

A book review on Game Theory: "Art of Strategy" by Avinash K. Dixit and Barry J. Nalebuff

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ABSTRACT

Operations Research is the interdisciplinary field of applied mathematics. Its roots come from second world war. It has wide application in many sciences. Military, economics, business, manufacturing, technology, medicine, i.e. In this book the author focused on gametheory, a dicipline under operations research. Game theory has again diffirent application areas in economy and business. In this book the authors focused on main game theory models, gave practical examples and Daily samples. They have given examples from economy and business, but kept examples usually focused on daily problems to keep the complex game theory concepts simple. I find this game theory book very useful to understand and examine game theory.

PART 1: Ten strategy stories

Most of us have encountered problems everyday, and at the end of a certain stream of thought or trial and error, did we find the right solution. The main purpose of this book is to show that such problems are common, they constitute a whole set of problems and methodical thinking will help in solving problems. At the beginning of the book, such problems are dealt with in a narrative in order to introduce game theory concepts that try to think strategically, modeling and find solutions. Simulating game theory, one of the current and popular approaches of economic theory, is essentially an approach that provides its popularity, prevalence of use and accessibility. This book, which allows us to analyze many Nobel Prize-winning economic theory from a current and daily perspective, therefore started its narration with ten strategy stories first.

1. Number match:

When you are asked to guess this number by keeping a number between one and 100, you are given 5 guesses, and in a game that guides by saying up or down after each guess, dividing the number range into two equal parts and choosing the number is the ideal strategy. The key lesson of game theory is to put yourself in the other person's shoes. Remember that the other person's intention is to win.

2. Win by losing

All three actors were aware that Ruddy was the most popular person among them. If he made it to the final, Ruddy would most likely be the winner. Richard hoped to meet Kelly in the finale. Comparing the options, Richard saw that he would achieve the best outcome for himself by losing. After 4 hours and 11 minutes, Ruddy told me to change his posture, and slipped the guardian figure, stumbled and lost. Kelly surpassed Richard as a contender in the final competition. Ruddy used the fateful game for him and became the first champion of Richard Survivor. What made Richard's game so impressive was that he had foreseen all the moves.

3. Unfailing hand

Incessant sports announcer who have long-term success, said the player "addressed an infallible" declare that it has. This is a false perception of reality, according to Professor of Psychology Thomas Gilovich, Robert Vallone, and Amos Tversky.

They performed this test on the Philadelphia 76ers basketball team. The results contradicted the unfailing and thinking. When a player hit his last shot, his probability of hitting the next was reduced; If the previous attempt failed, the probability of getting the next one increased.

4. To go ahead or not

In boat races, the leading boat often imitates the strategy of the boat following it. If you're leading, the best way to stay ahead is to fake the rear like a monkey.

Leading forecasters have an interest in sticking with the herd and making predictions similar to every one else's predictions. In the personal computer market, Dell is renowned for its ability to deliver standardized technology to the mass market rather than its innovation capability. The new ideas mostly came from Apple, Sun, and other startups. P&G, the Dell of the diaper, followed Kimberly-Klark's innovation of the resealable diaper. Thus, he regained his dominant position in the market.

There are two ways to keep second place. The moment he reveals his approach to you, you will immediately imitate it. Or you can wait until the success or failure of this approach is evident.

5. This is mystance

Catholic church of Math Luther, of the Popes and the assault on the authority of the council denied the request by not Marthin Luther King refusal to giveup her opinion had. This determination had long virtuous, profound consequences; It gave birth to Protestant Reformism and radically changed the medieval stereotype. Charles De Gaulle watched "No!" his stance influenced many important decisions regarding France's position in the European Economic Community. His stubbornness did not leave the opponent an opportunity to offer an acceptabl ecounter-proposal.

A compromise in the short term may be a goodstrategy in the longrun. The second kind of problem is managing to reach the required degree of stubbornness.

Ferdin and De Lesseps was a competent engineer with an extraordinary vision and determination. He became famous by building the Suez Canal. He later attempted the same tactic to build the Panama Canal, but this time the result was disastrous. De Lesseps' problem was that his inflexible personality did not allow him to admit defeat even when it was clear that he had lost the battle.

6. Analyzing with the strategic method

The trick is to change the incentives of the future self to change its behavior.

7. Buffet's dilemma:

The issue providing job security is the advantage offered by the collected funds. You put people in a dilemma of prisoners to get people to do something that is against their interests. This is called the prisoners' dilemma, as the two sides act against their mutual interests. The police meet with the two suspects separately. If one suspect thinks the other will confess before him, both inmates are encouraged to be the first to confess, fearing an increase in his sentence.

8. Mix your games

In a strategic game, it is not possible to predict the opponent's move. Whichever strategy you choose, there may be an option that will defeat it. Therefore, what is important here is that your opponent can not predict your choice .

