



## Game Theory

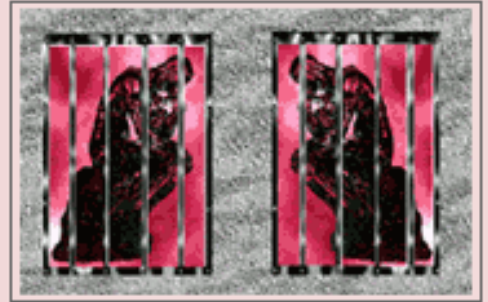
A game is any **rule-governed** situation with a **well-defined outcome**, characterized by **strategic inter-dependence**.

Although game theory began as applied mathematics, it has become a dominant mode of reasoning in business and economics. The well-known macroeconomist Robert Lucas argues that the most important contribution to macroeconomics since Keynes has been the result of formulating macroeconomic problems as games and solving them.

**G**ame **T**heory improves strategic decision-making. It makes one aware of which strategy matters in what situation, to say nothing of the strategic nuances on the part of one's competitors or opponents. It can improve one's ability to run a business or to evaluate changes in policy. The phrases like "**Competitive Advantage**", "**Winner's Curse**", "**Everyday Low Prices**", "**First Mover Advantage**", "**Market Failure**", "**Credibility**", "**Incentive Contracts**", "**Hostile Takeover**", "**Coalition Building**", "**Cartelization**", "**Mutually Assured Destruction**", make a lot more sense after they are strategically explained using game theory.

Among the issues discussed in game theory are:

1. What does it mean to choose strategies "rationally" when **outcomes depend** on the strategies chosen by others and when **information is incomplete**?
2. In "games" that allow mutual gain (or mutual loss) is it "rational" to cooperate to realize the mutual gain (or avoid the mutual loss) or is it "rational" to act aggressively **in seeking individual gain** regardless of mutual gain or loss?
3. If the answers to 2) are "sometimes," in what circumstances is aggression rational and in what circumstances is cooperation rational?
4. In particular, do ongoing relationships differ from one-off encounters in this connection?



### Game Theory in everyday situations

"Competing stores who undercut each other's prices when both would have done better if both had kept their prices high are victims of the dilemma. (But in this instance, consumers benefit from the lower prices when the sellers fink on each other.) The same concept explains why it is difficult to raise voluntary contributions, or to get people to volunteer enough time, for worthwhile public causes."

[See full story...](#)

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#### Related Resources

- [Game Theory \(Dr. Don Ross\)](#)
  - [History of Game Theory \(Paul Walker\)](#)
  - [Prisoner's Dilemma \(Dr. Steven Kuhn\)](#)
  - [Game Theory in Movies and on Television](#)
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5. Can **moral rules of cooperation** emerge spontaneously from the interactions of rational egoists?
6. How does real human behavior correspond to "rational" behavior in these cases?
7. If it differs, in what direction? Are real human beings more cooperative than "rational" agents? More aggressive? Both?

**H**ere are some examples of application of game theory:

**Prisoner's dilemma:** Cigarette Advertising on TV: In 1971, when advertising for cigarettes on television was banned, the **profits** of the cigarette companies **went up**. Earlier they were locked in a prisoner's dilemma'.

**Folk theorem:** Do firms always conspire to monopolize the market? Game theory says that in a continuously repeated game, **competition** leads to **collaboration**. That is why some times the biggest competitors appear to be colluding even when they are not doing so.

**Stag Hunt:** In early societies, people formed alliances to hunt deer. If even one person in the group did not help in the hunt, the deer would be lost. The hunters were sometimes tempted to leave the hunt by seeing rabbits, but they preferred deer to rabbit. However, only one person was needed to catch a rabbit. From a game theory perspective, the best strategy is to hunt the deer, but people may decide to hunt the rabbit because they believe **others may defect** from the hunt also.

Countries face the same dilemma in situations involving nuclear weapons. Each country generally believes that the world would be better if no countries possessed nuclear weapons. However, the temptation to build up a nuclear arsenal arises because each country is afraid that other countries may stash nuclear warheads and undermine international security.

**Centipede game:** Following the designation of Mr. Bush as President-Elect and the election of the new Congress, the smart money seemed to be betting that Bush would have been a one-term President and that the Democrats would have an excellent chance of retaking the Congress in '02. Centipede game explained how the Republicans were likely to respond - assuming that the corporate Republican Party would have acted as a rational, **self-interested** agent as those terms were understood in game theory.

**Hotelling's law:** The observation by Hotelling that in many markets it is rational for all the producers to make their products as similar as possible. Suppose, for example, there are two newsagents in a street, both want to **maximize their share** of local business by locating their shop so that it is the nearest

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newsagent for as much of the trade visiting the street as possible. In this situation, both newsagents will position themselves in the middle of the street guaranteeing themselves half the market. It would be **socially more desirable** for them to separate themselves, and sit a third of the way along the street from different ends. Unfortunately, if one newsagent did this, the other could position himself so as to capture more than half the total market. Too little variety results from the process. Hotelling's law manifests itself in numerous markets - competing bus operators scheduling their buses to run at the same times for example.

Next issue: [Distribution Planning](#)

Previous issue: [Planning for Contingency](#)

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