THE GREAT COURSES®

Topic
Science

Subtopic
Neuroscience & Psychology

Understanding Cognitive Biases

Course Guidebook

Alexander B. Swan

THE GREAT COURSES®

LEADERSHIP

President & CEO	PAUL SUIJK
Chief Financial Officer	BRUCE G. WILLIS
Chief Marketing Officer	CALE PRITCHETT
SVP, Marketing	JOSEPH PECKL
SVP, Content Development	JASON SMIGEL
VP, Content Production	KEVIN BARNHILL
VP, Marketing	EMILY COOPER
VP, Customer Engagement	KONSTANTINE GELFOND
VP, Technology Services	MARK LEONARD
VP, Content Strategy	KEVIN MANZEL
VP, People	AUDREY WILLIAMS
General Counsel	DEBRA STORMS
Sr. Director, Content Operations	GAIL GLEESON
Director, Talent Acquisition	WILLIAM SCHMIDT
Director, Creative	OCTAVIA VANNALL

PRODUCTION

Studio Operations Manager	JIM M. ALLEN
Video Production Director	ROBERTO DE MORAES
Technical Engineering Manager	SAL RODRIGUEZ
Quality Assurance Supervisor	JAMIE MCCOMBER
Sr. Postproduction Manager	PETER DWYER
Sr. Manager, Production	RIMA KHALEK
Executive Producer	JAY TATE
Sr. Producer	JAMES BLANDFORD
Writer/Producer	SUSAN LUTZ
Sr. Image Rights Analyst	ABBY INGHAM LULL
Image Rights Analyst	BETSY SILBER
Postproduction Manager	OWEN YOUNG
Editors	ART JARUPHAIBOON, CORY SIVAKOFF
Audio Engineers	GORDON HALL IV, EDDIE HARTNESS
Directors	JOHN NAPOLITANO, VALERIE WELCH
Camera Operators	GEORGE BOLDEN, SHARON SOBEL, KELLY TAGLIAFERRI

EDITORIAL & DESIGN

Director	FARHAD HOSSAIN
Sr. Managing Editor	BLAKELY SWAIN
Editorial Associates	MOLLY LEVY, MARGI WILHELM
Sr. Research Associate	RENEE TREACY
Research Associate	L. VIOLA KOZAK
Graphics Manager	JAMES NIDEL
Graphic Artist	KATE STEINBAUER
Graphic Designer	TIM OLABI
Editorial Services	PROOFED

Alexander B. Swan

Alexander B. Swan is an Associate Professor of Psychology at Eureka College. He earned a PhD in Psychological and Brain Sciences from the University of California, Santa Barbara, and received the Contribution to Excellence in Teaching Award while a graduate student there. His research focuses in part on how biases contribute to pseudoscientific beliefs and behaviors. He has published or copublished several articles, and he is the creator and host of the *CinemaPsych Podcast*, which reflects his love for combining film and psychology in his teaching.

Table of Contents

Understanding Cognitive Biases

This course is designed to help you understand several human biases that are common daily occurrences. Biases are tendencies and proclivities that most people have, and they range from mundane and silly to more harmful. Biases are generally systematic, which means that they are predictable and exist under known circumstances and their effects are observable.

Many of them are mental shortcuts people use to think quickly and efficiently, but sometimes they get us into trouble. This course will help you identify and understand several of the more common cognitive biases. There are approximately 200 cognitive biases identified through decades of cognitive psychology, social psychology, and other research. They affect our thinking, decision-making, relationships, problem-solving, and intrapersonal/interpersonal interactions.

This course addresses more than two dozen biases from the gigantic list of identified ones. In each lecture, each bias will be defined, several examples will be given, and the results and conclusions from seminal research studies will be explained and discussed.

Among these biases, you'll explore situations where too much information is available for you to access. Our senses are bombarded with this information, but our minds cannot possibly access all of it, so we have to take shortcuts, and sometimes those shortcuts lead to the wrong decision or a bad outcome. Biases that fall into this category include the bias blind spot, confirmation bias, observer bias, and anchoring and framing.

This course also tackles biases that occur when there's not enough meaning in the information we are getting. They happen when we encounter things that are vague or ambiguous. In these situations, we often have to figure out if there are patterns that we can use to make sense of the information. These include biases like pareidolia, hindsight bias, and stereotypes.

There are even biases when we don't remember stuff we should remember. Our memories are not physical records of events, and when we try to remember things that have occurred, we tend to add information that we encountered afterward or overheard. Sometimes, we have no idea how that information got into our minds in the first place! These biases include the misinformation effect, false memories, and the peak-end rule. However, sometimes our biases toward remembering things can actually help us learn.

Finally, this course discusses biases that occur because our brains and minds are extremely efficient and we have to act fast to make a decision or judgment. These biases include the Forer effect, the fundamental attribution error, belief bias, and the status quo bias.