It is difficult to make random selections in a one-move game. As the repetitions of the game increase, the potency of the approach can increase. Mix your games suggestion does not mean choosing a game strategy that keeps spinning with predictable logic. A systematic template of your opponent can easily detect and use against you, as well as constant repetitions of a single strategy. Important when mixing is unpredictability . The importance of random strategies is one of the first predictions of game theory. This is a simple and intuitive approach, but needsto be improvedto be useful in practice.

9. Never give a sucker equal chance

Take a look at the futures market on the Chicago exchange . If another speculato tries to sell you a futures contract, know that he can only win if you lose. From the point of view of the traders in the stockexchange, the shopping here is a zero-sumgame. When the two sides agree to trade, they both think they will make money. But one of them must be wrong. This is the nature of the zero-sumgame. Neitherside can win. When someone tries to sell you a futures contract, the number that will entry our pocket will be out of his pocket. Remember that wanting to sell means they see themselves smarter than you. The buying and selling numbers are not exactly the same; The difference between them is called the trade difference. The fact that this difference is quite low in liquid markets indicates that the level of information required in buy and sell orders is limited.

10. Game theory can be dangerous for your health

One of the important elements of game theory is bargaining. However, bargaining can be dangerous. This book is the game theory to negotiate in contain shedding light on the dangers. Understanding the player's point of view and empathy is one of the indispensable priorities of game theory. Otherwise, defeats and losses are inevitable in the games you play. Let's not forget that the games we play are small parts of bigger games. So there is always a bigger game.

PART 2: Games that can be solved by backward reasoning

The essence of a strategy game is the interdependence of the players' lands. This mutual interaction occurs in two ways. The first of these is sequencing, players move in turns, that is, in turns. The second type of interaction is synchronicity, where the players act at the same time, not knowing the other's current movements. Therefore, each player puts himself in the other's shoes and tries to calculate what the outcome will be. His best action is an integral part of this general account.

When playing a strategy game, it must be decided whether interactions are sequential or simultaneous. Some games may contain items from both. In this case, the strategy is adjusted according to the content of the game.

The general principle in games with sequential moves is that each player calculates the future counter moves of other players and uses them to make their best move at the moment. ***This situation is done by the rule of look forward, reasoning backward.***

Most strategy situations consist of a long series of cascading decisions, each involving multiple alternatives. In these types of games, a tree diagram showing the preferences in the game is a visual tool to aid in correct reasoning. Each game has two or more players. Using the term decision tree for situations where there is only one person, the tree that shows the cascade of decisions in a strategy game is referred to as a game tree.

According to game theory jargon, the result is not necessarily zero-sum, games can result in either side winning or losing.

Flag and match stick games are sequential games. These games are base games that describe sequential games. In games with 21 flags or 21 match sticks, two sides consecutively collect the flag or sticks. They can be arranged so that the one who gets the last flag or collects the last bar will win or lose. In these games, both sides determine their strategies and play accordingly. The strategies change according to the total number of flags and the number of bars. It is necessary to decide in advance how many to collect at a time. These are zero-sum games, meaning the reare always winners and losers. Also, who will start the game first is of key importance in determining strategies.

In the dictator game, the bidders pay much smaller amounts compared to the ultimatum game. But even they pick numbers well above zero. In the game of Ultimatum, the behavior of those making proposals is both generous and strategic. Most dictators accept this offer so that the other sacrifices not to find out how greedy they are. Even if the dictator is offered more, he prefer stotake it and not let the other person know. This one begins to endure crossing the entire street to avoid giving a beggar a little alms.

When the ultimatum games were played under these conditions, as the degree of inequality of the proposal increased, the activity of the front insula of the person responding to the proposal increased. To test this, ultimatum game experiments were conducted in poorer countries, using amounts equivalent to a few months' salaries of participants. Although a certain reduction in

rejection responses was observed, no significant increase in generosity was observed in the amounts offered.

The ultimatum by the game and findings resulting from experiments carried out on the others like him, stretch with the assumption that every player of the prize will win personally, the only problem I expect the basis to facing the theory of reasoning can state differs considerably. It is believed that backward reasoning should remain our starting point for predicting the analysis and consequences of such games. This takes us beyond classical economic theory. Game theorists should incorporate their analysis into players' concerns for fairness or altruism. Behavior game theory does not abandon rationality, but rather expands it. This is the best; If we better understand the motives that motivate people, our understanding of strategic interactions as well as economic decision-making will be enhanced. This is already happening; The boundary research of game theory is increasingly adding equality, altruism and similar concerns to players' goals.

When we gain some experience in reasoning backwards, you will find that many strategic situations in our work and daily life have a tree-like logic. However, for complex games like chess, it is not possible to reach a complete conclusion through backward reasoning. Chess is, in principle, an ideal game of sequential moves suitable for solving by backward reasoning.

The pragmatic solution involves combining forward-looking analysis with elements of value judgment. The first is the science of game theory, forward thinking and backward reasoning. The second is the art of the practitioner, it is to be able to make a value judgment about a position according to the number of stones and their mutual positioning, even though he can not find a clear solution that will bring the game to an end from that point forward.

