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. PICK A NUMBER

Believe it or not, we are going to ask you to play a game against us. We've picked a number between 1 and 100, and your goal is to guess the number. If you guess correctly on the first try, we'll pay you $100.

Actually, we aren't really going to pay you $100. It would be rather costly for us, especially since we want to give you some help along the way. But, as you play the game, we'd like you to imagine that we really are going to give you money, and we'll play the same way.

The chance of getting the number right on the first shot is quite low, only one in a hundred. So to improve your chances, we'll give you five guesses, and after each wrong guess, we'll also tell you if you are too high or too low. Of course, there's a bigger reward for getting the right answer quickly. If you guess correctly on the second try, you'll get $80. On the third try, the payment is down to $60, then $40 for the fourth guess, and $20 if you get the number on the fifth try. If it takes more than five guesses, the game is over and you get nothing.

Are you ready to play? We are, too. If you are wondering how to play a game with a book, it is a bit of a challenge, but not impossible. You can go to the artofstrategy.info web site and play the game interactively. Or, we can anticipate how you might be playing the game and respond accordingly.

Is your first guess 50? That's the most common first guess and, alas for you, it's too high.

Might your second guess be 25? Following 50, that is what most folks do. Sorry, that's too low. The next step for many is 37. We're afraid that 37 is too low. What about 42? Too low, again.

Let's pause, take a step back, and analyze the situation. This is your fifth guess coming up and your last chance to take our money. You know the number is above 42 and less than 50. There are seven options: 43, 44, 45, 46, 47, 48, and 49. Which of those seven do you think it will be?

So far, you have been guessing in a way that divides the interval into two equal parts and picking the midpoint. This is the ideal strategy in a game where the number has been chosen at random.* You are getting the most information possible from each guess and therefore will converge to the number as quickly as possible. Indeed, Microsoft CEO Steven Ballmer is said to have used this game as a job interview question. For Ballmer the correct answer was 50, 25, 37, 42,… He was interested in seeing if the candidate approached the search problem in the most logical and efficient manner.

Our answer is a bit different. In Ballmer's problem, the number was picked at random, and so the engineer's strategy of "divide the set in two and conquer" was just right. Getting the most information from each guess minimizes the expected number of guesses and therefore leads you to get the most money. In our case, however, the number was *not* picked at random. Remember that we said that we were playing this game as if we actually had to pay you the money. Well, no one is reimbursing us for money that, hypothetically, we would have to pay you. And as much as we like you for having bought our book, we like ourselves even more. We'd rather keep the money than give it to you. So we deliberately picked a number that would be hard for you to find. Think about it for a moment—would it have made any sense for us to have picked 50 as the number? That would have cost us a fortune.

The key lesson of game theory is to put yourself in the other player's shoes. We put ourselves in your shoes and anticipated that you would guess 50, then 25, then 37, then 42. Understanding how you would play the game allowed us to greatly decrease the chance that you would guess our number and thus reduce how much we'd have to pay out.

In explaining all of this to you before the game is over, we've given you a big hint. So now that you understand the real game you are playing, you've got one last guess, for $20. What number do you pick?

49?

Congratulations. To us, not you. You've fallen right into our trap again. The number we picked was 48. Indeed, the whole speech about picking a number that was hard to find according to the split-the-interval rule was further designed to mislead you. We wanted you to pick 49 so that our choice of 48 would remain safe. Remember our objective is not to give you money.

To beat us at that game, you had to be one step ahead of us. You would have had to think, "They want us to pick 49, so I'm going to pick 48." Of course, if we had thought you would have been so clever, then we would have picked 47 or even 49.

The larger point of this game is not that we are selfish professors or cunning tricksters. Rather, the point is to illustrate as cleanly as possible what makes something a game: you have to take into account the objectives and strategies of the other players. When guessing a number picked at random, the number isn't trying to hide. You can take the engineer's mindset and divide the interval in two and do the best possible. But if you are playing a game, then you have to consider how the other player will be acting and how those decisions will influence your strategy.

#2. WINNING BY LOSING

We admit it: we watched *Survivor*. We would never have made it on the island. If we hadn't starved first, the others would surely have voted us off for being eggheads. For us, the challenge was trying to predict how the game would play out. We weren't surprised when the pudgy nudist Richard Hatch outwitted, outplayed, and outlasted his rivals to become the first champion of the CBS series and earn the million-dollar prize. He was gifted in his ability to act strategically without appearing to be strategic.

Hatch's most cunning ploy was in the last episode. The game was down to three players. Richard's two remaining rivals were 72-year-old retired Navy SEAL Rudy Boesch and 23-year-old river guide Kelly Wiglesworth. For their final challenge, the three of them had to stand on a pole with one hand on the immunity idol. The last one standing would go into the finals. And just as important, the winner would get to choose his or her opponent in the finals.

Your first impression might be that this was just a physical endurance contest. Think again. All three players understood that Rudy was the most popular of the three. If Rudy made it to the finals, Rudy would likely win. Richard's best hope was to go against Kelly in the finals.

There were two ways that could happen. One is that Kelly would win the pole-standing competition and pick Richard. The other is that Richard would win and pick Kelly. Richard could count on Kelly picking him. She was also aware of Rudy's popularity. Her best hope of winning was to get to the finals against Richard.

