

# PRINCIPLES OF BEHAVIORAL ECONOMICS

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**Week 24**

**Lecture 24**

Hello, this is lecture 24 of the course on principles of behavioral economics. As we discuss some axioms and anomalies of EUT, we will begin this module with anomalies of EUT and also introduce certain aspects of prospect theory. The one that remains when we discuss the anomalies of EUT is probabilistic insurance. Suppose you consider the possibility of insuring some property against damage, such as fire or theft. After examining the risks and the premium, you find that you have no clear preference between purchasing insurance or leaving the property uninsured.

The insurance company then offers a new program called probabilistic insurance. Here, you pay half of the regular premium. In case of damage, there is a 50% chance that you pay the other half of the premium, and the insurance company covers all the losses. And there is a 50% chance that you get back your insurance payment and suffer all the losses. So we are talking about chance factors here.

It's not exactly about your decision whether to pay half the insurance premium or not. For example, if an incident occurs on an odd day of the month, you pay the other half of the premium, and your losses are covered. But if an accident occurs on an even day of the month, your losses are not covered. That's why this is called probabilistic insurance. You do not know with certainty whether the accident, if any at all happens,

it will happen on an odd day or an even day. Under the circumstances, out of 95 participants, 20% said yes, they will be going for the insurance, while 80% said no, they won't prefer to go for the insurance or the probabilistic insurance. So the installation of a burglar alarm, the replacement of old tires and the decision to stop smoking can all be viewed as probabilistic insurance. The experiment indicated that probabilistic insurance is generally unattractive because as you saw that only 20% agreed to go for such insurance, 80% said that they would not prefer such insurances. Apparently, reducing the probability of a loss from  $p$  to  $p/2$  is less valuable than reducing the probability of that loss from  $p/2$  to 0.

See, the point here is that The probability of a loss, suppose a damage was initially supposed to be  $p$ . Now when we are going for probabilistic insurance, then we are reducing the probability of getting the loss covered to  $p/2$ . And this is preferred to a situation where you are not getting it covered altogether. So, the probability of the loss being or the damage being covered is 0 here.

So,  $p/2$  appears to be less valuable than reducing the probability of that loss from  $p/2$  to 0. In contrast to these data, expected utility theory with a concave  $u$  implies that probabilistic insurance is superior to regular insurance. This is a rather puzzling consequence of the risk aversion hypothesis of utility theory because probabilistic insurance appears intuitively riskier than regular insurance which entirely eliminates the element of risk.

So if we are going for an insurance then that basically ensures us against all possible losses while probabilistic insurance is an insurance we are going for Nevertheless, it does not cover all your expenses or It does not guarantee that it is going to insure you against all possible losses. Evidently, the intuitive notion of risk is not adequately captured by the assumed concavity of the utility function for wealth. Aversion for probabilistic insurance is particularly intriguing because all insurance is in a sense probabilistic.

It appears that contingent insurance will be generally more attractive than probabilistic insurance when the probabilities of unprotected losses are equated. Thus, two prospects that are equivalent in probabilities and outcomes could have different values depending on their formulation. The most avid buyer of insurance remains vulnerable to many financial and other risks which his policies do not cover. There appears to be a significant difference between probabilistic insurance and what may be called contingent insurance which provides the certainty of coverage for a specified type of risk.

So, with this, I come to the conclusion of violations of EUT and introduce prospect theory. So far, we have reviewed several empirical effects which appear to invalidate expected utility theory as a descriptive model. Since the late 1970s, a variety of theories have been developed, but without any doubt, prospect theory has been by far the most influential of these. It is an alternative account of individual decision making under risk where the theory is developed for simple prospects with monetary

outcomes and stated probabilities but it can be extended to more involved choices. Prospect theory distinguishes two phases in the choice process, an early phase of editing and a subsequent phase of evaluation. The editing phase consists of a preliminary analysis of the offered prospects, which often yields a simpler representation of these prospects. In the

second phase, the edited prospects are evaluated, and the prospect of highest value is finally chosen.

So now, we are going to first talk about editing. The function of the editing phase is to organize and reformulate the options so as to simplify subsequent evaluation and choice. So, as you understand, the name suggests editing—we are going to edit the prospects in various manners so that the evaluation process becomes easier. So, editing consists of the application of several operations that transform the outcomes and probabilities

associated with the offered prospects, and these operations include actually six alternative processes. They can be applied together also on the same prospect. They can be applied on different prospects as well. These operations are coding, combination, segregation, cancellation, simplification, and detection of dominance. Now, we are going to talk about each one of them very briefly.