The conclusion we draw from chess gives us a way of thinking about the highly complex games that we may encounter. You must combine the forward looking rule with the backward reasoning rule that will guide you in evaluating the intermediate positions you reach at the end of our forward calculation analysis. Only such a synthesis of game theory science and the art of playing a certain game can lead to success, not only one of them.

An important practical aspect of looking ahead and reasoning backwards is to play the game from the perspective of both players. For this, while trying to put yourself in the other person's shoes, you need to know what they know and what they don't know and target what they really aim for. Otherwise, you may have to remain indecisive.

CHAPTER 3: The prisoner dilemma and solutions

Al Tucker, one of the pioneers of game theory, worked on the prisoners' dilemma, the Nash equilibrium, in the 1950s. Prisoners dilemma of matametiksel the structure from Tuckerman belongs ago. Merrill Flood and Melvin Dresher from Rand Cooper's have determined the mathematical background of this subject. Tucker's genius is that he builds real-life problems on this math fiction. The solution to the dilemma of prisoners is made through tables. This is called the pay off matrix. In many games, such as the imprisonment dilemma, the whole point is to avoid mutual losing and to achieve a mutually beneficial result.

When this feature is present in games that make moves at the same time, that is, whatever option the other player or players prefer, the best option for you does not change, the way the player thinks and the game theorist's analysis is also easy. Therefore, it would be appropriate to highlight this element and look to facilitate the solution of the game. The name game theorists give to this feature is the dominant strategy. No matter what strategy or combination of strategies the opposing player

or players choose, if a player's strategy remains the most favorable of all valid strategies, that player is considered to have the dominant strategy. This creates a rule for simultaneous moves games.

The prisoners dilemma is an even more featured game. Not one of the players but both of them have dominant strategies. This is what makes the prisoner dilemma an important game.

In games of simultaneous moves, the situation is different from sequential games. It will not be enough to just look back and produce a forward strategy. ***What is necessary for simultaneous moves is to think about what the other person is thinking. If you have a dominant strategy, you should use it.*** Another important issue here is that firms' efforts to protect themselves do not work best for them, contrary to what classical economic theories have taught since Adam Smith. In then extchapter, a broader concept of solutions for simultaneous games will be presented. This concept is Nash equilibrium.

In the fifty years since the invention of the prisoner's dilemma game, the theory has evolved. Some developments in this area are taken into consideration. The other side of cooperation is deviation. A player may be offered an appropriate reward, encouraging them to choose cooperation over the initial dominant divergence strategy or be discouraged from deviating by the threat of an appropriate penalty. Punishment is a more common method of solving prisoner dilemmas.

It is a version of the code of conduct for an eye-for-a-tooth behavior. Treat them as others have treated you. More precisely, the strategy envisages cooperation in the first period, after that it always imitates the actions of the opponent. *Kisasa-tit* is the clearest and simplest strategy ever seen. It's good because it never cheats. He is open to provocation, which means he never allows him to go unpunished. And it is forgiving because it does not hold grudges for a long time and is open to repairing cooperation.

Some preconditions and strategies are required to ensure cooperation. First of all, it is necessary to detect cheating before it can be punished. If this determination happens quickly and accurately, the penalty will be just in time and accurate. Determining the nature of the punishment is another strategy. Different penalties can occur within the structure of the game. Anyone who gains an advantage through cheating in a game always loses in subsequent games. The limits of acceptable behavior and the consequences of cheatings should be clear to the person who intends to cheat. Precision is another important prerequisite. Players must ensure that deviation will be punished and cooperation can be rewarded. Another criterion is size. The criminal dimension of the penalties should be clear. If strong enough to deter criminal who tried to do new tricks, probably never had to be applied on z . It is therefore necessary to keep the punishment at a sufficiently high level to provided eterrence.

PART 4: An elegant balance

Business world, sports, politicsetc. Many concepts and techniques from the fields are covered. There are more examples of the seide as and techniques in later chapters in the book.

A game is a situation of strategic inter dependence. The outcome of our choices, our strategies, depends on the choices of the person or people acting for a purpose. In this game, the decision-making party is called the player, and their choices are called the move. In a game, players' interests can completely conflict with each other. One person's gain is always another's loss. These types of games are called zero-sum games. However, in more common cases it is the existence of

partnerships rather than conflicts of interest. To be more precise, there are mutual gains or mutual collective losses.

The moves in a game can be sequential or simultaneous. There is a linear chain of thought and decision in sequential games. I'm evil like that my opponent if I can do it and I said in response responds as follows. This type of game is studied by drawing a game tree. Here **the first rule** can be expressed as "IR referto URLs, walked backward mind" is the rule.

There is a logical reasoning loop in simultaneous games. I think he thinks about me this way, like. In this cycle, although he does not know the opponent's move in the game, he must make predictions and make a move. To solve this type of game, we draw a table showing the results corresponding to all possible combinations of choices.

First of all, whether there is a dominant strategy that negates all strategies of the opponent, whatever the opponent's choice is, it is checked. This leads us to this **second rule**: "If you have a dominant strategy, use it" If we do not have a dominant strategy, this We must make sure that he will make the move and use the most appropriate move that can correspond.

