

PRINCIPLES OF BEHAVIORAL ECONOMICS

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Week 14

Lecture 14

So, welcome to the course on principles of behavioral economics. This is lecture 14. In this lecture or module, I'm going to talk about biases. So, first of all, how do we define biases? In theory, a bias is a cognitive or emotional distortion in decision-making.

And I'm going to give you an example—a very celebrated example—of what kind of biased decision or judgment we may often make. So, look at these two tables. Suppose you are planning to buy one coffee table; which one would you prefer for your house? This one looks thinner, longer. This is basically a rectangle.

And this one, though a rectangle, is more towards being a square. Now, when people were asked to guess their sizes or the proportions of their sizes, typical guesses were that the ratio of the length to the width is 3:1 for this table and 1.5:1 for this table. But when you actually use a pen, pencil, or stick to measure, you would find that this length is exactly equal to this length, and this is exactly equal to this length. Now, this is, of course, something that cannot be explained—why we perceive it to be like this—but this is why it is a celebrated concept.

that even though they look so different but actually they are the same in terms of their width and length proportion they are the very same they are of exact same size, for example if you look at these two table tops the pictures are taken from the top. Most people would consider them to be identical, they are actually identical and these two are actually the pictures of these two table taken from the top so it's only a visual manipulation The way they are drawn, they look very different, but they are actually the same. Now this is a case where seeing is not believing.

These two figures capture the key insight that behavioral economists have borrowed from psychologists. In order to understand how human minds work, we need to explore some aspects of human thinking before we get more into biases. So many psychologists and

neuroscientists have been converging on a description of the brain's functioning that helps us make sense of these seeming contradictions we observe in human behavior. Like we are very good at some but dumb at others.

So you might see individuals, those who are, they are genius but then it is quite possible that they often forget many petty things still important things. There are genius who were at least autistic when they were children. So there have been certain, you know, weird observations. We might be best at something, but then we may lack certain basic qualities or lack something in terms of our behavior.

So this approach involves a distinction between two kinds of thinking: one that is intuitive and automatic, and another that is reflective and rational. We will call the first the automatic system, which is intuitive, and the second one the reflective system. How are they different? The automatic system is rapid and feels instinctive, and it does not involve what we usually associate with the word 'thinking.' So whenever our actions are not a result of thought processes.

When we react immediately without thinking much about what we are going to do, then they constitute or come from the automatic system. The activities of the automatic system are associated with the oldest part of the brain, the parts we share with lizards, and maybe with puppies also. The reflective system is more deliberate and self-conscious. So when we think about something and then respond, that is actually caused by the reflective system. For example, if somebody throws a ball at you, your automatic system tries to escape it or helps you to stop it.

But the reflective system is more like when exams are approaching, and we know that we need to study. Then we study. That is basically a well-thought-out decision. Similarly, whenever we do math problems, whenever we do any kind of calculations, whenever we make decisions about investments, or play games that require thought processes, for example, chess, they are all outcomes of the reflective system.

So, some of the features of the two cognitive systems are listed here. The automatic system is an uncontrolled system; the reflective system is controlled. This is effortless. These are natural reactions. We do not put any effort, but this is effortful.

Associative, deductive, fast, slow, unconscious, self-aware, skilled, and rule-following. So when you talk about skills, it is almost like there are certain things—of course, we can also train our automatic system to be a reflective one. That is, or we can, through training, make

our reflective system an automatic one. For example, the very first day someone goes to play, say, tennis, they will not perform well. So then, each and every move could be, to a large extent, driven by the reflective system.

You need to understand the basics of the game—how to play, what the rules are—then you go slow, make a lot of mistakes, and learn from them. And then, when you become an expert player, to a large extent, many times your actions are driven by the automatic system. So you have actually trained your mind in such a manner that it has moved from the reflective to the automatic system. Similarly, when we learn a language for the first time or when you are initially learning a language, then that is our reflective system. We need to memorize a lot of things—the entire alphabet, then its applications.

We go very slowly, we read slowly, we write slowly, we understand slowly. But if I start living in a country or a place where that language is spoken, then over a period of time, I have already trained myself, my brain in such a manner that it becomes part of an automatic system. So maybe after staying in a place for 10 years, 15 years, it is my automatic system that is asking me or driving my ability to speak that particular language. For children or most people, their native languages are the languages they grow up learning, listening to, and speaking.

