

**PSY 210 – Basic Statistics for Psychology**  
**Professor Gernsbacher's Unit 6 Lecture Video**

**The Fallibility of Our Intuitions about Probabilities**

Let's begin by playing a game. To play the game, you'll need a pen or pencil and some paper. You should just pause the video while you go grab a pen and paper. I'll wait.

[Wait] Ok. Let's start our game.

**CLICK:** On your paper, draw a vertical line down the middle.

**CLICK:** Then, on the left side of your sheet of paper, write Truck Driver, and on the right side of your sheet of paper, write Professor.

[PAUSE] The reason why I asked you to write down the terms Truck Driver and Professor is because

**CLICK:** In a fictional town, every man is either a Truck Driver or a Professor. In fact, in this fictional town,

**CLICK:** 90% of the men are truck drivers,

**CLICK:** and only 10% of the men are professors.

Now, I'm going to describe to you 10 RANDOM men who live in this fictional town.

After you hear the description of each man, write the down that man's name under the column for Truck Drivers, IF you think the man I just described is a truck driver.

Or write down that man's name under the column for Professors, IF you think the man I just described is a professor.

**CLICK:** First, there's Buck. Buck likes football, lives in the town he was born in, and has been divorced three times. Do you think Buck is a truck driver or a professor? [Pause]

**CLICK:** How about Tom? Tom has a favorite oily baseball cap, uses a CB radio, and has a bushy beard. Do you think Tom is a truck driver or a professor?

**CLICK:** And Hank. Hank has long hair, likes to hunt, and often wears his favorite flannel shirt. Do you think Hank is a truck driver or a professor?

**CLICK:** Jerry has a lot of bumper stickers on his vehicle, uses curse words a lot, and enjoys rock music. Do you think Jerry is a truck driver or a professor?

**CLICK:** Jake always wears jeans, speaks in a Southern accent, and drinks a lot of coffee. Do you think Jake is a truck driver or a professor?

**CLICK:** Vincent wears glasses, is clumsy, and is long-winded when he talks. Do you think Vincent is a truck driver or a professor?

**CLICK:** Francis carries a laser pointer, is not very athletic, and likes classical music. Do you think Francis is a truck driver or a professor?

**CLICK:** William goes to the opera, spends a lot of time on the computer, and has visited 28 countries. Do you think William is a truck driver or a professor?

**CLICK:** Alfred is balding, wears a tweed jacket, and uses big words. Do you think Alfred is a truck driver or a professor?

**CLICK:** Harold, who smokes a pipe, reads a lot, and often has chalk dust on his hands. Do you think Harold is a truck driver or a professor?

**CLICK:** Ok, now, look at your list of Truck Drivers versus Professors. Count how many you classified as each.

[Pause] Most of us tend to judge

**CLICK:** half the descriptions I just read to be of truck drivers and

**CLICK:** half to be of professors. We make these judgments because of a Cognitive Bias called

**CLICK:** the Representativeness Heuristic. We judge that someone who

**CLICK:** likes football, lives in the town in which he was born, uses a CB radio, likes to hunt, and wears a flannel shirt is most likely a truck driver because these descriptions tend to **represent** truck drivers in our mind.

These descriptions are **representative** of how we think about truck drivers. And we are biased by representativeness when we make our cognitive judgments. The Cognitive Bias known as the Representativeness Heuristic is also why we tend to think that someone who

**CLICK:** wears glasses, is clumsy, carries a laser pointer, likes classical music, and uses big words is most likely a professor because these descriptions tend to represent professors in our minds.

So, we are again biased by Representativeness. Because the Representativeness Heuristic is a Cognitive Bias, it biases us against using **the most important** and **the most valid source** of information that we could have used and should have used, and that is

**CLICK:** **the base-rate probability.** We were told from the very beginning that in this fictional town,

**CLICK:** 90% of the men are truck drivers, and only 10% are professors. **That is our base-rate probability.**

Therefore, in any random sample of men from this town, such as the random sample I read, there should be 90% truck drivers and only 10% professors, not half and half.

We assumed half and half because we disregarded the objective information, **the base-rate probability**, and we made our judgment based on intuitions and stereotypes that we thought were representative. We fell prey to the Cognitive Bias known as the Representativeness Heuristic.

Here's another situation in which people usually fall prey to the Cognitive Bias known as the Representativeness Heuristic.

**CLICK:** Most people think that the sequence of heads and tails, Heads, Tails, Tails, Heads, Tails, Heads is more representative of flipping a coin six times than

**CLICK:** The sequence, Tails, Tails, Tails, Tails, Tails, Tails,

**CLICK:** Or the sequence, Heads, Heads, Heads, Heads, Heads, Heads,

But all three sequences are equally likely if you're flipping a coin only six times. It's just that the sequence, Heads, Tails, Tails, Heads, Tails, Heads seems more **representative** of randomness. Again, the Representativeness Heuristic is biasing us.