It would seem that if either Richard or Kelly won the final challenge, each would pick the other as his or her opponent. Hence Richard should try to stay in the game, at least until Rudy had fallen off. The only problem is that Richard and Rudy had a longstanding alliance. If Richard won the challenge and didn't pick Rudy, that would have turned Rudy (and all Rudy's friends) against Richard, and this could have cost him the victory. One of the great twists of *Survivor* is that the ousted contestants vote to determine the final winner. One has to be very careful how one disposes of rivals.

From Richard's perspective, the final challenge could go one of three ways:

- i. Rudy wins. Rudy then picks Richard, but Rudy would be the likely victor.
- ii. Kelly wins. Kelly would be smart enough to know her best hope was to eliminate Rudy and go against Richard.
- iii. Richard wins. If he picks Rudy to go on, Rudy beats him in the finals. If he picks Kelly to go on, Kelly might beat him because Richard would lose the support of Rudy and his many friends.

Comparing these options, Richard does best by losing. He wants Rudy eliminated, but it is better if Kelly does the dirty work for him. The smart money was on Kelly winning the challenge. She had won three of the previous four and as an outdoors guide was in the best shape of the three.

As a bonus, throwing the game saved Richard the trouble of standing on a pole under a hot sun. Early in the competition, host Jeff Probst offered a slice of orange to anyone willing to call it quits. Richard stepped off the pole and took the orange.

> **Throughout the book, you'll find these asides, which contain what we call a "Trip to the Gym." These trips take a look at more advanced elements of the game that we glossed over. For example, Richard could have tried to wait and see who dropped out first. If Kelly fell early, Richard might have preferred to beat Rudy and choose Kelly than to let Rudy win and have to go against Rudy in the finals. He might also have been concerned that Kelly would be savvy enough to do the same calculation and drop out early. The next chapters will show you how to use a more systematic approach to solve a game. The end goal is to help change the way you approach strategic situations, recognizing that you won't always have time to analyze every possible option.**

After 4 hours and 11 minutes, Rudy fumbled when shifting his stance, let go of the immunity idol, and lost. Kelly picked Richard to go on to the finals. Rudy cast the swing vote in his favor, and Richard Hatch became the first *Survivor* champion.

With the benefit of hindsight it may all seem easy. What makes Richard's play so impressive is that he was able to anticipate all the different moves before they happened.* In chapter 2, we'll provide some tools to help you anticipate the way a game will play out and even give you a chance to have a go at another *Survivor* game.

#3. THE HOT HAND

Do athletes ever have a "hot hand"? Sometimes it seems that Yao Ming cannot miss a basket or that Sachin Tendulkar cannot fail to score a century in cricket. 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 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 the team's passing game and a great 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.

A player may even assist himself when one hot hand warms up the other. The Cleveland Cavaliers star LeBron James eats and writes with his left hand but prefers shooting with his right (though his left hand is still better than most). The defense knows that LeBron is right-handed, so they concentrate on defending against right-handed shots. But they do not do so exclusively, since LeBron's left-handed shots are too effective to be left unguarded.

What happens when LeBron spends his off season working to improve his left-handed shooting? The defense responds by spending more time covering his left-handed shots. The result is that this frees his right hand more often. A better left-handed shot results in a more effective right-handed shot. In this case, not only does the left hand know what the right hand is doing, it's helping it out.

Going one step further, in chapter 5 we show that when the left hand is stronger it may even be used *less* often. Many of you will have experienced this seemingly strange phenomenon when playing tennis. If your backhand is much weaker than your forehand, your opponents will learn to play to your backhand. Eventually, as a result of all this backhand practice, your backhand will improve. As your two strokes become more equal, opponents can no longer exploit your weak backhand. They will play more evenly between forehand and backhand. You get to use your better forehand more often; this could be the real advantage of improving your backhand.

#4. TO LEAD OR NOT TO LEAD

After the first four races in the 1983 America's Cup finals, Dennis Conner's *Liberty* led 3–1 in a best-of-seven series. On the morning of the fifth race, "cases of champagne had been delivered to *Liberty*'s dock. And on their spectator yacht, the wives of the crew were wearing red-white-and-blue tops and shorts, in anticipation of having their picture taken after their husbands had prolonged the United States' winning streak to 132 years.[2] It was not to be.

At the start, *Liberty* got off to a 37-second lead when *Australia II* jumped the gun and had to recross the starting line. The Australian skipper, John Bertrand, tried to catch up by sailing way over to the left of the course in the hopes of catching a wind shift. Dennis Conner chose to keep *Liberty* on the right hand side of the course. Bertrand's gamble paid off. The wind shifted five degrees in *Australia II*'s favor and she won the race by one minute and forty-seven seconds. Conner was criticized for his strategic failure to follow *Australia II*'s path. Two races later, *Australia II* won the series.

Sailboat racing offers the chance to observe an interesting reversal of a "follow the leader" strategy. The leading sailboat usually copies the strategy of the trailing boat. When the follower tacks, so does the leader. The leader imitates the follower even when the follower is clearly pursuing a poor strategy. Why? Because in sailboat racing (unlike ballroom dancing) close doesn't count; only winning matters. If you have the lead, the surest way to stay ahead is to play monkey see, monkey do.[*]

Stock-market analysts and economic forecasters are not immune to this copycat strategy. The leading forecasters have an incentive to follow the pack and produce predictions similar to everyone else's. This way people are unlikely to change their perception of these forecasters' abilities. On the other hand, newcomers take the risky strategies; they tend to predict boom or doom. Usually they are wrong and are never heard of again, but now and again they are proven correct and move to the ranks of the famous.