If the dominant strategy of both sides, then both pressed strategy, namely from all the other possible strategies of each side using our au We look at whether that man is worse. Here, the **third rule should** be used if we can detect it. "The interests assessment under Suppressed strategies" have to do succession do not make a move on. If a dominant strategy emerges in smaller games in this progression, the second rule comes into play again and the emerging dominant strategies should be chosen. This approach will lead us to a simpler solvable result.

Finally, there is neither a dominant nor a suppressed strategy, or once the game has been simplified as much as possible, the **fourth rule is** applied. "Look for an equilibrium, a binary strategy where each player's action is better than can be given to the other's action." The result you will find is a **Nash equilibrium**.

John Nash's equilibrium, strategy games, such as thinking of making frames from apartments cycle so that others thought impossible to kill as manictheoreticalway is deđerlendirl. The goal here is to explore a result in which each player in the game will choose the strategy that best suits his or her opponent's strategy. If such a combination of strategies comes out, none of the players need to change their strategy unilaterally. The occurrence of such a result that each player finds the best response in the game according to the opinion of the opponent's preference and the response they both give is compatible with the opinion of the opponent, carefully puts the cycle of thinking (circle) of what the opponent thinks. Therefore, this situation is called the fulcrum or balance of the thinking systems of the players. This can be used as the definition of Nash Equilibrium. In addition, if the sum of the results of both players does not change in such games, this situation is called a fixed sumgame.

PART 5: Choice and chance

The best known and simplest example of the general situation in which random action is required is the penalty kick in football matches. This situation is called mixed strategies in game theory terminology. Both players will do their best to hide their intention from the other. For this reason, we can count this game amongs imultaneous move games. There is no Nash equilibrium in this game. What we need to do is present the shuffle as a new strategy, then look for a Nash Equilibrium in this expanded strategy environment. Right and left strategies in this game are called pure strategy.

An important general feature of mixed strategy balances in zero-sum games is that the best success percentage of the player and the best success percentage of the opponent are the same. This theory is called the Mini maks theorem. This theorem states that in zero -sumgames where players' interests are diametrically opposed , the player must strive to minimize the opponent's maximum return while the opponent tries to maximize his minimum return.

The fifth rule can be expressed as follows: if it seems disadvantageous for you to allow your opponent to anticipate your true preference in the game of forgiveness (zero-sumgame), it is in your best interest to randomly choose among your available pure strategies. The proportions of your mix should be a quality that your competitor can not take advantage of by applying a certain pure strategy among the strategies avail able to you .

SECTION 6: Strategic moves

These types of game-changing actions that ensure the player achieve a more successful outcome are called strategic moves. The reason for emphasizing this issue is todetermine what needs to be done and how. It was realized by Thomas Schelling that one or both actors did not make it one of the main issues of game theory to act to change the game .

A commitment is an unconditional move. On the other hand, threats and promises are more complex conditional moves. In such cases, you need to determine the rule of responding to your opponent's moves before the game. Threat is a response rule to punish anyone who doesn't act in the direction you want. The promise is an offer to reward the person who will act the way you want . The reciprocity rule describes the action you will make in response to the other player's move.

The general purpose of threats and promises is similar to the purpose of commitments , that is, to direct others to actions that differ from those they intend to do. In the context of threat and promise, it would be useful to consider the general purpose in two separate categories. If you want to prevent people from doing something they are trying to do, this is called deterrence. So the reflection of this in the mirror can be called compulsive .

There is a general classification of strategic moves in the display above.

All threats and promises have a common feature. The rule of reciprocity takes you to take precautions that you could not afford without it. If the rule only tells you to do what's best at the time, it's no different than a no-rulesituation. There will be no change in others' expectations of your future actions.

The rule has no effect, but there are still some notices in games and these notifications are called warnings and safeguards. If it is in your interest to send a threat, this is called a warning. On the other hand, if making a promise is in your interest, we can define it as a guarantee in games. Threats and promises are strategic moves, on the other hand, they take the form of warning and assurance if they are used to bring the role of information transfer. If we are making a threat or promise, we must do so clearly. Otherwise, we will not be able to convey to the other party what is prohibited or encouraged.

The cliffedge strategy that Schelling defines is often described as the first to take his adversary to the brink of disaster and blink first. You stand on the edge of the cliff and threaten to push the other person down to force them to fulfill your wishes. Undoubtedly, your adversary will pull you down with him. So, Schellin , the naive and simple threat of throwing his opponent off a cliff in coldblood is not reliable.

SECTION 7: Bring credibility to strategies

The birth of the problem of credible threatening begins with Adam and Eve changing the punishment that God promised them to give them after they were caught by God. If commitments, threats, and promises are not reliable, they will not help improve our game outcome. However, the main point we should focus on is the more mechanical aspects of strategic moves, that is, what should be done to change the game.

