PRINCIPLES OF BEHAVIORAL ECONOMICS

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Week 43

Lecture 43

Hello everyone, this is Lecture 43 of Principles of Behavioral Economics. We are currently in the topic of intertemporal choice modeling. In the previous module, I was giving some examples of how people are pretty bad at predicting their future well-being, their future state of well-being. So in that context, we will continue with another example to define something called projection bias. We take an example about choosing a college based on weather.

It is a common theme for students to turn down better educational opportunities for climates that are more amenable to beachgoing or other outdoor sporting activities. One would thus expect that visiting a college in the northeastern United States, a region known for its bad weather, on a day with particularly bad weather might lead students to question whether they could survive four years of such punishment. However, suppose the school had very little in the way of social or outdoor activities in the first place. At one academically challenging school, Uri Simonsohn found that visiting on bad weather days increases the probability that the potential student will actually enroll.

So here, as you understand, we are talking about the impact of weather conditions on making a decision about whether to enroll in a particular college or not. This is one academically challenging school in the sense that academics are more challenging here. And if a student is visiting that school on a bad weather day, then Uri Simonsohn had found that that increases the chance that the student will actually enroll in that school despite it being academically challenging.

Now, why is this happening? This is what we are going to understand the psychology or the thought processes behind it. He analyzed the decision of 562 applicants who had been admitted to the school and who had visited the school before making a decision to enroll. Of the 562 visitors, 259 eventually decided to accept the offer of admission. He then used data from the National Oceanic and Atmospheric Administration collected from the

weather station closest to the school on cloud cover for each day students visited the university.

Cloud cover is measured on a scale of 0 to 10 with 0 being completely clear skies and 10 being completely overcast skies. Amazingly, he found that an increase in cloud cover by one point increases the probability of accepting the offer of admission by between 0.02 to 0.03 depending on what other control variables are used. So, broadly increase in cloud cover increases the probability of a student getting admission in an academically challenging school. At first glance, one might think this suggests that prospective students are attached to cloudy places, which seems actually counterintuitive.

Rather, Simonsohn argued that this result occurs because the way people evaluate the options they will face in the future is biased by the options that are currently at hand. Alternatively, the current situation is guiding their decisions about future outcomes or their future decisions. When it is sunny, one might wish to spend time outside engaging in recreational activities rather than hunkered down with the textbook. Being taken on a tour of a prestigious university on such a sunny day might underscore the lack of available recreation there. So, since the day is not basically very sunny, the prospect of utilizing recreational activities might not be coming to the minds of the students.

So, they that is how stick to rather alternatives which are like studying. On the other hand, if it had it been a very sunny day then visiting an academically challenging school would remind you that this school requires more engagement more rigorous engagement with studies and less of recreational activities so In a beautiful day like this, I might not be able to engage very well with recreational activities.

So, I would not prefer to enroll myself in this college. That kind of thought may come in the minds of students. Thus, when students consider the prestigious school, that is the academically challenging school versus a school with more recreational options, they might opt for the school with more recreational opportunities if they are visiting on a sunny day, not wanting to be stuck indoors with their textbook when the sun is shining. Visiting when there is significant cloud cover can make outdoor activities less attractive.

In fact, about 78% of students polled report that they prefer studying on overcast days than on sunny days. The students who visit the prestigious institution when there is significant cloud cover are in a state in which they prefer studying more than they would otherwise. This experience colors the projection of the utility they anticipate that they will experience in the future when attending the school. So ideally the present situation is influencing their

decision or in fact their anticipation about future state. So if it is cloudy right now they anticipate it to be cloudy in future as well. And accordingly, they think that they have to study more, less of recreational activities.

So if I have to study more, then why not enroll myself in a prestigious university where academic is more challenging. On the other hand, if they are visiting on a sunny day, then they anticipate similar kind of days in future. And sunny days are best for recreational activities. So then you think that days are going to be like this in future when I should engage myself in a lot of recreational activities and

an academically challenging university or institution might not have much to offer in terms of recreational activities. In that case, the student will prefer to enroll himself or herself in the institute or university where there are more recreational activities. In this case, they suppose that they will not mind the lack of outdoor activities and decide to go to the prestigious school when there is cloud cover. Hence, college admission offers at academically challenging yet recreationally challenged schools across the country regularly hope for rain. So basically, if it is rainy, there are cloud cover, then

students visiting the university, college, school would have a preference for this kind of places and accordingly they hope that there should be more rain so that people take interest in academically challenging but recreationally challenged schools. There are a number of features of the DUM that now need to be examined since these relate to the implicit psychological assumptions underlying the model. The key to both the college admission story and the example dealing with kidney disease is projection bias. Projection bias supposes that people believe they will value options in the future the way they value them today.