Industrial and technological competitions offer further evidence. In the personal-computer market, Dell is less known for its innovation than for its ability to bring standardized technology to the mass market. More new ideas have come from Apple, Sun, and other start-up companies. Risky innovations are their best and perhaps only chance of gaining market share. This is true not just of high-technology goods. Procter & Gamble, the Dell of diapers, followed Kimberly-Clark's innovation of resealable diaper tape and recaptured its commanding market position.

There are two ways to move second. You can imitate as soon as the other has revealed his approach (as in sailboat racing) or wait longer until the success or failure of the approach is known (as in computers). The longer wait is more advantageous in business because, unlike in sports, the competition is usually not winner-take-all. As a result, market leaders will not follow the upstarts unless they also believe in the merits of their course.

#5. HERE I STAND

When the Catholic Church demanded that Martin Luther repudiate his attack on the authority of popes and councils, he refused to recant: "I will not recant anything, for to go against conscience is neither right nor safe." Nor would he compromise: "Here I stand, I cannot do otherwise."[3] Luther's intransigence was based on the divinity of his positions. When defining what was right, there was no room for compromise. His firmness had profound long-term consequences; his attacks led to the Protestant Reformation and substantially altered the medieval Catholic Church.

Similarly, Charles de Gaulle used the power of intransigence to become a powerful player in the arena of international relations. As his biographer Don Cook expressed it, "[de Gaulle] could create power for himself with nothing but his own rectitude, intelligence, personality and sense of destiny."[4] But above all, his was "the power of intransigence." During the Second World War, as the self-proclaimed leader in exile of a defeated and occupied nation, he held his own in negotiations with Roosevelt and Churchill. In the 1960s, his presidential "Non!"

swung several decisions France’s way in the European Economic Community (EEC).

In what way did his intransigence give him power in bargaining? When de Gaulle took a truly irrevocable position, the other parties in the negotiation were left with just two options—to take it or to leave it. For example, he single-handedly kept England out of the European Economic Community, once in 1963 and again in 1968; the other countries were forced either to accept de Gaulle’s veto or to break up the EEC. De Gaulle judged his position carefully to ensure that it would be accepted. But that often left the larger (and unfair) division of the spoils to France. De Gaulle’s intransigence denied the other party an opportunity to come back with a counteroffer that was acceptable.

In practice, this is easier said than done, for two kinds of reasons. The first kind stems from the fact that bargaining usually involves considerations other than the pie on today’s table. The perception that you have been excessively greedy may make others less willing to negotiate with you in the future. Or, next time they may be more firm bargainers as they try to recapture some of their perceived losses. On a personal level, an unfair win may spoil business relations, or even personal relations. Indeed, biographer David Schoenbrun faulted de Gaulle’s chauvinism: “In human relations, those who do not love are rarely loved: those who will not be friends end up by having none. De Gaulle’s rejection of friendship thus hurt France.”[5] A compromise in the short term may prove a better strategy over the long haul.

The second kind of problem lies in achieving the necessary degree of intransigence. Luther and de Gaulle achieved this through their personalities, but this entails a cost. An inflexible personality is not something you can just turn on and off. Although being inflexible can sometimes wear down an opponent and force him to make concessions, it can equally well allow small losses to grow into major disasters.

Ferdinand de Lesseps was a mildly competent engineer with extraordinary vision and determination. He is famous for building the Suez Canal in what seemed almost impossible conditions. He did not recognize the impossible and thereby accomplished it. Later, he tried using the same technique to build the Panama Canal. It ended in disaster.* Whereas the sands of the Nile yielded to his will, tropical malaria did not. The problem for de Lesseps was that his inflexible personality could not admit defeat even when the battle was lost.

How can one achieve selective inflexibility? Although there is no ideal solution, there are various means by which commitment can be achieved and sustained; this is the topic for chapter 7.

#6. THINNING STRATEGICALLY

Cindy Nacson-Schechter wanted to lose weight. She knew just what to do: eat less and exercise more. She knew all about the food pyramid and the hidden calories in soft drinks. Still, nothing had worked. She had gained forty pounds with the birth of her second child and it just wasn't coming off.

That's why she accepted ABC's offer to help her lose weight. On December 9, 2005, she came into a photographer's studio on Manhattan's West Side, where she found herself changing into a bikini. She hadn't worn a bikini since she was nine, and this wasn't the time to start again.

The setup felt like backstage at the *Sports Illustrated* swimsuit issue shoot. There were lights and cameras everywhere, and all she had on was a tiny lime-green bikini. The producers had thoughtfully placed a hidden space heater to keep her warm. Snap. Smile. Snap. Smile. What in the world was she thinking? Snap.

If things worked out as she hoped, no one would ever see these pictures. The deal she made with ABC *Primetime* was that they would destroy the pictures if she lost 15 pounds over the next two months. They wouldn't help her in any way. No coach, no trainer, no special diets. She already knew what she had to do. All she needed was some extra motivation and a reason to start today rather than tomorrow.

Now she had that extra motivation. If she didn't lose the promised weight, ABC would show the photos and the videos on primetime television. She had already signed the release giving them permission.