The first principle on the road to reliability is to change the payoffs of the game. Two general tactical groups are used for this. These are writing contracts to support your decision, creating a reputation for yourself, and using it. A second way is to change the game in a way that limits your abilities to such a degree that you have no chance to come back from a commitment. For this, the possibilities of interrupting communication, burning bridges behind you, allowing the outcome to take control of you and even leave it to chance can be emphasized. Sometimes building a bridge instead of burning a bridge can also be a reliable source of commitment.

If we combine these two principles and divide a large commitment into smaller parts, then the gain for violating one part can make you more than compensate for the loss of other parts of the contract. For this, the method of moving in small steps is used. When the lath is too high, both sides may not trust each other. But if the commitment problem is reduced to a sufficiently small scale, the credibility issue will resolve itself.

A third way is to enlist the help of others to maintain your commitment. So team work can help us increase credibility or appoint authorized representatives.

When you profit from making your strategic moves reliable, it will be in your favor to prevent other players from trying to give credibility to their strategic moves.

Reinhard Selten, Nash could be perfected the concept of balance, thus partially eliminating pluralism, the possibility of making incorrect moves players can be reduced revealed. This forces players to optimize their strategy even if the game takes an unexpected turn. This approach is very similar to the idea of looking forward, backward reasoning, but applies to simultaneous games.

Robert Aumann introduced the concept of common knowledge into game theory. To give an example, the two players have common knowledge on a subject; they both know this and they both know that each other knows, they both know that the other know this and it goes on forever. Over the past three decades, ideas and theories of information manipulation have revolutionized economic science and game theory, and have had a tremendous impact on other social sciences and evolutionary biology.

Thomas Schelling has made great contributions to the topic of commitment and strategic moves. The cue and discrimination strategies used to eliminate information asymmetries were developed by Michael Spence and the seide as were adapted by Joseph Stiglitz to many markets such as insurance, credit, and labor.

SECTION 8: Interpreting and manipulating information

We do not trust people to tell the truth because it may be against their interests. For this reason, people look for signs to learn the honesty of the other party in their bilateral dialogues. This issue can be encountered in pre-marital relationships or relationships in the poker game.

Some players know more than others about something that has consequences that will affect the mall. Those who have extra information take care to hide this information. Others are just as

determined to uncover the truth. Players who know less often tend to take that information straight from them. Game theorists have studied many tools that serve this purpose.

Actions explain more than words. Players should observe what another player is doing, not what they say. Each player should endeavor to manipulate their actions in a way that changes the information content, knowing that the other party will interpret their actions with the same understanding. These kinds of games of behavior manipulation aimed at manipulating the inferences of others and seeing others' efforts to manipulate our interests continue every day through out our lives.

Strategic players with special knowledge try to hide it, fearing that others will be harmed when they gain access to that information. And, when properly interpreted, they attempt to reveal information that will work for them. They know that actions, like their faces, leak information. They prefer actions that will increase this leak in their favor. These types of strategies are called signaling strategies. They will act in a way that eliminates or minimizes leaks against them; This is called a signal (signal) mixing strategy.

If you want to leak information from someone, you must set up a certain action if the information is of one kind, or a situation in which it is most appropriate for him to take another action if it is another type. Action (or inaction) then brings information to light. This strategy is called screening . Actions aimed at transmitting personal information about a player to other players are called beacons. In order for a sign to be a reliable carrier of a certain information item, there is a situation that makes it an optimal action for the player to take it only if and only if it has that special knowledge.

Whether different players use the discrimination and signaling strategies, the same principle underlies both, that is, it serves to distinguish between possible types of players and highlight the special expertise that one of the players has.

Giving no signs is sometimes an act that conveys information. It is often a sign of a bad incident, but not always. If the other player knows that you have an opportunity for action that points to something good about yourself, and you do not take that action, he or she will interpret it as you really do not have the good feature in question.

Everything you do gives a sign, not even sending any sign. For this reason, if you can give a sign about yourself, you should. Thus, you will distinguish yourself from those who can not signal. In some cases, the best way to give a clue about your talent or type is to give no sign, and you can get the insight that refusing to play the sign game. In some cases, the strongest sign you can send is that you don't need to give a sign.

This situation in which all types (or everyone with different types of information) exhibit the same behavior and therefore it is not possible to derive from this behavior, is called the collecting balance in the signaling game. Different types eventually meet in the same pool of signals. On the contrary, the type of balance that one type signals, another type does not, so that the action clearly defines or separates the types is called the separating balance. In order to derive the type probabilities of actions on the basis of observations, it is necessary to use a formula called Bayes Rule. Partial information can be extracted from the action to distinguish the two types, the result is called semi-separation.

The correct balance game mixing ratio of the person depends on the results he obtains. Observing a player's move provides information about the mix used and provides valuable evidence for

understanding the results the opponent can achieve. Betting strategies in poker are a prime example of this.

The most effective application of the concept of discrimination in your life is the one related to price differentiation. Firms use the concept of distinction when pricing their products and services. Some firms may use a system that can encourage customers not to deviate from their price preference. Such a constraint is called incentive compliance limitation. On the other hand, the requirement of customers to protect their purchase willingness regarding price is called participation restriction.