Then they speak that language using their automatic system. But the reflective system is used whenever we try to learn a new language. So let's give some more examples. For each of the questions, begin by writing down the first answer that comes to your mind. So when I say that...

Writing down the first answer that comes to your mind means I am asking you to use your automatic system to answer that question. Do not go for any calculations. The moment I get into calculations, this is basically the reflective system. So the first question is: a bat and ball cost \$1.10 in total. The bat costs \$1 more than the ball.

How much does the ball cost? In terms of cents, it has been observed that most people say 10 cents. In fact, I have also asked students who came for some interviews. I have also asked this question in class. Of course, people most often, whenever they take time to answer, do the calculations and get it right.

But otherwise, many people—there are several who make mistakes also. Still, it's a pretty simple question. The next one: if it takes five machines five minutes to make five widgets, how long would it take 200 machines to make 100 widgets? The answer most people have

given is 100 minutes, but the actual answer is still five minutes. The third question is: in a lake, there is a patch of lily pads.

Every day, the patch doubles in size. If it takes 48 days for the patch to cover the entire lake, how long would it take for the patch to cover half of the lake? Read the questions thoroughly—read them again and again. Most people say it would take 24 days because since many times we use the term 'half,' and every day the patch doubles in size.

So, of course, it is doubling in size, so we understand that we need to go for half. So, most people say 24 days. Shane Frederick finds that these are the most popular answers, even among bright college students. So, it's not that only individuals—those who are poor at calculations, those we may call laymen— would answer like this.

Unlike humans, ECON never makes an important decision without checking with their reflective system, so basically, they think about each and everything repeatedly. So, going back to the answers: the answer to the first question of bat and ball would be 0.5 cents as the price of the ball. The second one, I have already mentioned, is five minutes. And the third one—this is 47 days. Because in 47 days, on the 48th day, it would actually be doubled. Whatever is covered, the lily pad would be covered.

So, in order to come up with correct answers, many people—or most people—if they use their automatic systems, would give wrong answers. If they use the reflective systems, then they will come up with the right answers. Okay, now, having talked about the two systems that basically help us in our decision-making, I am now going to talk about some of the biases that we encounter most often or that are reflected in our behavior very commonly. Most often, the biases are caused by our automatic system, so these are the biases that I am going to discuss in the following. Optimism and overconfidence, loss aversion, disposition effect, illusion of control, hindsight bias, and the conjunction effect or conjunction fallacy.

Talking about optimism and overconfidence, unrealistic optimism is a pervasive feature of human lives. They result in a lot of risk-taking behaviors, especially in the domain of life and health. Overconfidence is when one's perception of or judgment on his or her ability to perform some task exceeds the actual objective outcome. Thaler reported that in a prestigious university in the US, 94% of the professors considered them to be above average. So as you understand that if 94% is above average, then this is actually mathematically is an impossible thing.

So this is ideally driven by optimism and overconfidence. Overconfidence is common even when the stakes are very high. Overconfidence has been defined in three ways. Overestimation of one's actual performance. So this is most common among many individuals including students, including managers, professionals.

They are at times overestimate their ability to perform, how they are supposed to perform. Whenever we say that over term or whenever you use the term over, this means that basically there is actually the assessment is wrong. So the problem is that out of overconfidence or when one goes for overestimation of one's actual performance, then possibly he or she will not prepare that well for the exam, not prepare well for fulfilling his or her target. So these are the problems that may arise.

Over-placement of one's performance relative to others. So I always consider myself superior to others. Over-precision in expressing unwarranted certainty in the accuracy of one's belief. Examples include students' expected performance. Success in marriages, this is an important example as quoted by some of the studies.

In the US, the divorce rates are very high. So even some, you know, 50 years, 40-50 years ago, the rates were as high as 50%. It could be even higher today. Nevertheless, when people are very much confident that their marriage is going to be a successful one, they are going to be happy, they are going to live happily ever after after their marriages, then that's an outcome of overconfidence.

In a similar fashion, most people when dating someone else, actually experience breakup. Nevertheless when you start dating you are optimistic about your possible relationship you know that a breakup is going to break your heart badly Nevertheless you choose to date because you are optimistic that your heart is not going to be broken Your partner is a nice person. You probably have made the best decision by choosing him or her.

Then we have confidence about one's profession, including entrepreneurship. Entrepreneurs are most often found to be extremely confident about their success rate or possibility of success, though the success rates are actually not really that high as estimated, understood or predicted by them. Unrealistic optimism can explain a lot of individual risk taking, especially in the domain of risks to life and health. When they overestimate their personal immune from harm, people may fail to take sensible preventive steps.