They tend to ignore the impact of some factors that should change in the intervening time. For example, when we talked about the kidney disease problem or the case when the individuals were asked about how they would expect their life to be if under dialysis then what happens is that it is always like as it is mentioned that they will value options in the future the way they value them today so now when I am completely healthy living with dialysis is very bad for me but then when actually one individual is surviving on dialysis, his or her interest for survival may still be very high and accordingly they would value probably much higher their state of being

as compared to what a healthy individual perceives. So, that is why it is said that they tend to ignore the impact of some factors that should change in the intervening time. In the case

of weather and college admissions, the individual observations of weather—whether cloudy or sunny—have little to do with the overall climate. So, one particular day could be cloudy or sunny, but that does not mean the weather conditions will be like this for the rest of the year. At a university, on any individual day, a student who chooses to engage in an activity will obtain utility.

So, one gets utility from activities under two conditions. The conditions are which university you are enrolled in and what the weather conditions are. Where activity represents the chosen activity with possible values. So, here we are considering two alternative activities. Study and recreate.

University represents the chosen university, which can take on the values prestige and party. So, the university which is academically challenging is called prestige, and the university that is not very academically challenging but offers many recreational activities is referred to as party. And W represents weather, which can take on the values cloudy and sunny. So, what we are trying to understand is that individuals are getting benefits or satisfaction from activity which are conditional upon two things that

which university they are studying in and what are the weather conditions. Suppose that at the prestigious university, recreation options are very poor but still just slightly better than studying. Thus, on a sunny day, a student decides to recreate, receiving utility from recreation, provided that he or she is studying at a prestige university and the day is sunny. With U study, conditional upon prestige and sunny, less than utility from recreation, conditional upon prestige and sunny.

So, this less than sign implies that If a student is studying in the prestigious university and it is a sunny weather then he or she would get more utility by recreational or through recreational activities compared to study. But on a cloudy day the student chooses to study so the utility from recreational activities provided that he or she is studying in the prestigious university and the weather condition is cloudy, is less than the utility he or she is going to get from studying under the same university and same weather conditions.

So if it is sunny, then if the student is studying in prestigious university, he or she would get more utility from recreational activity. If it is cloudy, then the student is going to get more utility from study provided that they are studying in prestigious university. Suppose that at another university that is the party there are poor opportunities for studying. The studying at the party school is utility from studying given that the individual is studying in party university or party school under any weather conditions would be less than the utility

he or she would get from studying if he or she is studying in the prestigious university under any weather conditions.

So, what it yields is that utility from studying in the party university is lower than utility from studying in the prestigious university which is strictly lower than the utility for studying at the prestigious university on either sunny or cloudy days. There are spectacular opportunities to recreate at the party school. Therefore, recreation when it comes to prestigious university and the weather is sunny is less than the utility from recreation if the individual is studying in party school and the weather condition is sunny.

So now you can see that here we are comparing across university or institutions. So first we said that studying always is better under any weather conditions if it is the prestigious university. And recreation is always preferred or when it is specifically sunny weather, then recreation is always preferred if the student is studying in the party university. Recreating when it is sunny is always chosen. However, when it is cloudy, despite the poor opportunities to study, studying is preferred to recreating.

Therefore, what we are trying to say is that when it is sunny and the individual is studying in party. then the utility from studying is less than the utility from recreation when the student is studying in party and it is cloudy. Further this is this recreation in the party school when it is cloudy it is less than the utility from studying in the party school when it is cloudy and which is less than the recreation from or utility from recreation when it is party school and then it is sunny. So, here you see that we have party the condition is always the same that the individual is studying in party.

So, the options are basically designed or written in ascending order of utility. When it is sunny then studying gives the lowest utility followed by recreation when it is cloudy. because studying opportunities are less in that university. And of course, you do not want to study on a sunny day. It is worse than recreation on a cloudy day.

And then this is actually said to be worse than studying or in a cloudy day and finally recreating on a sunny day is providing us the maximum possible utility. So these are the two situations which people look forward to. So on a sunny day you recreate you get the maximum benefit when you are studying in party university. If it is a cloudy day, then you are of course better off by studying if you are studying in part university.

Now, since the studying opportunities are less in that university, so now we are swapping the activities with the weather conditions. On a cloudy day, you do not prefer to do

recreational activities. On a sunny day, you do not want to study. But since this university offers poor opportunities for study, so on a sunny day, studying gives the lowest utility.

On a cloudy day, recreational activities are still preferred. And after that comes the situation, the two situations, which is basically rather paired in a favorable manner. Suppose every year exactly half of the days are cloudy and half are sunny at both schools. Thus if the student in question decided which college to attend, we could write the utility of the prestigious university as N by 2 that is half the days. She is going to get utility from studying.

