

Applied Game Theory

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GAME THEORY

1 Introduction

This book introduces the fundamental ideas of **game theory**—the study of strategic interaction between rational decision-makers. The goal is to develop intuition first, mathematics second, and insight throughout. The chapters build progressively from simple ideas like dominant strategies to more advanced concepts such as sequential games, mixed strategies, and repeated interaction.

2 Introduction to Game Theory

Game theory studies **rational interactive decision-making**. Unlike standard optimization—where a decision affects only the outcome—game theory analyzes situations where **your outcome depends on the actions of others**. Examples include:

Athletes choosing tactics in sports

- Businesses setting prices or advertising levels
 - Governments choosing spending, taxes, or military strategies
 - Students choosing effort levels in a group project
 - Everyday strategic choices such as which route to take or whether to cooperate
- Game theory separates two parts of performance:
1. **Skill** — mechanical or physical ability
 2. **Strategy** — anticipating and responding to others' choices

This book focuses on the **strategic** part.

Games and Strategic Interaction

A *game* is any situation with:

- **Players**: decision makers

- **Actions**: choices available to each player

Strategies: complete plans of action

Payoffs: the benefits or consequences that result from the choices

Rules: who moves when, what they know, and how outcomes are determined. Throughout this book, we use examples such as:

- Penalty kicks

- The Prisoner's Dilemma
- Coordination problems
- Mixed strategies in competitive settings
- Sequential moves in investment or bargaining
- Repeated games with incentives to sustain cooperation

3 Summary

In summary, this book has no content whatsoever.

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