So that is definitely there that if I'm too much confident, for example, even during now we all can relate that during Corona, some people were confident that I'm not going to be

impacted or affected by Corona. Even if that percentage were at that point of time very low, it's not necessary that there is high percentage of overconfident people are all the time roaming around us. Nevertheless, there would be some percentages always. So then probably they were risking their lives more compared to other individuals.

Those were more careful. If people are running risks because of unrealistic optimism, they might be able to benefit from a nudge. So what is nudge? How it is going to impact the individual's decision making? Why we need it?

That we might cover in a later module. It's definitely a very important outcome of behavioral economics as a subject. Next, talking about loss aversion, it is associated with the fact that the pain of losing is psychologically much greater, typically at least twice as estimated empirically by learned scholars, than the pleasure derived from an equivalent gain. Loss aversion produces the inertia to hold on to your current belongings.

That is a strong desire to stick with your current holdings. I do not want to be parted from the things that I have. This is the concept of loss aversion, where interesting experiments have been conducted. For example, we talk about first an experiment with Mugs Trading. So in a university, half the students in a class are given coffee mugs with the insignia of their home university embossed on them.

And the other half are asked to examine their neighbor's mug. So they do not have anything. They did not get mugs. Then the mug owners are invited to sell their mugs, and non-owners are invited to buy them. They were asked to quote prices at which they would be willing to sell and they would be willing to buy.

The results show that those with mugs demanded roughly twice as much to give up their mugs as others were willing to pay to get one. So suppose I am a mug owner; if I am asking for 200 rupees for the mug, then someone, a non-owner, is actually willing to pay only 100 rupees for the mug. So we can see that this could be an average observation. On average, it was observed that the owners were ready to accept a price that was twice as large as what the non-owners were willing to offer.

So this is loss aversion. Again, this implies that you want to hold on to your belongings. And you value it more than the person who does not have it, and that's why you are asking for more. Losing it or giving it away is a loss. You want to avert it, and as a result, you are asking for a much higher price.

This means that people do not assign specific values to objects. They were mugs. So we do not assign any specific value to it, but rather, it is a completely subjective perception of how we value it. When they have to give something up, they are hurt more than they are pleased if they acquire the very same thing. In another experiment, half the students in a class received coffee mugs, and half got large chocolate bars of the same value.

And when they were actually given the option between choosing mugs and chocolate bars, most of them were pretty much indifferent between getting either one. So it's not that they associate any particular value, or that most of them valued mugs over chocolates or chocolates over mugs. But when offered the opportunity to switch from a mug to a candy bar or vice versa, only 1 in 10 switched. So when the individuals were later asked if they would be willing to exchange their mug with chocolate from another person, only 10% of the individuals were willing to switch or go for an exchange.

Again, this reflects that we want to hold on to our belongings. There are examples with bets as well. Suppose in a bet a coin is tossed, and for heads you win X , for tails you lose \$100. If asked how much X has to be for you to take the bet, for most people the answer is somewhere around \$200. So X takes a value of \$200 for the majority.

This implies that the prospect of winning \$200 just offsets the prospect of losing \$100. So you are indifferent between winning \$200 and losing \$100, which implies that loss actually pinches you nearly twice as much. Next, we talk about the disposition effect. The disposition effect describes the behavior of investors or financial professionals when they sell winning positions too soon or hold losing positions too long. Investors should sell losers for tax reductions because if you are not making any money, you do not have to pay any tax.

On the other hand, if you are making money through investment, for example, I have invested one lakh rupees in shares. Now they have grown up, say after 2 years, they have become 2 lakh rupees. So if I now sell my position, then I have to pay a tax. There are certain basic exemptions. After that exemption, I have to pay a tax in India of 12.5%. So this is called long-term capital gains tax.

So that's why neoclassicals say that I will not be willing to sell my winning positions because by selling them, I'm going to pay a tax on it. But there is no harm in selling the losing positions. Because I do not have to pay anything on that. Rather, it is possible in the US that the losses are subtracted from your income. So there is actually tax saving, or it is possible that there would be tax savings.

All decisions on shorting or longing should depend on the expected future value of security and not the purchase price. This is what rational decision-making suggests, that is, neoclassical suggests. Shorting is like taking the seller's position; longing is taking the buyer's position. So whether you would be selling something or buying something would depend on the expected future value of security. The disposition effect (DE) is driven by expected feelings of pride and regret.