Of course, this is Prestige University, and the weather condition is cloudy. And half the days, she is going to get utility from recreational activities on the sunny days. Half the days are cloudy; half the days are sunny. So, on cloudy days, she would be studying. On sunny days, she would be doing recreational activities.

where N is the number of school days. Alternatively, at the party school, the student would obtain—again, half the days are cloudy. So, the student would be getting utility from studying when the days are cloudy, and half the days are sunny. So, on the sunny days, they would be recreating. If 'you study prestige cloudy' minus 'you study party cloudy' is less than 'you recreate party sunny' minus 'you recreate prestige sunny', then—

Your party or utility from the party school is greater than utility from the prestigious school. So, what it tries to say is that if you look at this expression, what it says is that when the weather is cloudy, then you would be studying in both places—both schools. prestige as well as party so if utility from studying which is definitely expected to be higher when it comes to the prestige school but the difference between the utility from studying at two places is less than the utility that one would get from the recreational activities— And since recreational activities are better in party school, so we are subtracting utility from recreational activities on sunny days in the party school

minus recreational activities on the sunny days in the prestige school. Then overall the individual is actually getting more utility from recreation and that's why that individual must join the party school. The overall utility would be greater if he or she joins the party school, and the student should choose the party school no matter what the weather on the day of the visit. If instead, 'you study minus prestigious'— given that weather is cloudy minus utility from studying when you are studying in party school the weather is cloudy is greater than the

utility that individual is getting through recreational activities being in the party school during the sunny days and being in the prestigious school during the sunny days. Then you understand that the individual gets more utility by studying. So the student should choose the prestigious school no matter what the weather on the day of the visit. Suppose however that students ignore the impact of weather on the utility of either recreation or studying, gauging their future utility based on the state of the weather on that particular day.

In this case, students visiting on a cloudy day might instead perceive all through the year the weather should be cloudy. So, N multiplied by the utility that they would be getting from studying in that or being in that university. So, U prestigious that is the total utility of being in that or studying in that university is the number of days you are going to be there and the utility from studying when the days are cloudy. N would perceive the utility of attending the party school as

Again the number of days you think that it is always cloudy. So first of all the assumption that the student is visiting on a cloudy day both the places. So when it is cloudy then studying in the party school given that it is cloudy and it is going to be cloudy for all the days. In this case, they would be led to choose the prestigious university because we know that overall utility from the prestigious university from studying when it is cloudy is greater than the overall utility from being in the party school and studying when it is cloudy.

So, they should be choosing or they would be choosing the prestigious university. Alternatively, if they visited on a sunny day, they would perceive it again as a prestigious university. So, all the days are going to be sunny and multiplied by U recreate is going to give you the utility that you expect from recreational activities being in the prestigious university. When you think that all the days are going to be like these sunny days, the second thing is that what would be your utility from recreational activities if you are in the party school?

And since we know that here, your party utility is greater than your prestigious utility, they would be led to choose the party school understandably. Though when they actually arrive on either campus, they will experience both sunny and rainy days. They might not consider this variation when comparing the two options. Such a process could explain why students visiting on cloudy days were more likely to choose the prestigious university than those visiting on sunny days. So the last slide actually told us that if I am visiting on a cloudy day, I would expect all the days to be cloudy and since I get more utility by studying on cloudy days,

at the prestigious university, I would choose to join that university. It suggests that people bias their projection of the utility of an action in the future toward the utility they assign to that action at that moment. Notably, if people are subject to projection bias, it can create situations in which they will regret their decisions, believing that they made a mistake. In the case of this example, if utility from studying in prestigious university in cloudy conditions minus utility from studying given that you are studying in party school and the weather is cloudy is less than the recreational activity related utility

from the party school when the weather is sunny minus recreational activities being in the prestigious school when the weather is sunny students would be better off at the party school but if they visited the campus on a cloudy day they choose the prestigious university This is where the problem lies because, after all, you are not much inclined to study, and that's why even though you prefer to study on cloudy days, the overall utility from studying is less than the overall utility from recreational activities. But since the student visited the party school or the prestigious school on a cloudy day, she or he decided to join the prestigious school.

But later on, they would regret it because when the weather is sunny, they would realize that they should have joined the recreational or the party school for having better recreational facilities. At the time of the decision, they consider the utility of studying because it seems that this will be what matters. After beginning to attend, students are exposed to sunny days about half the time and might realize that the party school would be a better option. When people at one period in time believe they will have one set of preferences in the future, but then later realize systematically inconsistent preferences, we call this time-inconsistent preferences.

