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THINKING STRATEGICALLY

The Competitive Edge in Business, Politics, and Everyday Life

AVINASH K. DIXIT AND BARRY J. NALEBUFF

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For Kusum and Marcia

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Preface

Strategic thinking is the art of outdoing an adversary, knowing that the adversary is trying to do the same to you. All of us must practice strategic thinking at work as well as at home. Businessmen and corporations must use good competitive strategies to survive. Politicians have to devise campaign strategies to get elected, and legislative strategies to implement their visions. Football coaches plan strategies for the players to execute on the field. Parents trying to elicit good behavior from children must become amateur strategists (the children are the pros). For forty years, superpowers' nuclear strategies have governed the survival of the human race.

Good strategic thinking in such numerous diverse contexts remains an art. But its foundations consist of some simple basic principles—an emerging science of strategy. Our premise in writing this book is that readers from a variety of backgrounds and occupations can become better strategists if they know these principles.

The science of strategic thinking is called game theory. This is a relatively young science—less than fifty years old. It has already provided many useful insights for practical strategists. But, like all sciences, it has become shrouded in jargon and mathematics. These are essential research tools, but they prevent all but the specialists from understanding the basic ideas. We have attempted a translation of many important insights for the intelligent general reader. We have replaced theoretical arguments with illustrative examples and case studies. We have removed all the mathematics and most of the jargon. The book should be accessible to all readers who are willing to follow a little bit of arithmetic, charts, and tables.

Many books have already attempted to develop ideas of strategic thinking for particular applications. Tom Schelling's writings on nuclear strategies, particularly *The Strategy of Conflict* and *Arms and Influence*, are justly famous. In fact, Schelling pioneered a lot of game theory in the process of applying it to nuclear conflict. Michael Porter's *Competitive Strategy*, drawing on the lessons of game theory for business strategy, is equally famous. Steven Brams has written several books, the most notable being *Game Theory and Politics*.

In this book we do not confine the ideas to any particular context. Instead, we offer a very wide range of illustrations for each basic principle. Thus readers from many different backgrounds will all find something familiar here. They will also see how the same principles bear on strategies in less familiar circumstances; we hope this gives them a new perspective on many events in news as well as history. We also draw on the shared experience of most American readers, with illustrations from, for example, literature, movies, and sports. Serious scientists may think this trivializes strategy, but we believe that familiar examples from movies and sports are a very effective vehicle for conveying the important ideas.

Like Tolkien's *Lord of the Rings*, this book grew in the telling. Its ancient origins are a course on "games of strategy" that Avinash Dixit developed and taught at Princeton's Woodrow Wilson School of Public and International Affairs. Barry Nalebuff later taught this course, and a similar one at Yale University's Political Science Department and then at Yale's School of Organization and Management (SOM). We thank many students from these courses for their enthusiasm and ideas. Particular mention should be made of Anne Case, Jonathan Flemming, Heather Hazard, Dani Rodrik, and Jonathan Shimshoni. Takashi Kanno and Yuichi Shimazu undertook the task of translating our words and ideas into Japanese; in the process, they improved the English version.

The idea of writing a book at a more popular level than that of a course text came from Hal Varian of the University of Michigan. He also gave us many useful ideas and comments on earlier drafts. Drake McFeely at W. W.

Norton was an excellent if exacting editor. He made extraordinary efforts to fashion our academic writing into a lively text. If the book still retains some traces of its teaching origins, that is because we did not listen to all of his advice.

Many colleagues and friends read earlier drafts with care and gave us numerous detailed and excellent suggestions for improvement. At the risk of omitting some, we should make particular mention of David Austen-Smith (Rochester), Alan Blinder (Princeton), Seth Masters (S. Bernstein), Carl Shapiro (Princeton), Louis Taylor (MITRE Corporation), Thomas Tren-dell (ATT-Paradyne), Terry Vaughn (MIT Press), and Robert Willig (Princeton). As manuscript editors, Stacey Mandel-baum and Laura Kang Ward were generous to our faults—each time you don't find a mistake, you should thank them.