Examples given in the relevant book section:

Marriage decision

A lady asks him to tattoo the man's body to see if the person he is planning to marry is serious about the marriage. When the man does not do it, he thinks that he is not serious and leaves.

King Solomon Dilemma

Two women appeal to the king, claiming ownership of a child. The king tells him that he will divide the child in two and the part that will remain alive will go to the real mother. The real mother shows herself and wants her child to be given to the other woman rather than harmed.

Poker game

The poker player must always hide his hand behind a mask of instability. A good poker player should avoid regular movements and behave in such a way that they do not follow even the most basic correct game principles. This example gives an example of raising the pots of the floor at the poker table using Bayes' Rule.

The simplest probability table of the poker game can be expressed as follows:

	Raise	See	Escape
Good	$2/3$	$1/3$	0
Bad	$1/3$	0	$2/3$

Before your opponent speaks, you assume that the probabilities of his hand being good or bad are the same. You can get something out of his speech. If he runs away, you don't need to doubt his hand is bad. If he sees the ground, you'll know his hand is fine.

The calculation of probabilities due to the elevation of the ground is made by Bayes' Rule. The probability that the opponent player has a good hand, provided that he gets X bid, is equal to that person's probability of both good hand and probability of cloak X divided by the probability of always casting X. The player's escape means that his hand is bad. A good hand never runs away. If he says he must have a good hand, a poker player will never see if his hand is not good. If a boost comes in, things get a little more complicated. Since the player has a good hand, the probability of raising is $1/2 * 2/3 = 1/3$. On the other hand, the probability of increasing, i.e. bluffing, even though he is badly handed is $1/2 * 1/3 = 1/6$. Therefore, the probability of raising in total is $1/3 + 1/6 = 1/2$. According to Bayes' rule, the probability of having a good hand depending on the raising condition is a small part of the total probability of raising compared to when the player's hand is good. In this case, this ratio is $1/3 / 1/2 = 2/3$.

Used car purchase

The processes of pricing and bargaining were examined by examining the conditions such as buying and selling used cars, cleaning and insurance. Offering a guarantee is a reliable sign of the quality of the car. For example, if the estimated repair cost is 500 USD for a quality vehicle and 20000 USD for a poor quality vehicle, the buyer may say to give me a guarantee and give you 800 USD. This is a good offer for the dealer, but only if he knows his car is good quality. Every figure above 500 USD and below 2000 USD as a guarantee fee will lead good car dealers to act differently from bad car sellers. The buyer and seller can continue to negotiate in this context.

Fee amount as an MBA graduate

Candidates with an MBA degree are paid higher, and those who do not receive less. This issue has been studied in terms of discrimination and signaling. In this game, one of the candidates entered into a negotiation process with the employer and provided a better opportunity and got the job.

The cost of a specialist managerial skill in an unnecessary environment is 40,000 USD and in a necessary business environment the cost of an MBA is around 200,000 USD. Assuming people want to pay off the money spent on an MBA in five years, you would have to pay a candidate with an MBA at least \$ 40,000 per year and \$ 90,000 more per year. In this way, two types of certified candidate status, talented and non-talented, will rise.

MBA can also come across as a sign tool. This time, the candidate can choose to negotiate with the recruiter. And it can signal that he can work with a salary from \$ 75,000 instead of \$ 90,000 for work. This could be a clue regarding his loyalty.

Air ticket prices

Flight tickets are sold to tourist and business travelers. Business travelers tend to pay more for tickets. Based on this, business class passenger tickets are sold at higher prices.

Let's assume that 30 percent of customers are business travelers and 70 percent are tourists. Let's set up a scenario to make the calculation on every 100 customers. The table below shows the maximum price each group is ready to pay for each service class (technically we call it the reservation price) and the cost of these two different services.

Service type	Cost to company	Reservation price		Potential profit of the company	
		Tourist	Business	Tourist	Business
Economic class	One hundred	140	225	40	125
First class	150	175	300	25	150

Let's set up the ideal situation for the company. For example, let's assume that they can distinguish between types with customer at time. The company can create a perfect price separation. If he sells the first ticket to tourists for 175 USD, he earns $175 - 150 = 25$ USD. If he sells the economy ticket for 140 USD, he will make a profit of $140 - 100 = 40$ USD this time. Here, the second option is more suitable for the company. The best for the company is to sell the first class only to Business and the economy to tourists.

When this strategy is implemented, the company's total profit for 100 customers is as follows.

$$(140 - 100) * 70 + (300 - 150) * 30 =$$

$$40 * 70 + 150 * 30 = 2800 + 4500 = 7300 \text{ USD}$$

Although they are ready to pay 225 USD, they can give 140 USD and buy economy seats, which will earn them a consumer surplus of 85 USD. The company must provide business passengers with this excess that they will earn if they buy at least economy tickets. For this reason, first class tickets should be at most $300 - 85 = 215$ USD. Therefore, we see that the company can distinguish between two types of consumers.

Signaling through bureaucracy

People view bureaucratic delays and troubles as indicative of government incompetence, although these are sometimes valuable strategies for dealing with information problems.