Fifteen pounds in two months was a safe amount to lose, but it wouldn't be a cakewalk. There was a series of holiday parties and Christmas dinners. She couldn't risk waiting until the New Year. She had to start now.

Cindy knew all about the dangers of being overweight—the increased risk of diabetes, heart attack, and death. And yet that wasn't enough to scare her into action. What she feared more than anything was the possibility that her ex-boyfriend would see her hanging out of a bikini on national TV. And there was little doubt that he would watch the show. Her best friend was going to tell him if she failed.

Laurie Edwards didn't like the way she looked or how she felt. It didn't help that she worked part-time tending bar, surrounded by hot twenty-somethings. She had tried Weight Watchers, South Beach, Slim-Fast, you name it. She was headed in the wrong direction and needed something to help her change course. When she told her girlfriends about the show, they thought it was the stupidest thing she'd ever done. The cameras captured that "what am I doing?" look on her face and a lot more.

Ray needed to lose weight, too. He was a newlywed in his twenties but looked closer to forty. As he walked the red carpet in his racing swimsuit, it wasn't a pretty picture. Click. Smile. Click.

He wasn't taking any chances. His wife wanted him to lose weight and was willing to help. She offered to diet with him. Then she took the plunge. She changed into a bikini, too. She wasn't as overweight as Ray, but she wasn't bikini-ready, either.

Her deal was different from Cindy's. She didn't have to weigh in. She didn't even have to lose weight. The pictures of her in a bikini would only be shown if *Ray* didn't lose the weight.

For Ray, the stakes had been raised even higher. He was either going to lose the weight or his wife.

All together, four women and one couple bared their soles and much more in front of the cameras. What were they doing? They weren't exhibitionists. The ABC producers had carefully screened them out. None of the five wanted to see these photos appear on TV, and none of them expected they ever would.

They were playing a game against their future selves. Today's self wants the future self to diet and exercise. The future self wants the ice cream and the television. Most of the time, the future self wins because it gets to move last. The trick is to change the incentives for the future self so as to change its behavior.

In Greek mythology, Odysseus wanted to hear the Sirens' songs. He knew that if he allowed his future self to listen to their song, that future self would sail his ship into the rocks. So he tied his hands—literally. He had his crew bind his hands to the mast (while plugging their own ears). In dieting, this is known as the empty-fridge strategy.

Cindy, Laurie, and Ray went one step further. They put themselves in a bind that only dieting would get them out of. You might think that having more options is always a good thing. But thinking strategically, you can often do better by cutting off options. Thomas Schelling describes how the Athenian General Xenophon fought with his back against an impassable ravine. He purposefully set himself up so that his soldiers had no option of retreat.[6] Backs stiffened, they won.

Similarly, Cortés scuttled his ships upon arrival in Mexico. This decision was made with the support of his troops. Vastly outnumbered, his six hundred soldiers decided that they would either defeat the Aztecs or perish trying. The Aztecs could retreat inland, but for Cortés's soldiers there was no possibility of desertion or retreat. By making defeat worse, Cortés increased his chance of victory and indeed conquered.[*]

What worked for Cortés and Xenophon worked for Cindy, Laurie, and Ray. Two months later, just in time for Valentine's Day, Cindy had lost 17 pounds. Ray was down 22 pounds and two belt loops. While the threat was the motivator to get them started, once they got going, they were doing it for themselves. Laurie lost the required 15 pounds in the first month. She kept on going and lost another 13 in month two. Laurie's 28 pounds translated into two dress sizes and over 14 percent of her body weight. Her friends no longer think the ABC show was a stupid idea.

At this point, you shouldn't be surprised to know that one of us was behind the show's design.[7] Perhaps we should have called this book *Thinning Strategically* and sold many more copies. Alas, not, and we return to study these types of strategic moves in chapter 6.

#7. BUFFETT'S DILEMMA

In an op-ed promoting campaign finance reform, the Oracle of Omaha, Warren Buffett, proposed raising the limit on individual contributions from $1,000 to $5,000 and banning all other contributions. No corporate money, no union money, no soft money. It sounds great, except that it would never pass.

Campaign finance reform is so hard to pass because the incumbent legislators who have to approve it are the ones who have the most to lose. Their advantage in fundraising is what gives them job security.[*] How do you get people to do something that is against their interest? Put them in what is known as the prisoners' dilemma.[†] According to Buffett:

> Well, just suppose some eccentric billionaire (not me, not me!) made the following offer: If the bill was defeated, this person—the E.B.—would donate $1 billion in an allowable manner (soft money makes all possible) to the political party that had delivered the most votes to getting it passed. Given this diabolical application of game theory, the bill would sail through Congress and thus cost our E.B. nothing (establishing him as not so eccentric after all).[8]

Consider your options as a Democratic legislator. If you think that the Republicans will support the bill and you work to defeat it, then if you are successful, you will have delivered $1 billion to the Republicans, thereby handing them the resources to dominate for the next decade. Thus there is no gain in opposing the bill if the Republicans are supporting it. Now, if the Republicans are against it and you support it, then you have the chance of making $1 billion.

