost allocation leads to different lines of reasoning involving **bargaining** and the **nucleolus**

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What Do We Make of This

- . . . apparent failure to provide uniform predictions and prescriptions for a wealth of human endeavors?
- The mathematician revels in clear answers
- But also enjoys the processes of reasoning
- Are there exact and incontrovertible answers which game theory has failed to deliver?

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Complexity of Underlying Processes

- Game theory reveals that the underlying processes themselves are “also complicated, rich and various”
- Coalitional bargaining is sometimes impossible, as revealed by an empty core
- The idea of power in political science is not logically simple
- Nor is idea of fairness from welfare economics
- Game theory is complex because it models an underlying complexity in society

Mathematical Analysis and Dogma

- "Mathematical analysis of the kind embodied in game theory is the enemy of dogma" – Straffin
- "Tyranny thrives on the canonization of nonsense on the perpetuation of falsehood" – Rapoport
- Be skeptical concerning "rationality" and "fairness"
- Draw upon a useful collection of concepts, models and lines of reasoning to support your skepticism
- Apply game theory to generation of insight not just simple answers

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Exemplifying Theory

- Fisher (1989), Rasmusen ()
- Also known as “no fat modeling” or “modelling by example” or “MIT-style theory” or exemplary theory
- The simplest assumptions needed to generate an interesting conclusion
- The starkest, barest model that has the desired result
- This desired result is the answer to some relatively narrow question

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The Process of Exemplifying Theory

- Start with a vague idea
- Model the idea formally in a simple way
- The idea might
  - survive intact,
  - be found to be meaningless or in need of qualification
  - or the reverse (of the idea) might be true
- Proofs, precise propositions, generation of ideas
- Return to thinking in words

Ockham's Razor

- Good theory of any kind uses Ockham's razor
- Restricts attention to one issue at a time
- A robust answer to fundamental uncertainties
- Modesty in the face of empirical uncertainty
- Creating parameters for a range of possible explanations within a common framework

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Stories That Might be True

- "Exemplifying theory does not tell us what must happen. Rather it tells us what can happen."
- Chicago-style "Stories That Might be True."
- Not destructive criticism if the modeller is modest, since there are also a great many "Stories That Can't Be True"
- Unfortunately these stories which can't be true *are* often used as the basis for decisions in business and government

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Seven Possible Solution Concepts

	Triangle Diagram	Algebraic Work	Logical or Rhetorical Defense
Core	Map the associated inequalities. If there is a feasible region, identify the region. If the core is empty, say so.	Derive the associated inequalities	Justify the use of the core in a single sentence.
Stable Set	Display the associated stable sets.	Not needed.	Defend your selection as being both internally and externally stable. Justify the use of the stable set in a single sentence.
Shapley Value	Not needed.	Provide the imputation. The complete solution including the permutations, marginal value calculations or the swing voting combinatorics.	Justify the use of the Shapley value in a single sentence.
Banzhaf Value *	Not needed.	Provide the imputation. The complete solution including the permutations, marginal value calculations, or the swing voting combinatorics.	Justify the use of the Banzhaf value in a single sentence.
Bargaining Set	Show the set of possible bargaining solutions if there are multiple possible solutions.	Provide a list of the possible partitions. Provide the equalities resulting from the bargaining setting, and their solution. For each partition state whether the imputation is a single value or a set. If it is a single value, then provide this value. If is a set, then describe the set in a series of inequalities.	Justify the use of the bargaining set in a single sentence. Logically defend the presence or absence of set-valued solutions.
Nucleolus	Identify the core on the diagram Geometrically identify the nucleolus point.	Provide the imputation. If you have not already identified the associated inequalities for the core, do so now. Calculate the excess for all players at this point.	Justify the use of the nucleolus in a single sentence. Defend the idea that the identified point minimizes the maximum excess.
Gately Point	Not needed.	A calculation of the marginal values associated with each of the players. A calculation of the appropriate ratios of division to minimize disruption. Calculate the associated disruption at this point.	Justify the use of the Gately point in a single sentence. Defend the idea that the identified point minimizes the maximum disruption.

* The Banzhaf Value, unlike all other techniques, works only on weighted voting games

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