Pride about having made the right decision when selling at a gain. So when you are making profit, you take pride in it that I have made so much of profit and feeling of regret about having made a wrong decision when selling at a loss. They say that you are unwilling to sell at a loss because you would be ashamed of talking about it. You will regret that I made a wrong decision this is not a good investment so that's why I run into a loss so you would not feel like talking about it on the other hand making money makes you feel proud of your investment next we talk about illusion of control illusion of control is a belief that we are able to

control or have influence over some events, while the actual outcomes of these events are beyond our control or understanding. See, this is extremely common. This is common in our behavior on a daily basis. The head of the family wants to control the entire family. Even the children are very small when they grow up in all possible situations,

there is always a conflict between the parents and the children only because of the fact that the parents suffer from some illusion of control. I should have control over my family members. my wife, my children and whosoever is actually dependent on me. In a similar fashion, when we go to the class as a teacher, we think that we should have some control over our students. So this is again illusion of control.

As time passes, we are finding it more and more difficult to actually control individuals or keep individuals under control as head of the family or as teachers or being in any other position. But why does IOC or illusion of control occur? Traditional theories believe that humans have strong motives to have control over life events and their environment. Studies show that controllability dimension is considered an achievement and the failure of this measure may be attributed to personal causes. So as you understand that the more I am able to control

things around me, including my family, my environment, the things that are happening around me every day, whatever I do, I will get more and more satisfaction. So it is related to the sense of achieving something. Thus, IOC is a defense mechanism associated with

self-esteem for either an individual or in some cases for a nation even. The most noticeable instance of IOC in real life occurred in the risk management in the banking sector, which significantly contributed to the 2008 financial crisis. When IOC indeed encouraged more risk-taking, that ultimately became uncontrollable.

So when the companies, the banking sector, some of the financial companies, they were issuing or creating new instruments and issuing them, they thought that they will have the entire situation under control. They could never imagine that it is going to get into such or result in such a disaster. So that is why it is said to be a classic example of illusion of control. Gamblers tend to throw the dice harder when they need higher numbers, evidencing an implicit belief that with skill they can somehow control their fortune.

Gambling and there are many other games also. For example, even the game of Ludo. There are things that are We do not require skill to win the game. It's completely a game of chance.

Nevertheless, even when we were children, we remember that while playing Ludo, we used to, when we desperately needed a higher number, we would shake the bottle as much as possible and throw it hard on the board. That gives us some sense of illusion of control that by doing this, I may get the desired number. Participants in a lottery experiment believed they had more control over the outcome if they chose their numbers rather than having them randomly assigned. So there are many instances where we prefer particular numbers.

We consider them to be lucky numbers. Again, this is a case of illusion of control. While IOC may affect the quality of decision-making, others argue that it can foster mental health as people receive satisfaction by exerting some level of control in their lives. IOC also motivates people to be persistent at some tasks when otherwise they would have actually given up. Studies observed that there is an adaptive effect of optimistic beliefs about control and performance in circumstances where control is possible.

Next, we talk about the hindsight bias. Also known as the knew-it-all-along effect or creeping determinism, it is a tendency to overstate one's ability to have predicted an outcome, or the belief that one actually predicted it correctly, whether expected or unexpected, after the outcome is known. It is associated with or triggered by false memory, anchoring, overconfidence, and personal motivation. The study of false memory was initiated by psychologists Pierre Janet and Sigmund Freud.

In severe cases, the person who has false memory recalls a memory that did not actually occur or did not occur at all. In less severe cases, people recall or distort their foresight predictions, which they did not actually make before the events occurred. Take some examples. An example of false memory in the context of hindsight bias could be a student not good in mathematics anticipating failing in it. But when the results come out and he sees a B-plus grade, he tells his mother, 'I knew I could pass that exam,' and eventually convinces himself that he knew it in foresight.

So this is hindsight bias. The HB is revealed through multi-factor deficiencies and traits of limitations in humans. For example, selective memory retrieval, anchoring, and the illusion of foreseeability are representations of self-fulfilling prophecy. We give some examples; in the case of anchoring in hindsight bias, anchoring is a kind of heuristic, which we are going to talk about at length in a later module. It simply says that you basically anchor your understanding on something.

So your idea or decisions are basically anchored on a particular thing. So suppose an investor, after reading predictions about gold price movements in the future, invests in gold. So his investment is anchored by the predictions that he read about. Now when the prices actually go up, he claims, 'I knew I predicted it right that it would go up.' But you understand that he actually did not predict it.