Thus whatever the Republicans do, the Democrats should support the bill. Of course, the same logic applies to the Republicans. They should support the bill no matter what the Democrats do. In the end, both parties support the bill, and our billionaire gets his proposal for free. As a bonus, Buffett notes that the very effectiveness of his plan "would highlight the absurdity of claims that money doesn't influence Congressional votes."

This situation is called a prisoners' dilemma because both sides are led to take an action that is against their mutual interest.* In the classic version of the prisoners' dilemma, the police are separately interrogating two suspects. Each is given an incentive to be the first to confess and a much harsher sentence if he holds out while the other confesses. Thus each finds it advantageous to confess, though they would both do better if each kept quiet.

Truman Capote's *In Cold Blood* provides a vivid illustration. Richard "Dick" Hickock and Perry Edward Smith have been arrested for the senseless murder of the Clutter family. While there were no witnesses to the crime, a jailhouse snitch had given their names to the police. During the interrogation, the police play one against the other. Capote takes us into Perry's mind:

> …that it was just another way of getting under his skin, like that phony business about a witness—"a living witness." There couldn't be. Or did they mean—If only he could talk to Dick! But he and Dick were being kept apart; Dick was locked in a cell on another floor…. And Dick? Presumably they'd pulled the same stunt on him. Dick was smart, a convincing performer, but his "guts" were unreliable, he panicked too easily…. "And before you left that house you killed all the people in it." It wouldn't amaze him if every Old Grad in Kansas had heard that line. They must have questioned hundreds of men, and no doubt accused dozens; he and Dick were merely two more….
>
> And Dick, awake in a cell on the floor below, was (he later recalled) equally eager to converse with Perry—find out what the punk had told them.[9]

Eventually Dick confessed and then Perry.* That’s the nature of the game.

The problem of collective action is a variant of the prisoners’ dilemma, albeit one with many more than two prisoners. In the children’s story about belling the cat, the mice decide that life would be much safer if the cat were stuck with a bell around its neck. The problem is, who will risk his life to bell the cat?

This is a problem for both mice and men. How can unpopular tyrants control large populations for long periods? Why can a lone bully terrorize a schoolyard? In both cases, a simultaneous move by the masses stands a very good chance of success.

But the communication and coordination required for such action is difficult, and the oppressors, knowing the power of the masses, take special steps to keep it difficult. When the people must act individually and hope that the momentum will build up, the question arises, “Who is going to be the first?” Such a leader will pay a high cost—a broken nose or possibly his life. His reward may be posthumous glory or gratitude. There are people who are moved by considerations of duty or honor, but most find the costs exceed the benefits.

Khrushchev first denounced Stalin’s purges at the Soviet Communist Party’s 20th Congress. After his dramatic speech, someone in the audience shouted out, asking what Khrushchev had been doing at the time. Khrushchev responded by asking the questioner to please stand up and identify himself. The audience remained silent. Khrushchev replied, “That is what I did, too.”

Each person acts in his or her self-interest, and the result is a disaster for the group. The prisoners’ dilemma is perhaps the most famous and troubling game in game theory, and we return to the topic in chapter 3 to discuss what can be done. We should emphasize right from the start that we have no presumption that the outcome of a game will be good for the players. Many economists, ourselves included, tout the advantages of the free market. The theory behind this conclusion relies on a price system that guides individual behavior. In most strategic interactions, there is no invisible hand of prices to guide the baker or the butcher or anyone else. Thus there is no reason to expect that the outcome of a game will be good for the players or society. It may not be enough to play a game well—you must also be sure you are playing the right game.

#8. MIX YOUR PLAYS

Apparently Takashi Hashiyama has trouble making decisions. Both

Sotheby's and Christie's had made attractive offers to be the auction house for the sale of his company's $18 million art collection. Rather than choose one over the other, he suggested the two of them play a game of Rock Paper Scissors to determine the winner. Yes, Rock Paper Scissors. Rock breaks scissors, scissors cuts paper, and paper covers rock.

Christie's chose scissors and Sotheby's chose paper. Scissors cut paper and so Christie's won the assignment and a nearly $3 million commission. With the stakes so high, could game theory have helped?

The obvious point is that in this type of game, one can't be predictable. If Sotheby's had known that Christie's would be playing scissors, then they would have chosen rock. No matter what you choose, there is something else that beats it. Hence it is important that the other side can't predict your play.

As part of their preparation, Christie's turned to local experts, namely the kids of their employees who play the game regularly. According to eleven-year-old Alice, "Everybody knows you always start with scissors." Alice's twin sister, Flora, added her perspective: "Rock is way too obvious, and scissors beats paper. Since they were beginners, scissors was definitely the safest."[10]

Sotheby's took a different tack. They thought this was simply a game of chance and hence there was no room for strategy. Paper was as good as anything else.

What is interesting here is that both sides were half right. If Sotheby's picked its strategy at random—with an equal chance of rock, scissors, or paper—then whatever Christie's did would have been equally good. Each option has a one-third chance of winning, a one-third chance of losing, and a one-third chance of a tie.

But Christie's didn't pick at random. Thus Sotheby's would have done better to think about the advice Christie's would likely get and then play to beat it. If it's true that everyone knows you start with scissors, Sotheby's should have started with Bart Simpson's favorite, good old rock.

In that sense, both players got it half wrong. Given Sotheby's lack of strategy, there was no point in Christie's efforts. But given Christie's efforts, there would have been a point to Sotheby's thinking strategically.

