A Reader's Guide

Game theory studies strategic situations. Suppose that you are a contestant on the quiz show "Jeopardy!" At the end of the half hour contest (during Final Jeopardy) you have to make a wager on being able to answer correctly a final question (that you have not yet been asked). If you answer correctly, your wager will be added to your winnings up to that point; otherwise, the wager will be subtracted from your total. The two other contestants also make wagers and their final totals are computed in an identical fashion. The catch is that there will be only one winner: the contestant with the maximum amount at the very end will take home his or her winnings while the other two will get (essentially) nothing.

Question: How much should you wager? The easy part of the answer is that the more confident you are in your knowledge, the more you should bet. The difficult part is, how much is enough to beat out your rivals? That clearly depends on how much they wager, that is, what their strategies are. It also depends on how knowledgeable you think they are (after all, like you, they will bet more if they are more knowledgeable, and they are also more likely to add to their total in that case). The right wager may also depend on how much money you have already won—and how much they have won.

For instance, suppose you currently have $10,000 and they have $7,500 each. Then a $5,001 wager—and a correct answer—guarantees you victory. But that wager also guarantees you a loss—if you answer incorrectly—against an opponent who wagers only $2,500. You could have bet nothing and guaranteed victory against the $2,500 opponent (since the rules of "Jeopardy!" allow all contestants to keep their winnings in the event of a tie). Of course, the zero bet would have been out of luck against an opponent who bet everything and answered correctly. And then there is a third possibility for you: betting everything . . .

As you can see the problem appears to be quite complicated. (And keep in mind that I did not even mention additional relevant factors: estimates that you have about answering correctly or about the other contestants answering correctly, that the others may have less than $5,000, that you may have more than $15,000, and so forth.) However, game theory has the answer to this seemingly complicated problem! (And you will read about it in Chapter 20.) The theory provides us with a systematic way to analyze questions such as: What are the options available for each contestant? What are the consequences of various choices? How can we model a contestant's estimate of the others' knowledge? What is a rational wager for a contestant?

In Chapter 1 you will encounter a variety of other examples—from real life, from economics, from politics, from law, and from business—where game theory gives us the tools and the techniques to analyze the strategic issues.

In terms of prerequisites for this book, I have attempted to write a self-contained text. If you have taken one semester each of calculus, statistics, and intermediate micro-economics, you will find life easier. If you do not have the mathematics background,

it is essential that you acquire it. You should start with the two chapters in Part Five, one on calculus and optimization, the other on probability and expectation. Read them carefully and do as many of the exercises as possible. If the chapter on utility theory, also in Part Five, is not going to be covered in class, you should read that carefully as well. As for economic knowledge, if you have not taken an intermediate microeconomics class, it would help for you to pick up one of the many textbooks for that course and read the chapters on perfect competition and monopoly.

I have tried to write each chapter—and each part of the book—in a way that the level of difficulty rises as you read through it. This approach facilitates jumping from topic to topic. If you are reading this book on your own—and not as part of a class—then a good way to proceed is to read the foundational chapters (25 through 27) first and then to read sequentially through each part. At a first reading you may wish to skip the last two chapters within each part, which present more difficult material. Likewise you may wish to skip the last conceptual section or so within each chapter (but don't skip the case studies!). Sections that are more difficult are marked with the symbol ⚠; you may wish to skip those sections as well at first reading (or to read them at a more deliberate pace).