Beginning with coding, people normally perceive outcomes as gains and losses rather than as final states of wealth or welfare. gains and losses of course are defined relative to some neutral reference point unless and until I have a reference point I will not be able to assess something as a gain or loss. The reference point usually corresponds to the current asset position, in which case gains and losses coincide with the actual amounts that are received or paid. So, for example, if I have 1000 rupees in my bank account, then this is my current asset position and then if I receive 100 rupees,

then this becomes my gain. If I lose 100 rupees, then that becomes my loss. So this is exactly what is said that reference point usually corresponds to the current asset position. So if this is my current asset position and if this is my reference point, then gains and losses coincide with the actual amounts that are received or paid. however the location of the reference point and the consequent coding of outcomes as gains or losses can be affected by the formulation of the offered prospects

and by the expectations of the decision maker now before i talk about the next operation of combination so this is the first phase first operation under the first phase editing is the first phase evaluation is the second phase I have just mentioned that editing has six operations. The first one was coding, the second one was combination. But before I talk about combination, I am going to talk about reference point, exactly what it is. Because,

in the prospect theory, we are going to use reference point. Reference point is also a very important concept when you discuss later topics like mental accounting and so on. So some

attributes of an object are more accessible than others when you first perceive it. Such natural assessments of an object include size, distance, loudness, temperature, similarity and whether it is good or bad. Importantly, a natural assessment will usually be a relative rather than absolute one.

It is far more natural for us to say what is bigger, longer, louder, hotter and better without knowing the exact volume, length, temperature etc. To be able to judge relative magnitude, we need some standard of comparison, and this is called the reference point or reference level. For example, the moment I come, suppose it is very hot summer day, I enter an AC room, immediately I can feel the difference in temperature. I may not be able to exactly say what the temperature was outside and what the temperature is inside. But then I can sense that the room is much more comfortable in reference to the temperature outside.

So, having the reference point in mind—here, the reference point is the outside temperature—I can easily say that the room temperature is much lower and much more comfortable. So here, the reference point or reference level, in a similar fashion, basically plays an important role in many such situations. To illustrate why the distinction between absolute and relative can be important for economic behavior, consider this question by Kahneman where he asks: two persons get their monthly report from a broker where they invested some money in the stock market, and

and the broker says to Carol that her wealth went from \$4 million to \$3 million. While there is another individual, Amanda, who is told that her wealth went from \$1 million to \$1.1 million. So the question is: who is happier? The standard in economics is to measure utility using a utility function  $u(x)$ , where  $x$  is the money or any amount. The more money there is, the higher the utility.

The answer, therefore, should be that Carol is happier because she has more money in her bank account, which is \$3 million, as compared to Amanda, who now has \$1.1 million. However, most of us would think that Amanda would be happier. And in fact, Carol would be very unhappy because Amanda's wealth is now greater than before. She is able to grow it from 1 to 1.1 million, while Carol's is smaller than before.

She has lost money. \$4 million has shrunk to \$3 million. How could she be happy? But standard economic theory may tell us that Carol would be happier because she has more money in her bank account. So see, reference points matter.

It's not the absolute amount that you are left with. It depends on what you have lost or what you have gained. Next, we talk about combination. Prospects can sometimes be simplified by combining the probabilities associated with identical outcomes. For example, the prospect (100, 0.3; 100, 0.3) will be reduced to (100, 0.6) and evaluated in this form.

Here, as you understand that there is no point in writing 100 winning 100 with probability 0.32 times. Instead, we can always write that there is a 0.6 probability of winning 100. The operation of combining is also referred to as coalescing. Then, the third operation is segregation. Some prospects contain a riskless component that can be segregated from the risky component.

For example, the prospect (100, 0.7; 150, 0.3) can be segregated into a sure gain of 100 because 100 is there in 100 as well as 150. So, and 0.70 plus 0.30 makes it 100. So, this means you are definitely going to win 100. So, sure gain of 100 and the risky prospect of 50, 0.3.

Other than winning this 100, you can also win another or other than getting this 100, you can also win another 50 with a probability of 0.3. Likewise, the prospect (-200, 0.8) and (-300, 0.2) can be segregated into a sure loss of 200 because again -200 is there, -200 is there. There is a sure loss of 200 and the risky prospect of losing another 100 with a probability of 0.2. These three operations are applied to each prospect separately. So, we have talked about coding, combination, and segregation.