In a single play of a game, it isn't hard to choose randomly. But when games get repeated, the approach is trickier. Mixing your plays does not mean rotating your strategies in a predictable manner. Your opponent can observe and exploit any systematic pattern almost as easily as he can exploit an unchanging repetition of a single strategy. It is *unpredictability* that is important when mixing.

It turns out most people fall into predictable patterns. You can test this yourself online where computer programs are able to find the pattern and beat you.[11] In an effort to mix things up, players often rotate their strategies too much. This leads to the surprise success of the “avalanche” strategy: rock, rock, rock.

People are also too influenced by what the other side did last time. If both Sotheby’s and Christie’s had opened with scissors, there would have been a tie and a rematch. According to Flora, Sotheby’s would expect Christie’s to play rock (to beat their scissors). That should lead Sotheby’s to play paper and so Christie’s should stick with scissors. Of course, that formulaic approach can’t be right, either. If it were, Sotheby’s could then play rock and win.

Imagine what would happen if there were some known formula that determined who would be audited by the IRS. Before you submitted a tax return, you could apply the formula to see if you would be audited. If an audit was predicted, but you could see a way to “amend” your return until the formula no longer predicted an audit, you probably would do so. If an audit was unavoidable, you would choose to tell the truth. The result of the IRS being completely predictable is that it would audit exactly the wrong people. All those audited would have anticipated their fate and chosen to act honestly, while those spared an audit would have only their consciences to watch over them. When the IRS audit formula is somewhat fuzzy, everyone stands some risk of an audit; this gives an added incentive for honesty.

The importance of randomized strategies was one of the early insights of game theory. The idea is simple and intuitive but needs refinement to be useful in practice. It is not enough for a tennis player to know that he should mix his shots between the opponent’s forehand and backhand. He needs some idea of whether he should go to the forehand 30 percent or 64 percent of the time and how the answer depends on the relative strengths of the two sides. In chapter 5 we develop methods to answer such questions.

We’d like to leave you with one last commentary. The biggest loser in the Rock Paper Scissors game wasn’t Sotheby’s; it was Mr. Hashiyama. His decision to deploy Rock Paper Scissors gave each of the two auction houses a 50 percent chance of winning the commission. Instead of letting the two contestants effectively agree to split the commission, he could have run his own auction. Both firms were willing, even eager, to lead the sale with a 12 percent commission.* The winning house would be the one willing to take the lowest fee. Do I hear 11 percent? Going once, going twice,…

#9. NEVER GIVE A SUCKER AN EVEN BET

In *Guys and Dolls*, gambler Sky Masterson relates this valuable advice from his father:

> One of these days in your travels, a guy is going to show you a brand-new deck of cards on which the seal is not yet broken. Then this guy is going to offer to bet you that he can make the jack of spades jump out of this brand-new deck of cards and squirt cider in your ear. But, son, you do not accept this bet because, as sure as you stand there, you're going to wind up with an ear full of cider.

The context of the story is that Nathan Detroit has offered Sky Masterson a bet about whether Mindy's sells more strudel or cheesecake. Nathan had just discovered the answer (strudel) and is willing to bet if Sky will bet on cheesecake.†

This example may sound somewhat extreme. Of course no one would take such a sucker bet. Or would they? Look at the market for futures contracts on the Chicago Board of Exchange. If another speculator offers to sell you a futures contract, he will make money only if you lose money.*

If you happen to be a farmer with soy beans to sell in the future, then the contract can provide a hedge against future price movements. Similarly, if you sell soy milk and hence need to buy soy beans in the future, this contract is insurance, not a gamble.

But the volume of the contracts on the exchange suggests that most people buying and selling are traders, not farmers and manufacturers. For them, the deal is a *zero-sum* game. When both sides agree to trade, each one thinks it will make money. One of them must be wrong. That's the nature of a zero-sum game. Both sides can't win.

This is a paradox. How can both sides think that they can outsmart the other? Someone must be wrong. Why do you think the other person is wrong, not you? Let us assume that you don't have any insider information. If someone is willing to sell you a futures contract, any money you make is money they lose. Why do you think that you are smarter than they are? Remember that their willingness to trade means that they think they are smarter than you.

In poker, players battle this paradox when it comes to raising the stakes. If a player bets only when he has a strong hand, the other players will soon figure this out. In response to a raise, most other players will fold, and he'll never win a big pot. Those who raise back will have even stronger hands, and so our poor player will end up a big loser. To get others to bet against a strong hand, they have to think you might be bluffing. To convince them of this possibility, it helps to bet often enough so that you must be bluffing some of the time. This leads to an interesting dilemma. You'd like others to fold against your bluffs and thereby win with weak hands. But that won't lead to high-pot victories. To convince others to raise your bets, you also need to get caught bluffing.

As the players get even more sophisticated, persuading others to take big bets against you becomes harder and harder. Consider the following high-stakes game of wits between Erick Lindgren and Daniel Negreanu, two of poker's top-ranked players.

> …Negreanu, sensing a weak hand, raised him two hundred thousand [dollars]. "I put two hundred and seventy thousand in, so I have two hundred thousand left," Negreanu said. "And Erick looks over my chips and says, 'How much you got left?' And he moves all in"—wagering all he had. Under the special betting rules governing the tournament, Negreanu had only ninety seconds to decide whether to call the bet, and risk losing all his money if Lindgren wasn't bluffing, or to fold, and give up the hefty sum he had already put into the pot.

