Bounded Rationality–Everyone Makes Mistakes

SUBMITTED BY: Michael Ryan Moore, University of Pennsylvania, GSE

SUBJECT(S): Personal Finance

GRADE LEVEL(S): 9, 10, 11, 12

☰ OVERVIEW:

In this lesson, we will look at the role of cognitive biases in economic theory. Students will think about the concept of bounded rationality, looking specifically at their own heuristics and intuitions. In particular, we will look at confirmation bias, framing, anchoring and egocentrism.

☰ NBEA STANDARD(S):

- Personal Finance, I. Personal Decision Making
- Personal Finance, VIII. Protecting Against Risk

☰ WHARTON GLOBAL YOUTH PROGRAM ARTICLE:

- "5 Things You Should Know About a British Exit from the European Union"

Objectives/Purposes: The purpose of this lesson is for students to understand how cognitive biases can affect individual choices.

- Students will be able to explain the term *heuristic.*
- Students will be able to explain several types of *cognitive biases.*
- Students will be able to think about their own susceptibility to these cognitive biases.

Knowledge@Wharton Article: "In the Mind's Eye: Fusing Neuroscience, Economics and Psychology to Learn How People Make Decisions"

Other Resources/Materials:

For Teachers:

- Internet Access
- Printer/Copier
- Access to Chalkboard/Whiteboard
- Chart Paper
- Markers
- Tape measure or ruler

Activity:

The lesson is divided into five parts: (1) Introduction, (2) Definitions, (3) Exploration Activities, (4) Guided Reading and finally (5) Closing

1. Introduction (1-5 mins)

In this lesson we will be looking at the concept of bounded rationality—of individual economic agents who are limited in their ability to calculate expected return of their own and others' choices. Introduce the lesson by reminding students that economic theory depends on the idea of a "rational actor," of someone who is disinterested and completely logical in his or her decision-making.

For example, have students think about the concept of scarcity and utility. In economic theory, everyone always acts to maximize their utility, given their limited resources. If I have to choose between enrolling in college or working a full-time job, economic theory says I will carefully, and correctly, weigh all the costs and benefits of each decision. Similarly, when I am sitting down at a restaurant, I am going to carefully consider how to maximize my happiness with the money I spend without making any errors in judgment.

Next, have students think about supply and demand. In economic theory, we know that price will eventually meet at the intersection of supply and demand—at the equilibrium price point. Why? Because when the price is higher, there will be excess supply, so suppliers will lower their prices.

And when the price is below, demand is extremely high, so suppliers can make money by raising prices.

In all of the classical economic examples, the system depends on rationality. Today we will be testing whether this assumption holds up.

2. Definitions (5 mins)

Before we get to the tests, talk to students about heuristics and biases. First, ask students what a heuristic is. Write the word on the board for students to examine. After students give their best guess, give them a more formal definition. A heuristic is a tool used to speed up decision making. It is a "rule of thumb" that helps us get a *good* answer, as opposed to the perfectly correct answer. A heuristic allows us to make an educated guess without spending too much time working through the problem. Ask students if they can think of any examples of heuristics (e.g. pi = 3.14).

In order to give students an idea of how heuristics work, break them into small groups. In this activity, each group will have 3-5 minutes to accurately measure the length of the entire classroom.

After time is up, ask each group to report back their answers. Next, ask students what heuristics they used to measure the room. Provide students with the *actual* measurements for the room. Were students' guesses accurate or inaccurate? Which heuristics worked well? Which did not?

3. Exploration Activities (15-20 mins)

For the rest of class we are going to focus on *bad* heuristics. In other words, we are going to look at places where the idea of a "rational" economic actor may not actually hold up. Economists often refer to these as "biases."

The first bias we are going to talk about is the *confirmation bias.* Ask students to think of a time when they had a really difficult question. Even though you didn't know the right answer to the question, you may have had a hunch. Instead of looking for the right answer to the question, you only look for people who agree with your hunch. For example, I have a friend who sleeps 4 hours a night. My friend wanted to know, "How many hours of sleep is healthy?" Instead of looking for the right answer, my friend searched on the internet for people who said 4 hours was enough. My friend wasn't interested in opposing viewpoints; rather she wanted to find information that would *confirm* her own opinions.

Ask students if they can think of examples of confirmation bias in their own lives. A good example is usually medical history. Many people search for illnesses online — often confirming their own bias that nothing is wrong (or conversely, that something is gravely wrong).