We also want to give credit to those who have helped us find a title for this book. Hal Varian started us off with *Thinking Strategically*. Yale SOM students gave us many more choices. Our favorite was Deborah Halpern's *Beyond the Playground* and an advertising campaign written by William Barnes:

"*Thinking Strategically*—Don't Compete Without It."*

Avinash Dixit
Barry Nalebuff
October 1990

Thinking Strategically

Introduction

What Is Strategic Behavior?

How should people behave in society?

Our answer does not deal with ethics or etiquette. Nor do we aim to compete with philosophers, preachers, or even Emily Post. Our theme, although less lofty, affects the lives of all of us just as much as do morality and manners. This book is about strategic behavior. All of us are strategists, whether we like it or not. It is better to be a good strategist than a bad one, and this book aims to help you improve your skills at discovering and using effective strategies.

Work, even social life, is a constant stream of decisions. What career to follow, how to manage a business, whom to marry, how to bring up children, whether to run for president, are just some examples of such fateful choices. The common element in these situations is that you do not act in a vacuum. Instead, you are surrounded by active decision-makers whose choices interact with yours. This interaction has an important effect on your thinking and actions.

To illustrate the point, think of the difference between the decisions of a lumberjack and those of a general. When the lumberjack decides how to chop wood, he does not expect the wood to fight back; his environment is neutral. But when the general tries to cut down the enemy's army, he must anticipate and overcome resistance to his plans. Like the general, you must recognize that your business rivals, prospective spouse, and even your child are intelligent and purposive people. Their aims often conflict with yours, but they include some potential allies. Your own choice must allow for the

conflict, and utilize the cooperation. Such interactive decisions are called strategic, and the plan of action appropriate to them is called a strategy. This book aims to help you think strategically, and then translate these thoughts into action.

The branch of social science that studies strategic decision-making is called *game theory*. The games in this theory range from chess to child-rearing, from tennis to takeovers, and from advertising to arms control. As the Hungarian humorist George Mikes expressed it, "Many continentals think life is a game; the English think cricket is a game." We think both are right.

Playing these games requires many different kinds of skills. Basic skills, such as shooting ability in basketball, knowledge of precedents in law, or a blank face in poker, are one kind; strategic thinking is another. Strategic thinking starts with your basic skills, and considers how best to use them. Knowing the law, you must decide the strategy for defending your client. Knowing *how well* your football team can pass or run, and how well the other team can defend against each choice, your decision as the coach is *whether* to pass or to run. Sometimes, as in the case of superpowers contemplating an adventure that risks nuclear war, strategic thinking also means knowing when not to play.

Our aim is to improve your strategy I.Q. But we have not tried to provide a book of recipes for strategies. We develop the ideas and principles of strategic thinking; to apply them to a specific situation you face and to find the right choice there, you will have to do some more work. This is because the specifics of each situation are likely to differ in some significant aspects, and any general prescriptions for action we might give could be misleading. In each situation, you will have to pull together principles of good strategy we have discussed, and also other principles from other considerations. You must combine them and, where they conflict with each other, evaluate the relative strengths of the different arguments. We do not promise to solve every question you might have. The science of game theory is far from being complete, and in some ways strategic thinking remains an art.

We do provide guidance for translating the ideas into action. Chapter 1 offers several examples showing how strategic issues arise in a variety of decisions. We point out some effective strategies, some less effective ones, and even some downright bad ones. The subsequent chapters proceed to build these examples into a system or a framework of thought. In the later chapters, we take up several broad classes of strategic situations—brinkmanship, voting, incentives, and bargaining—where you can see the principles in action.

The examples range from the familiar, trivial, or amusing—usually drawn from literature, sports, or movies—to the frightening—nuclear confrontation. The former are merely a nice and palatable vehicle for the game-theoretic ideas. As to the latter, at one point many readers would have thought the subject of nuclear war too horrible to permit rational analysis. But as the cold war winds down and the world is generally perceived to be a safer place, we hope that the game-theoretic aspects of the arms race and the Cuban missile crisis can be examined for their strategic logic in some detachment from their emotional content.