> "I didn't think he could be so stupid," Negreanu said. "But it wasn't stupid. It was like a step above. He knows that I know that he wouldn't do something so stupid, so by doing something so quote-unquote stupid it actually became a great play."[12]

While it is obvious that you shouldn't bet against these poker champions, when should you take a gamble? Groucho Marx famously said that he didn't care to belong to any club that would accept him as a member. For similar reasons, you might not want to take any bet that others offer. You should even be worried when you win an auction. The very fact that you were the highest bidder implies that everyone else thought the item was worth less than you did. The result of winning an auction and discovering you've overpaid is called the winner's curse.

Every action someone takes tells us something about what he knows, and you should use these inferences along with what you already know to guide your actions. How to bid so that you won't be cursed when you win is something we discuss in chapter 10.

There are some rules of the game that can help put you on more equal footing. One way to allow trading with lopsided information is to let the less informed party pick which side of the bet to take. If Nathan Detroit agreed in advance to take the bet whatever side Sky picked, then Nathan's inside information would be of no help. In stock markets, foreign exchange markets, and other financial markets, people are free to take either side of the bet. Indeed, in some exchanges, including the London stock market, when you ask for a quote on a stock the market maker is required to state both the buying and selling prices *before* he knows which side of the transaction you want. Without such a safeguard, market makers could stand to profit from private information, and the outside investors' fear of being suckered might cause the entire market to fold. The buy and sell prices are not quite the same; the difference is called the bid-ask spread. In liquid markets the spread is quite small, indicating that little information is contained in any buy or sell order. We return to the role of information in chapter 8.

#10. GAME THEORY CAN BE DANGEROUS TO YOUR HEALTH

Late one night, after a conference in Jerusalem, two American economists—one of whom is this book's coauthor—found a taxicab and gave the driver directions to the hotel. Immediately recognizing us as American tourists, the driver refused to turn on his meter; instead, he proclaimed his love for Americans and promised us a lower fare than the meter. Naturally, we were somewhat skeptical of this promise. Why should this stranger offer to charge less than the meter when we were willing to pay the metered fare? How would we even know whether or not we were being overcharged?

On the other hand, we had not promised to pay the driver anything more than what would be on the meter. We put on our gametheory hats. If we were to start bargaining and the negotiations broke down, we would have to find another taxi. But if we waited until we arrived at the hotel, our bargaining position would be much stronger. And taxis were hard to find.

We arrived. The driver demanded 2,500 Israeli shekels ($2.75). Who knew what fare was fair? Because people generally bargain in Israel, Barry protested and counteroffered 2,200 shekels. The driver was outraged. He claimed that it would be impossible to get from there to here for that amount. Before negotiations could continue, he locked all the doors automatically and retraced the route at breakneck speed, ignoring traffic lights and pedestrians. Were we being kidnapped to Beirut? No. He returned to the original position and ungraciously kicked us out of his cab, yelling, “See how far your 2,200 shekels will get you now.”

We found another cab. This driver turned on his meter, and 2,200 shekels later we were home.

Certainly the extra time was not worth the 300 shekels. On the other hand, the story was well worth it. It illustrates the dangers of bargaining with those who have not yet read our book. More generally, pride and irrationality cannot be ignored. Sometimes, it may be better to be taken for a ride when it costs only two dimes.

There is a second lesson to the story. We didn’t really think far enough ahead. Think of how much stronger our bargaining position would have been if we had begun to discuss the price *after* getting out of the taxi. (Of course, for hiring a taxi, this logic should be reversed. If you tell the driver where you want to go before getting in, you may find your taxi chasing after some other customer. Get in first, then say where you want to go.)

Some years after this story was first published, we received the following letter:

> Dear Professors,
>
> You certainly don’t know my name, but I think you will remember my story. I was a student in Jerusalem moonlighting as a taxi driver. Now I am a consultant and chanced upon your book when it was translated into Hebrew. What you might find interesting is that I too have been sharing the story with my clients. Yes, it was indeed a late night in Jerusalem. As for the rest, well, I recall things a bit differently.
>
> Between classes and working nights as a taxi driver, there was almost no time for me to spend with my new bride. My solution was to have her ride with me in the front seat. Although she was silent, it was a big mistake for you to have left her out of the story.
>
> My meter was broken, but you didn’t seem to believe me. I was too tired to argue. When we arrived, I asked for 2,500 shekels, a fair price. I was even hoping you would round the fare up to 3,000. You rich Americans could well afford a 50¢ tip.
>
> I couldn’t believe you tried to cheat me. Your refusal to pay a fair price dishonored me in front of my wife. As poor as I was, I did not need to take

your meager offer.

Americans think that we should be happy to take whatever crumbs you offer. I say that we should teach you a lesson in the game of life. My wife and I are now married twenty years. We still laugh about those stupid Americans who spent a half an hour riding back and forth in taxis to save twenty cents.

Sincerely,
(name withheld)

Truth be told, we never received such a letter. Our point in creating it was to illustrate a critical lesson in game theory: you need to understand the other player's perspective. You need to consider what they know, what motivates them, and even how they think about you. George Bernard Shaw's quip on the golden rule was to not do unto others as you would have them do unto you—their tastes may be different. When thinking strategically, you have to work extra hard to understand the perspective and interactions of all the other players in the game, including ones who may be silent.