**CLICK:** So, the Representativeness Heuristic is a cognitive bias that causes us to incorrectly judge the probability of a phenomenon because of its representativeness.

Let's look at another but similar cognitive bias,

**CLICK:** the Availability Heuristic. The Availability Heuristic is a cognitive bias that causes us to incorrectly judge the probability of a phenomenon because of its salience (its availability in our minds).

For example, in one study,

**CLICK:** half the research participants read a news story about someone being attacked by a shark.

**CLICK:** The other half of the research participants read a news story about someone winning a lottery. Then both groups of participants judged

**CLICK:** the probability that they themselves would be attacked by a shark and that they themselves would win a lottery.

**CLICK:** The participants who read a news story about someone being attacked by a shark overestimated the probability that they would be attacked by a shark, and they underestimated the probability that they would win a lottery. In contrast,

**CLICK:** the participants who read a news story about someone winning a lottery overestimated the probability of winning a lottery, and they underestimated the probability of being attacked by a shark.

Because the participants had just read about either a shark attack or winning the lottery, availability of that information biased their estimations of the likelihood of those phenomena happening, and that's what we mean by the Availability Heuristic.

In my Psychological Effects of the Internet depth course, we talk about how the Availability Heuristic often biases us when we're reading on the Internet. For example,

**CLICK:** Studies have shown that if teenagers view a social media picture of their friends drinking alcohol, they overestimate the probability of other teens drinking alcohol.

**CLICK:** Similarly, if parents are shown a social media picture of their friends going on vacation, they overestimate the probability of other families going on vacation. Both offline and online, the Availability Heuristic is a Cognitive Bias that affects our critical thinking.

Another Cognitive Bias that greatly affects our critical thinking is

**CLICK:** the Confirmation Bias, which is well illustrated by the following article published in *The Onion*. As you might know because *The Onion* was founded in Madison, Wisconsin, *The Onion* is a satirical newspaper. And satire, as you know, is the use of exaggeration to make fun of or criticize something.

So, the headline of this satirical article in *The Onion* stated,

**CLICK:** QUOTE "Facebook User Verifies Truth of Article by Carefully Checking It Against [His] Own Preconceived Opinions."

Following this satirical headline, the satirical article begins in the following way:

Quote: "Explaining that people need to be [cautious] about the news stories that circulate on social media these days, area Facebook user James Wheatley, 44, reportedly took the time to verify the truth of an article he came across Thursday by carefully checking it against the opinions he already holds. UNQUOTE

The article continues by quoting the mythical James Wheatley saying,

QUOTE “You can’t just accept everything you see online, which is why

**CLICK:** I always take a closer look at the claims that are made in every article and make sure that each [claim] is backed up by **my existing assumptions and personal feelings about the world.**” UNQUOTE.

This satirical article in *The Onion* well captures Confirmation Bias, which is

**CLICK:** a Cognitive Bias that causes us to attend to phenomena that confirm our biases and ignore phenomena that disconfirm our biases.

The Confirmation gets in the way of critical thinking about life, as well as critical thinking about research, as the following cartoon by Timo Elliot illustrates:

**CLICK:** In this cartoon, a salesperson, who is pointing to data on a presentation screen, says to a scientist, who is observing the presentation:

Quote “Our unique JustifyIt feature uses deep learning to find data that agrees with **your point of view!**” Unquote.

Like the hypothetical JustifyIt feature that the salesman in this cartoon is trying to sell, the Confirmation Bias distorts our critical thinking by causing us to attend to phenomena that confirm our point of view and ignore phenomena that disconfirm our point of view.

Lastly, and related to the Confirmation Bias, is another Cognitive Bias. It’s often called the

**CLICK:** Blind-Spot Bias, but I’m going to call it

**CLICK:** the Self-Perception Bias because that term is more direct and less ableist.

The Self-Perception Bias is

**CLICK:** a Cognitive Bias that causes us to incorrectly perceive ourselves as less susceptible to bias than other people are.

For example, in one study, with a large sample of U.S. adults, 85% of the adults believed they were less susceptible to bias than the average U.S. adult. Of course, that’s impossible. Only half the people can be less susceptible to bias than the average person because that’s the way averages work.

Half the people are taller than the average person, and half the people are shorter. That’s the definition of average. For every trait, half the people have more of that trait than the average person, and half the people have less of that trait than the average person. Because that’s the very definition of average.

So, it’s unlikely that 85% of people are actually less susceptible to bias than the average person; instead, it’s more likely that many of us fool ourselves into thinking we’re less susceptible to bias because of the Self-Perception Bias.

And that’s a problem. As the great Nobel Prize winning physicist,

**CLICK:** Richard Feynman said (in a 1974 commencement address):

**CLICK:** “you must not fool yourself and you are the easiest person to fool.”