The chapters are full of examples, but these serve primarily to develop or illustrate the particular principle being discussed, and many other details of reality that pertain to the example are set aside. At the end of each chapter, we present a "case study," similar to one you might come across in a business-school class. Each case sets out a particular set of circumstances and invites you to apply the principles discussed in that chapter to find the right strategy for that situation. Some cases are open-ended; but that is also a feature of life. At times there is no clearly correct solution, only imperfect ways to cope with the problem. A serious effort to think each case through before reading our discussion is a better way to understand the ideas than any amount of reading of the text alone. For more practice, the final chapter is a collection of twenty three more cases, in roughly increasing order of difficulty.

By the end of the book, we hope that you will emerge a more effective manager, negotiator, athlete, politician, or parent. We warn you that some of

the strategies that are good for achieving these goals may not earn you the love of your defeated rivals. If you want to be fair, tell them about our book.

Part I

Ten Tales of Strategy

We begin with ten tales of strategy from different aspects of life and offer preliminary thoughts on how best to play. Many of you will have faced similar problems in everyday life, and will have reached the correct solution after some thought or trial and error. For others, some of the answers may be surprising, but surprise is not the primary purpose of the examples. Our aim is to show that such situations are pervasive, that they amount to a coherent set of questions, and that methodical thinking about them is likely to be fruitful. In later chapters, we develop these systems of thought into prescriptions for effective strategy. Think of these tales as a taste of dessert before the main course. They are designed to whet your appetite, not fill you up.

1. The Hot Hand

Do athletes ever have a "hot hand"? Sometimes it seems that Larry Bird cannot miss a basket, or Wayne Gretzky or Diego Maradona a shot on goal. Sports announcers see these long streaks of consecutive successes and proclaim that the athlete has a "hot hand." Yet according to psychology professors Thomas Gilovich, Robert Vallone, and Amos Tversky, this is a misperception of reality.[1] They point out that if you flip a coin long enough, you will find some very long series of consecutive heads. The psychologists suspect that sports commentators, short on insightful things to say, are just finding patterns in what amounts to a long series of coin tosses over a long playing season. They propose a more rigorous test. In basketball, they look at all the instances of a player's baskets, and observe the percentage of times that player's next shot is also a basket. A similar calculation is made for the shots immediately following misses. If a basket is more likely to follow a

basket than to follow a miss, then there really is something to the theory of the hot hand.

They conducted this test on the Philadelphia 76ers basketball team. The results contradicted the "hot hand" view. When a player made his last shot, he was less likely to make his next; when he missed his previous attempt, he was more likely to make his next. This was true even for Andrew Toney, a player with the reputation for being a streak shooter. Does this mean we should be talking of the "stroboscopic hand," like the strobe light that alternates between on and off?

Game theory suggests a different interpretation. While the statistical evidence denies the presence of streak shooting, it does not refute the possibility that a "hot" player might warm up the game in some other way. The difference between streak shooting and a hot hand arises because of the interaction between the offensive and the defensive strategies. Suppose Andrew Toney does have a truly hot hand. Surely the other side would start to crowd him. This could easily lower his shooting percentage.

That is not all. When the defense focuses on Toney, one of his teammates is left unguarded and is more likely to shoot successfully. In other words, Toney's hot hand leads to an improvement in the 76ers' *team* performance, although there may be a deterioration in Toney's *individual* performance. Thus we might test for hot hands by looking for streaks in team success.

Similar phenomena are observed in many other team sports. A brilliant running-back on a football team improves its passing game and a great pass-receiver helps the running game, as the opposition is forced to allocate more of its defensive resources to guard the stars. In the 1986 soccer World Cup final, the Argentine star Diego Maradona did not score a goal, but his passes through a ring of West German defenders led to two Argentine goals. The value of a star cannot be assessed by looking only at his scoring performance; his contribution to his teammates' performance is crucial, and assist statistics help measure this contribution. In ice hockey, assists and goals are given equal weight for ranking individual performance.