CHAPTER 9: Cooperation and coordination

Success is determined by relative performance, not absolute. It is not possible to improve everyone's situation in zero-sum games. The winning chances depend on the reduction of inputs. The only way out of this dilemma is through an enforceable collective agreement.

In this section, examples are given where there are more losers than winners. Uncoordinated choices create greater problems for society with mutual interaction. When we look at the situations where there are various alternatives, it is obvious how the group fell down on the slippery ground and regret collectively. Some other examples have an extremely homogeneous structure. With some examples, a balance situation could be determined based on what the players thought about other players. In other examples, it was not possible to find a balance. The basic idea of this section is that the free market will not always lead to the right result. We should not expect that the coincidences of the past can necessarily be corrected in today's markets. Many situations that are important in life take place outside of the economic market. General courtesy is located in a spectrum ranging from clean air is often not priced, therefore, where there is no invisible hand to direct the selfish behavior.

SECTION 10: Auctions, bids and competitions

If there are a large number of applicants and a buyer together the job in a purchasing process, this is called a purchase tender. To bid at auction or auction requires a certain strategy. The problem arises when people get excited and price with their emotions. In this case, they may regret later. To get the job at an auction or a tender, it is absolutely necessary to define a strategy. Below we will describe the main auction techniques:

British and Japanese auctions

The most famous British auction type and style. In this type of auction, the price is increased starting from small. In this format the auctioneer stands in front of the hall and announces the constantly rising bids in loud voice. The ideal bidding strategy here is very simple; so much so that it cannot be called a strategy. You continue until the price of the product or service exceeds what you have in mind, and when it comes to that point, you withdraw. The hardest part is determining what you mean by "value". These values are very related products and is the amount you can afford to give to the service.

Values are two fold: private and common. In the world of special values, the value you give to a product has nothing to do with the thoughts of others about its worth. In terms of common value, there is a general value on which all participants meet, although every one may have different views on this general value. The value that buyers meet in a product or service can have both

common and special elements. While common values are valid, when determining the value of a product or service, it is important to know how many people bid and when they will withdraw from the tender.

The advantage in Japanese auctions is that when raising prices, it is clear how many people are active. Even if a participant wants to continue until the end, in the British auction, he can stay quietly. He can join later with a surprise exit. It is literally known how many people participated in the Japanese auction, and even what number they were drawn. Japanese auctions can be called a British auction where every one clearly shows their hand.

Vickrey Auction

At the Vickrey auction, bids are put in a sealed envelope. To determine the winner, envelopes are opened and the highest bidder wins. However, there is an intervention here. The winner pays not his own bid, but the second highest bid.

Income balance

At this point you understand that the Vickrey auction yields the same result as the British (or Japanese) auction method in the same step. The one who reaps the highest value in both wins. In both, the winning player will pay the second highest bid.

Buyer premium

Auction houses operate with a 20 percent buyer premium. Since the buyer knows this rule, what we need to do is assume that the buyer will take this into account when bidding because he knows this rule. In other words, the number that the buyer will set as the upper limit when raising the price should be twenty percent lower than the number determined for the purchase of the product or service.

Online auctions

Although the Vickrey auction technique was defined a long time ago, it is not used today. Nowadays, it emerges as the indispensable technique of online auctions. The world-famous eBay auction site has an application called bidding by proxy. We can compare this to the Vickrey auction. Proxy bids are reminiscent of the Vickrey auction. In the highest bid at the end of time people earn and pay figure is equal to the second highest bid by proxy.

Sniping (ambush bedtime)

People generally do not prefer to play directly empirically. They wait until the last minute, or even the last second, to put forward their best offers. This is called sniping (lurking). Bidnapper that will snip on your behalf, etc. There are internet services such as; they save you the trouble of waiting in front of your computer until the end of the auction to bid.

One of the powerful ideas of game theory is the concept of being result-oriented. What is meant to be stated here is to look at the results of the games and to follow the places where the steps you take result and act accordingly.

Closed envelope tender

The hardest part of sealed-envelope auctions is determining the number of offers to be given. This requires you to participate in the tender by setting a price slightly lower than the amount you have set for your bid. How far you will lower your number is the bid expectations of other

players. However, their offers also depend on your offers. At this point, it is always planning to end this endless loop as if you were the winner.

Netherlands Auction

In the Dutch auction, the bidding process works in reverse. The auction starts with a high price, goes down gradually and stops at one point. This auction is exactly the opposite of the Japanese auction.

Treasury bond

Each week, the US Treasury opens an auction to determine interest rates on national debt, at least for that weekly portion. Until the early 1990s, the functioning of the tender was that the winners paid the number they offered. With the encouragement of Milton Friedman and other economists, the Treasury switched to uniform pricing in 1992 and made this change permanent in 1998.

Priority game

The priority grabbing game is just like a duel. If you miss by firing prematurely, it is inevitable that your opponent will take over the move and shoot you. If you wait too long, you have a good chance of being hit without any opportunity to shoot.