They are applied to individual prospects. Next, we are going to talk about cancellation. This operation is applied to a set of two or more prospects. When different prospects share certain identical components, these components may be discarded or ignored. We have already discussed a two-stage game in the context of isolation effect where there is a probability of 0.75 of ending the game without winning anything

and a probability of 0.25 moving on to the second stage. In the second stage, there may be a choice between 4000, 0.8 and 3000. So, if you remember that for this game, we also drew a decision tree where or a game tree where if you do not, there is 0.75 or 3 by 4 chance of ending the game where no one wins anything. And you can continue with the game with a chance of 0.25 where there is possibility of winning 3000. This is a sure one or winning 4000 with a possibility of 0.8 and 0 with 0.2.

The player must make the choice at the start of the game before the outcome of the first stage is known. It is observed that the respondents apparently ignored the first stage of the

sequential game and evaluated the prospects with respect to the results of the second stage and as a result of which if you remember people preferred 3000 over 4000 with 0.8. This has been an example of cancellation because this contradicted basically their previous choices or choices in a different context where we had seen of contradiction that 3000 with 0.25 was less preferred to 4000 with 0.2.

So, there have been contradictions and that is because people basically cancelled the first stage altogether. So, this is an example of cancellation. Another type of cancellation involves the discarding of common constituents that is outcome probability pairs. For example, The choice between  $(200, 0.2, 100, 0.5, -50, 0.3)$  and  $(200, 0.2, 150, 0.5, -100, 0.3)$  can be reduced by cancellation to  $(100, 0.5, -50, 0.3)$

and  $(150, 0.5, -100, 0.3)$ . See, the simple difference between this one and this one is that 200, 0.2 was common to both these prospects, right. So, we have actually reduced 200, 0.2 or removed 200, 0.2 from these two prospects and made them basically the other, the rest of the part stays. Similarly, neglecting the common bonus that was added to the prospect, like in a problem discussed under the reflection effect, is an example of cancellation. So again, I have reproduced the example discussed under the reflection effect where, in statement 1,

Individuals who are given 1000 were asked to choose between A and B. In statement 2 individuals were given 2000 and were asked to choose between C and D. And basically, here also, we discussed already that the bonus being common to both A and B was ignored. The bonus being common to both C and D was ignored. As a result, we observed that though B was preferred to A, C was preferred to D. So that was a contradiction, and that was because of cancellation. Individuals canceled the component of the bonus.

The fifth operation is simplification. Prospects may be simplified by rounding either outcomes or probabilities. For example, the prospect  $(99, 0.51)$  or  $(101, 0.49)$  is likely to be coded as an even chance of winning 100 with 0.5 probability. So, 99 is made 100. 0.51 is made 0.5.

Similarly, 101 is also made 100, and 0.49 is made 0.5. A particularly important form of simplification involves discarding extremely unlikely outcomes. So, in case there are some prospects where there is one outcome with a probability, say one outcome with a probability of 0.001, then that is simplified—that is, canceled altogether in this simplification process. So, extremely unlikely outcomes are basically dropped.

Then, the next one is the detection of dominance. This involves scanning offered prospects to detect dominated alternatives, which are rejected without further evaluation. A prospect that dominates others may have elements in common, but other elements involve outcomes or probabilities that are always preferable. So, some elements would be common, and then some elements would be better.

Consider the two prospects (200, 0.3 and 99, 0.51) and (200, 0.4 and 101, 0.49) So, assuming that the second component of each prospect—that is, the second component of each prospect—is first rounded to 100, 0.5. So, when they are rounded to 100, 0.5, then these two prospects become more comparable. Then, the second prospect dominates the first one because the second prospect has a winning probability of 0.5 and a winning amount of 200.

While in the first prospect, the winning amount is still 200, but the winning probability is smaller at 0.3. That is why the second prospect dominates the first, because the outcome of the first component is the same, but its probability is greater in the second prospect. Many anomalies of preference result from the editing of prospects. For example, the inconsistencies associated with the isolation effect result from the cancellation of common components. Some intransitivities of choice are explained by simplification that eliminates small differences between prospects.

More generally, the preference order between prospects need to be invariant across context because the same offered prospect could be edited in different ways depending on the context in which it appears. With this, I conclude this This module on the introduction to prospect theory covers the first phase of prospect theory, which is the editing phase. In the next part, I will continue with prospect theory's evaluation phase. Thank you.