He read about it and invested accordingly. So the credit that he is asking for, he actually does not deserve. So this is one example of using anchoring in hindsight bias. And the last bias that we talk about is the conjunction effect or fallacy. Using formal logic as a norm, Kahneman and Tversky had determined in their initial experiment that conjunction is a fallacy

since the probability of two things being true can never be greater than the probability of either one of them being true, while each must be true in order for both to be true. Alternatively, two possibilities together, hence in conjunction, are always less than, if not equal to, the probability of either of the probabilities in mathematical terms. So in simple terms, what it says is that the probability of A and B happening together, which is denoted as probability A conjunction B, is less than probability A, less than or equal to probability A, as well as less than or equal to probability B.

If I give you a very simple example, suppose the probability of today being a rainy day is 0.3. The probability of having a thunderstorm is 0.2. So this is my $P(A)$ and this is my $P(B)$. The probability of A conjunction B, that is, it being a rainy day where there will be a

thunderstorm as well, is actually 0.3 multiplied by 0.2. Under the assumption that these two events are independent, it turns out to be 0.06.

So 0.06—you can see that this is actually smaller than 0.3. This is also smaller than 0.2. This is also smaller than 0.2, the probability of B. So this is what it tries to say: that this is mathematically true. But in our decision-making, we many times reflect the conjunction fallacy in the sense that we consider the occurrence of two things together. The probability of the two things happening together is greater than the probability of the individual event.

We will be taking some examples. This is one example that was given by Tversky and Kahneman in 1983. There is a description of an individual called Bill. Bill is 34 years old. He is intelligent but unimaginative, compulsive, and generally lifeless.

In school, he was strong in mathematics but weak in social studies and humanities. Rank the following statements from most probable to least probable. So, what do you think Bill is like? And your ranking would actually reflect the probability of Bill being a particular thing or having this particular characteristic feature. And these are the options.

So, Bill is a physician who plays poker for a hobby. The second one is: Bill is an architect. Bill is an accountant. Bill plays jazz for a hobby. Bill surfs for a hobby.

Bill is a reporter. Bill is an accountant who plays jazz for a hobby. And Bill climbs mountains for a hobby. So, these are the options. You rank them.

That was given to a bunch of students. The results showed that 92% of 94 undergraduates at the University of British Columbia gave an ordering with A greater than E greater than C. So option A was probability of being accountant, E accountant and plays jazz, and B plays jazz for a hobby. So you can see that if this, I call this my probability A, And I call this my probability B. Then probability A into B cannot be greater than probability of B. So this is the conjunction fallacy.

Further the ranking E greater than C that is accounting and plays jazz and plays jazz for a hobby was displayed by 83% of 32 graduate students in the decision science program. Just see, they were in the decision science program of Stanford Business School and all of whom had taken advanced courses in probability and statistics. Nevertheless, they made this mistake. This violates the rule of probability that for all x and y, p probability y greater than equal to probability x conjunction y. So simply, there are a lot of evidence in favor of conjunction fallacy. But I will conclude this with some comment on the conjunction fallacy.

Why is it observed? Researchers have observed that it is an error to impose the rules of probability as the norm for making rational inference under uncertainty and researchers have mistaken intelligent inferences as reasoning errors. In a series of studies, it is shown that people infer non-mathematical meaning of the term probability. So though Kahneman and Tversky wanted to understand the mathematical implications or try to extract the mathematical implications,

They actually did not treat that ranking as having any probabilistic implications. There is evidence that the term frequency narrows the spectrum of possible interpretations of probability down to its mathematical meaning. If frequency is used in place of probability, then people would consider it a mathematical term, treat it more mathematically, and make fewer mistakes. Tversky and Kahneman also tested the conjunction fallacy problem by using frequencies instead of probabilities. They found that the effect of thinking diagrammatically sharply reduced or eliminated some forms of the conjunction fallacy.

So some forms of the conjunction fallacy were eliminated or reduced. When the statement was rephrased as: 'There are 100 persons who fit the aforementioned description, that of Bill.' 'How many of them are, say, accountants out of 100?' 'How many of them are accountants and play jazz as a hobby?' When questions were framed like this, they observed that people did not make the conjunction fallacy or that kind of mistake.

Rather, they could then apply the proper concept of probability. No conjunction fallacy was observed by them. I conclude this module with discussions up to the conjunction fallacy. These are the references used. Thank you.