War of attrition

The opposite of the war of priority is the war of attrition. The goal here is to overwhelm your opponent with your stamina instead of acting first. The essence of the game is not who will move first, but who will throw the towel first. This is a dangerous game, so making an agreement with the other player would be the most reasonable strategy.

Chapter 11: Bargaining

The best alternative definition to the agreement reached as a result of the meeting is used as a bargaining definition in games as "Best alternative to a negotiated agreement (BATNA). This definition describes the best alternative you can get if you can not agree with the other party. The bargaining process of unions with managers can be given as an example to this issue. This approach is used to measure the size of the cake. Often you want to raise your own BATNA and lower the other party's BATNA. Sometimes these two goals conflict with each other.

Bargaining can be done in a single issue or in many dimensions. When it is made in one dimension, there is a total amount and it is shared between the two parties. An example of bargaining in many dimensions is the bargaining of the unions over health, wages and pension rights.

Rubinstein bargain

If the end date of the game is not known, it is impossible to solve the bargaining problem. It is only possible to answer this with an ingenious approach developed by Ariel Rubinstein. In this bargaining game, the parties bid alternately. The offers are about how the cake will be divided. The more patient gains more in this game, and most of the cake goes. Certain situations in the games foster impatience. The party that controls impatience wins in this bargaining game.

SECTION 12: Voting

As with other multiplayer games, there are strategic elements in the voting process. Voters often face factors that encourage them to misrepresent their true preferences. This is what the majority of issues guidelines nor any beer can solve the electoral system, because picking a perfect system that reflects the preferences of individuals in the form of the people's will is not in question. The most used electoral system is the simple majority rule.

If your vote does not change the situation, you can vote as you please. But if your vote can change the situation, then you have to act strategically. An ideal electoral system is one that unites people in a way that expresses their individual preferences and will, without directing them to act strategically. The conclusion reached by counting and collecting the votes in any way is definitely flawed. In practical terms, this means that there will always be factors that guide people to act strategically. Thus, the election results will be determined by this process as much as the choices of the voters.

In the US legal system, it is first decided whether the suspect is guilty or innocent. The punishment to be imposed is determined only after the suspect is found guilty. It can be considered that this is a relatively minor point regarding the method of judgment. However, the order of priority among these decisions may mean the difference between life and death, or even between conviction and acquittal.

It would be appropriate for candidates to determine their position in an election environment in advance. Does the voter have a definite decision or is it ambiguously the voter in the middle? Therefore, it is also strategic for candidates to decide on their positions. The advantage of the middle position rule is that there are no factors that encourage any voters to overturn their choice. Giving the right vote is the dominant strategy for every one. The only problem with adopting the middle voter position is the limitations in implementation. This option is only possible if everything can be reduced to a one-dimensional preference, as in the liberal-conservative opposition. However, it is not easy to classify all issues in this way.

The US Constitution is also mentioned in the voting section. The reason for this is that the authors wanted to show the durability of this Constitution within the scope of game theory.

SECTION 13: Incentives

Why don't socialist economies work right? The reason for the collapse of the five-year development plan, elaborated by Stalin and his successors, was that workers and managers lacked sufficient incentives. Most importantly, it puts the good worker on the same level with the enough hones to manage. There was nothing that encouraged people to take initiative or to innovate, but there were every reason for them to get too easy, for example it was enough to just fill the quota without improving quality.

There are incentives for an academic writer while doing the essay reading of the book. However, if the author asks students to help with this, they have no encouragement. In order to increase accuracy, the author must set an incentive for students. This incentive is a financial aid for accuracy.

Many incentive schemes give incentives linearly. For example, it is a linear incentive for a company to give stock to its employees. Other common payment programs are not distinctly linear. The most typical example of this is incentives based on whether the result exceeds a predetermined threshold or allocated quota.

There are two main aspects to an incentive scheme: the average pay to the worker enough to overcome the participation constraint, and the pay depending on whether the outcome is good or bad to encourage him to do more. The wider the difference between these two, the greater the potency of the incentive.

We pay productivity wages because we have to pay the worker enough to convince him to work at our company and adjust this amount in a way that encourages careful effort. This way we get a control over the productivity of the worker.

Employees often have more than one task. In such cases, incentives for different tasks may interact with each other. Ultimately, the overall effect depends on whether these two tasks are substitutes or complementary to each other. In a situation where tasks are interchangeable, incentive incentives to an effort in one direction will have a negative effect on the end result in another.

In many companies and organizations, there are many people doing similar or even exactly the same tasks at the same time. This situation will reveal competition among workers. This situation can be overcome by paying according to relative performance with the appropriate incentive system.

Most organizations of any size consist of many layers. Companies have a hierarchical structure such as shareholders, board members, senior management, middle management, chief and line worker. Each of these levels is in charge of the lower ones in the hierarchy and is obliged to provide them with appropriate incentives.

In some organizations, the control structure is not pyramid. In work places where the pyramid is reversed, a worker is responsible to more than one boss. We encounter this situation mainly in the public sector.