George Loewenstein, Ted O'Donoghue, and Matthew Rabin proposed a model of projection bias based on the notion that people may be able to project the direction of the change in their future preferences but not the full extent of the change. In the language of the above example, they might recognize that on sunny days they will prefer to be at the party school recreating but they might not recognize how much better off they would be at the party school on those days. Suppose that somebody's

preferences can be represented by a state dependent utility function. A person receives utility U(C,S) from consuming bundle C in state S. So your consumption here, in this case for this example, is studying or recreational activities, and S is the state. The state could be the university as well as the weather conditions. The state represents the external conditions

that affect the utility of consumption. This may be weather, as in the previous example, whether or not one has kidney disease, hunger, pain, or any other factor

that could influence the utility of various consumption options. Suppose someone in state S prime is placed in a situation where he needs to make a decision that will affect his consumption in some future state S not equal to S prime. So S prime is the current state and S is the future state. In this case, the decision maker needs to predict the utility of consumption function he will face in this new state, which is U (CS). So, one is supposed to find out the utility that is going to come in the future state.

S is the future state. Let U tilde C S conditional upon S prime represent the predicted utility of consumption under state S when the decision maker makes the prediction while in state S prime. So, this is the current state and you are making the decision now and U tilde is the predicted utility that is going to happen in future. This is future state S. The decision maker displays simple projection bias if u tilde c s conditional upon s prime equal to 1 minus alpha u c s plus alpha u c s tilde or s prime.

What does it imply? Here alpha is between 0 and 1 it is greater than 0 and less than equal to 1. In this case if alpha is equals to 0 the decision maker displays no projection bias and can perfectly predict the utility of consumption he will face in the future state S. So if I just go back then here if alpha is equals to 0.

And if alpha equals to 0, then I have 1 minus alpha equals to 1. So the prediction is correct. Alternatively, if alpha equals 1, then he perceives his utility in state S as identical to his preferences in his current state, which is S prime. In general, the larger the alpha, the greater the degree of simple projection bias. Thus, the decision maker's perception of the preferences he will realize in the future state lies somewhere between the preferences he will actually face and those that he currently holds.

People facing an intertemporal choice problem, in which the state affecting their preferences would change in the second period, thus solve: maximize c1 u(c1, s prime) plus delta u tilde (w minus c1, s) plus alpha u(w minus c1, s prime). So now you understand here that s prime is the current state, and s is the future state. u tilde is the predicted utility. We have a discount factor delta here, which can be assumed to be 1 for simplicity, as we have not discussed what delta refers to.

Here, W is the total wealth a person has. So, this is total wealth, and this is consumption in period 1. So, total wealth minus consumption in period 1 gives us the consumption in

period 2. And C1 is greater than or equal to 0 and less than or equal to W, which means consumption in period 1 should be either 0 or any value between 0 and the entire wealth spent on consumption in period 1.

A pair of potential indifference curves representing this choice, when delta equals 1, appears next. Here, we measure consumption in period 1 on the horizontal axis and consumption in period 2 on the vertical axis. This is the usual budget line or feasible frontier that we derived earlier. These are the indifference curves. Here, if alpha equals 0, then they do not display any projection bias and they perceive correctly that their future utility will be maximized at point 0.

where the indifference curve accounting for their future utility is tangent to the budget constraint. So, this is the line for future utility when there is no projection bias. You can see the difference between this expression and this expression is that here it is u c to s and here it is u c to s prime. So, this is a state which basically talks about the utility in period 1 current period consumption and the current state, and this is consumption in the second period and this is the second state.

So, this is basically the utility which shows that there is no projection bias. Now, if we have the indifference curve represented by the dashed curve in the figure, it represents the highest level of utility possible to achieve. And this is the utility line which suffers from, or the indifference curve which suffers from, projection bias where uc2s prime is actually not equal to uc2s. That is, this is the utility that is expected to be there in period 2. when I am assessing it being in period 1.

So, this is the current period. Current period assessment of utility in period 2. Alternatively, if alpha equals to 1, then they will choose to consume at point A. So, alpha equals to 1 implies highest projection bias, maximum possible projection bias, where the indifference curve that assumes today's state persists for both periods is tangent to the budget curve. So, this is the utility function.

or indifference curve point a lies closer to the origin than the dashed curve does meaning that people are clearly worse off when choosing point A so in point B they are better off when there is no projection bias the points between a and b represent the different possible bundles that people might choose given different values of alpha the higher the level of projection bias the closer the consumption bundle will be to point A, and the lower the corresponding level of utility will be realized. Projection bias unambiguously makes people worse off than if they could perceive the true preferences they would face in the new state.

It is a relatively simple way to explain a multitude of behaviors we observe in which people tend toward actions they will later regret. So, with this, I conclude this module on projection bias. In the next, we will introduce the discounted utility model, the neoclassical workhorse or the main contributions of neoclassicals in the domain of intertemporal choice. Thank you.