The second bias we are going to talk about is called *framing.* Before introducing it students, ask them a few questions. Keep track of their answers on the board.

Question 1: Would you be willing to play the following coin-flip game: If the coin lands heads, you win $5. If the coin lands tails, you win $0

Question 2: Would you be willing to play the following coin-flip game: If the coin lands heads, you win $10. If the coin lands tails, you lose $5.

Question 3: You are in the hospital with a broken finger. The doctor can let it heal on its own, or he can perform a minor surgery to fix the finger. The doctor says, "The surgery is experimental. It fails on 20% of patients, and those patients feel extreme pain." Would you get the surgery?

Question 4: You are in the hospital with a broken finger. The doctor can let it heal on its own, or he can perform a minor surgery to fix the finger. The doctor says, "The surgery is experimental. 80% of patients are perfectly healed and experience no pain."

Ask students to think about the difference between question 1 and 2, and between question 3 and 4. Both pairs are identical from an economics standpoint. However, they are *framed* differently. In the coin-toss game, one question is framed as a *loss* and one is not. Studies show that people tend to avoid losses, even if the outcomes are identical. Similarly, the second pair are also framed differently. In question 3, there is a strong negative framing. In question 4 there is a positive framing. Even though both questions are identical (80% success, 20% failure), the framing of the question matters. This is a *framing bias.*

The next bias we will look at is *egocentrism.* Before introducing it to students, have them each pull out a scrap of paper. Tell students that they will be playing a game in a few minutes. At the end of the game, everyone will be ranked from 1-10 (or from 1 to however many students you have in the room)*,* where 1 is the best and 10 is the worst. Ask students to guess how well they will do in the game and write it down on their scrap of paper. For instance, if I think I will be in fourth place, I will write down a 4. If I think I will be in 10th place, I will write down a 10. Make sure that students write down their guesses anonymously. Collect each of the pieces and find the average.

In almost every case, the average student guess will be above 50%. Does this make sense? No. In real life, the average for this game will always be 50% (e.g. if there are 10 kids in the class, half of them will be ranked 1-5 and the other half 6-10). Why are students' guesses above average? This is an example of *egocentrism.* We tend to see ourselves as above average. This bias is particularly prevalent when it comes to statistics. People think they are less likely to contract diseases, and less likely to suffer negative consequences from risky behaviors like alcohol, drugs, etc.

Finally, introduce students to the concept of *anchoring*. An anchoring bias occurs when our decision-making is influenced by some other factor, or anchor. For this experiment, have each student take out a piece of paper. Have half of the class write down the day of their birth. For example, if you were born on March 3rd, you would write down 3. Have the other class write down the last two numbers of the *year* they were born. For example, if you were born in 1995, you would write down 95.

After students write down their number, have them turn over the piece of paper. Next, have students guess how many cities in India have a population greater than 500,000 people.

Have each side of the room report their guesses, and then find an average for each group. Often, the group using birth year will have a much higher average than the group using birth date. This is because of *anchoring.* When you ask students to write down a number, that number becomes the anchor from which students make a guess. Because birth dates are smaller than birth year (1-30 vs. 90-99), students who wrote down a birth date are likely to guess a smaller number.

4. Guided Reading (5-10 mins)

With the remaining time, have students read through the article "In the Mind's Eye: Fusing Neuroscience, Economics and Psychology to Learn How People Make Decisions." As they read, encourage students to think about the idea of heuristics and biases. What heuristics do the authors mention? What biases? How might we overcome these biases?

5. Closing (1-10 mins)

With the remaining time, repeat the main concepts of the lesson. Although economic theory assumes that we are all perfectly rational actors, that is not always the case. Often we use heuristics, or rules of thumb, to make educated guesses. These heuristics can often lead to biases, including *egocentrism, anchoring, framing,* and *confirmation bias.*

What Worked and What I Would Do Differently:

After introducing each bias, make a point to explain *why* that bias matters. For example, connect "egocentrism" to risk-taking behavior (e.g. playing the lottery, wearing a helmet/seatbelt). Connect "framing," with marketing. How do advertisements frame products? How do drug companies frame their products? Finally, connect "anchoring" to pricing. What happens when you see a huge price tag that is on sale? Initial high prices can be great anchors, convincing people to buy products they would otherwise overlook.