Game Theory

A philosophical ending

What to learn from a game

Game-theoretic models are used to derive one of three types of insight:

1. The first arises directly from the **equilibrium of the model**

2. The second arises from the **strategic incentives present in equilibrium**

3. The third arises from the **comparative statics of the model**

Insights from Equilibrium

- From games like the *prisoner's dilemma*, we learnt that we can arrive at socially worse outcomes if individuals have incentives to deviate from socially better actions
- From *coordination games*, we learnt the difficulty of coordinating on an outcome when more than one could be an equilibrium, and the role played by focal points and strategic moves
- From *assurance games*, we learnt the role played by (miss)perceptions
- From *chicken games*, we learnt the role played by strategic moves

Insights from Equilibrium

- What these examples, and many more, have in common is that they are derived from the **point prediction produced by game-theoretic analysis**: the equilibrium strategies played by each actor

Insights from Strategic Incentives

- Game theory's focus may be on equilibrium behavior; however, underlying every equilibrium are **the strategic incentives of the actors, and these incentives can be directly of interest to us**

- Consider again the PD. The equilibrium of mutual defection is not the only object of interest; we also learn from the existence of a private incentive to defect from cooperation

- Though these incentives are often viewed as part and parcel of an equilibrium, they are in many ways more general. For example, one might have an incentive to defect or free-ride even if no equilibrium is reached

5

Insights from Comparative Statics

- Equilibrium predictions in game-theoretic models present a high bar for empirical testing. They are **point predictions**, and in the social sciences, we rarely believe our models are sufficiently well determined so as to produce accurate point predictions

- Thus, we often focus not on the equilibrium of the model, but rather on the **manner in which the equilibrium changes with exogenous parameters** (for example, what if the initial system of beliefs were different?)

- In all cases, the result is the same: a statement of how an endogenously determined outcome of the model changes with an exogenous parameter

Why games must be simple

For achieving all that, game theoretic models must be **simplifications** meant to represent a **small piece of a larger phenomenon**

Why that? For at least **three main reasons**

Why games must be simple

First:

- when we say that a model offers insight into mechanisms, we mean that it **makes clear which assumptions** generate a particular outcome in the model

- If some of those assumptions, and the relationships among them, **represent analogous features** of the empirical political/social environment that we want to analyze, then the model is **useful for explanation**

Why games must be simple

- But **without knowing** which features of a model drive a result, **we cannot know** whether the proposed explanation is **robust** or the product of special assumptions that are too distant from reality to constitute a satisfying explanation

- This type of clarity typically is achievable only in a <u>simple model</u> - it is indeed easier to "**see through**" models that do not have too many moving parts

Why games must be simple

Second:

- theorists often want to ask **what would happen if** some feature of the environment changed (the comparative statics already discussed!)
- They answer these questions by asking what happens when the representation of that feature **changes** in the model
- In this way, models can generate various types of insights, including empirical hypotheses, theoretical explanations, and normative implications
- However, this process requires a model that **can be manipulated**, which necessitates simplicity

Why games must be simple

Third:

- applied-game theorists typically **want more** than a model in which agents behave in a way consistent with behavior in the world

- Rather, they seek an **understanding** of agents' behavior in their models in terms of preferences, beliefs, information, and constraints

- Thus, another important value of <u>simple models </u>is the following one: the analyst's inability to see through a complex model **hinders hermeneutic understanding**

Why games must be simple

The fundamental explanatory goals of game theory require <u>simple models</u>

However, **this simplicity** constrains the type of conclusions that we can draw from a formal model

These models typically are not attempts to write down a **complete description** of the mechanisms underlying some phenomenon

Why games must be simple

Therefore, since a theorist deliberately omits from any particular model most of what is important about the world, conclusions drawn from **the model are best thought of as all-else-equal claims** about the central tendency of behavior in collections of individuals with preferences, beliefs, information, and constraints similar to those in the model

The connection between formal-theory and causal-inference research traditions

For instance, a theoretical model's comparative static prediction about the relationship between two variables explicitly **holds constant everything else** in the model

The model **also** implicitly holds constant everything else that is **omitted** from it but might alter the relationship in the world

But that's more or less the same **that we do in any statistical model**!

Accordingly, there is a **tight connection** between the formal-theory and causal-inference research traditions. Thus, the two traditions are naturally complementary