That brings us to one last point. You may be thinking you are playing one game, but it is only part of a larger game. There is always a larger game.

THE SHAPE OF THINGS TO COME

These examples have given us glimpses of principles that guide strategic decisions. We can summarize these principles with a few "morals" from our tales.

Think 48 when you are wondering what the other player is trying to achieve. Recall Richard Hatch's ability to play out all the future moves to figure out what he should do. The story of the hot hand told us that in strategy, no less than in physics, "For every action we take, there is a reaction." We do not live and act in a vacuum. Therefore, we cannot assume that when we change our behavior everything else will remain unchanged. De Gaulle's success in negotiations suggests that "the stuck wheel gets the grease."* But being stubborn is not always easy, especially when one has to be more stubborn than an obstinate adversary. That stubborn adversary might well be your future self, especially when it comes to dieting. Fighting or dieting with your back up against the wall can help strengthen your resolve.

In Cold Blood and the story of belling the cat demonstrate the difficulty of obtaining outcomes that require coordination and individual sacrifice. In technology races, no less than in sailboat races, those who trail tend to employ more innovative strategies; the leaders tend to imitate the followers.

Rock Paper Scissors points out the strategic advantage of being unpredictable. Such behavior may also have the added advantage that it makes life just a little more interesting. Our taxi rides make it clear that the other players in games are people, not machines. Pride, spite, and other emotions may color their decisions. When you put yourself in others' shoes, you have to take them as they are, not as you are.

We could go on offering more examples and drawing morals from them, but this is not the best way to think methodically about strategic games. That is better done by approaching the subject from a different angle. We pick up the principles—for example, commitment, cooperation, and mixing—one at a time. In each instance, we explore examples that bear centrally on that issue, until the principle is clear. Then you will have a chance to apply that principle in the case study that ends each chapter.

CASE STUDY: MULTIPLE CHOICE

We think almost everything in life is a game, even things that might not seem that way at first. Consider the following question from the GMAT (the test given to MBA applicants).

Unfortunately, issues of copyright clearance have prevented us from reproducing the question, but that shouldn't stop us. Which of the following is the correct answer?

- a. 4∏ sq. inches
- b. 8∏sq. inches
- c. 16 sq. inches
- d. 16∏sq. inches
- e. 32∏sq. inches

Okay, we recognize that you're at a bit of a disadvantage not having the question. Still, we think that by putting on your gametheory hat you can still figure it out.

Case Discussion

The odd answer in the series is c. Since it is so different from the other answers, it is probably not right. The fact that the units are in square inches suggests an answer that has a perfect square in it, such as 4∏ or 16∏.

This is a fine start and demonstrates good test-taking skills, but we haven't really started to use game theory. Think of the game being played by the person writing the question. What is that person's objective?

He or she wants people who understand the problem to get the answer right and those who don't to get it wrong. Thus wrong answers have to be chosen carefully so as to be appealing to folks who don't quite know the answer. For example, in response to the question: How many feet are in a mile, an answer of "Giraffe," or even 16∏, is unlikely to attract any takers.

Turning this around, imagine that 16 square inches really is the right answer. What kind of question might have 16 square inches as the answer but would lead someone to think 32∏ is right? Not many. People don't often go around adding ∏ to answers for the fun of it. "Did you see my new car—it gets 10∏ miles to the gallon." We think not. Hence we can truly rule out 16 as being the correct solution.

Let's now turn to the two perfect squares, 4∏ and 16∏. Assume for a moment that 16∏ square inches is the correct solution. The problem might have been what is the area of a circle with a radius of 4? The correct formula for the area of a circle is ∏r^2. However, the person who didn't quite remember the formula might have mixed it up with the formula for the circumference of a circle, 2∏r. (Yes, we know that the circumference is in inches, not square inches, but the person making this mistake would be unlikely to recognize this issue.)

Note that if $r = 4$, then 2∏r is 8∏, and that would lead the person to the wrong answer of b. The person could also mix and match and use the formula 2∏r^2 and hence believe that 32∏ or e was the right answer. The person could leave off the ∏ and come up with 16 or c, or the person could forget to square the radius and simply use ∏r as the area, leading to 4∏ or a. In summary, if 16∏ is the correct answer, then we can tell a plausible story about how each of the other answers might be chosen. They are all good wrong answers for the test maker.

What if 4∏ is the correct solution (so that $r = 2$)? Think now about the most common mistake, mixing up circumference with area. If the student used the wrong formula, 2∏r, he or she would still get 4∏, albeit with incorrect units. There is nothing worse, from a test maker's perspective, than allowing the person to get the right answer for the wrong reason. Hence 4∏ would be a terrible right answer, as it would allow too many people who didn't know what they were doing to get full credit.

At this point, we are done. We are confident that the right answer is 16∏. And we are right. By thinking about the objective of the person writing the test, we can suss out the right answer, often without even seeing the question.

Now, we don't recommend that you go about taking the GMAT and other tests without bothering to even look at the questions. We appreciate that if you are smart enough to go through this logic, you most likely know the formula for the area of a circle. But you never know. There will be cases where you don't know the meaning of one of the answers or the material for the question wasn't covered in your course. In those cases, thinking about the testing game may lead you to the right answer.