This course is designed to appeal to everyone on the cognitive bias learning spectrum. Whether you are interested in figuring out why you're susceptible to these biases or want to reduce the impact of these biases on your life, this course will help you think critically about your own thoughts and behaviors. You may not be able to squash these biases, because the caveat is that the majority of these biases are here to stay, but you will leave with more self-awareness than you had before.

1

Why We're Blind to Our Own Biases

Bias is commonly defined as a preference in favor of—or against—any thing, person, or group. *Bias* can also be defined as a systematic error: an error that's predictable under known circumstances and situations, leads to an incorrect assumption or behavior, and affects future decisions and judgments. Cognitive biases can also be thought of as efficient ways for humans to think about the world. This course plans to shine a light on biases that you might not even be aware of. Many biases are cognitive. They can be related to how our memories work, how we think about likelihoods and probabilities, and how we reason through problems quickly. Over the next 24 lectures, you'll explore confirmation bias, the availability heuristic, the belief bias, and many other biases that mold how we understand reality.

The Bias Blind Spot

Biases affect our lives in ways that we don't always realize. For example, although fast, efficient thinking can be crucial for survival, it can also lead to poor outcomes when we weigh only what we learn first and do not weigh all the other information at hand.

Although biases do help us remember things more effectively, they can also lead to errors of memory and judgment by leading us to fill in gaps with guesswork when we don't possess additional, more reliable information. Consequently, our biases tend to get us into trouble, with unintended consequences and outcomes. Thus, it's important to take the time to determine how they work. The goal of this course is to help you better understand the role that biases play in your life and to help free you from biased decision-making and interactions with others. The blind spot regarding your own biases is called the bias blind spot.

Why a *blind spot*? Consider where the term comes from. The light-sensitive neurons in your retina combine to convey information from the eye to the brain through the optic nerve. The spot where the optic nerve connects to your retina has no light-sensitive cells; thus, you can't see anything at this part of your eye. However, each eye sends its own set of data to your brain. That means a missing piece of information from one eye can be supplied by the other eye. Your brain uses this additional information to fill in what's missing.

Conceptually, that explains the bias blind spot, too. Your brain operates so efficiently that you aren't aware of what it's doing most of the time, nor of how the brain fills in missing pieces of information that you don't even know are missing. In psychology, the idea of the bias blind spot originated in research investigating the phenomenon of how many of us think we're better than average at any number of daily activities. These inflated self-assessments are a boon for our self-esteem, and it's normal to have these thoughts. But it's statistically impossible for everyone to be better than average.

On the other hand, are we all biased like our fellow humans? Yes, of course. Are some people more biased? Yes. Are some people less biased? Also yes. Some years ago, psychologists Emily Pronin, Daniel Lin, and Lee Ross investigated this better-than-average bias and cleverly identified the blind spot.

Discovery of the Bias Blind Spot

In one experiment employing human subjects at a prestigious university, student participants were given information packets describing several social-cognitive biases—among them self-serving bias, confirmation bias, and group polarization through media sources. The packet included a definition of each bias and an explanation of the biases' cognitive and behavioral effects. However, Pronin and her colleagues made sure not to include the word *bias* because it's perceived as a negatively charged word that might influence how participants responded to it.

The sample was divided in half, and each was given a slightly different form of the same questionnaire. The first group of participants was presented with this question: "To what extent do you believe that you show this effect [meaning bias] or tendency?" Participants answered the question on a scale from 1 to 9, with 1 representing "not at all," 5 representing "somewhat," and 9 representing "strongly." Then, they answered a small but important variation of the same question: "To what extent do you believe the average American shows this effect or tendency?"

The second group of participants answered the same two questions in reverse order to mitigate the possibility that the order of the questions would bias the results. Perhaps unsurprisingly, participants rated their own susceptibility to these biases at the midpoint of the scale. By comparison, they rated the susceptibility of the average American to these biases as higher than their own—a full point higher on the scale. In other words, participants said that they were less susceptible than the average American to social-cognitive biases.

Again, the participants in this experiment were students at a prestigious university. Perhaps they were less biased than the average American. Thus, to account for this possibility, another group of students from the same university was asked to compare their own bias susceptibility to that of their classmates. This second group of students also rated themselves at the midpoint of the scale while suggesting that their classmates were almost a full point higher on the scale—the exact same result. The researchers additionally asked student participants about student behaviors and anxieties, including procrastination and the fear of public speaking. This time, the students rated themselves as more susceptible than their fellow students to these characteristics.

Thus, the bias is not about feeling superior in general but something a little more subversive: that the human foibles that plague most people's decisions and judgments are not their own problem—they are everyone else's! The researchers offered the explanation of "naïve realism" to explain that people tend to assume that they see the world objectively and that anyone who disagrees with them must be wrong, irrational, or biased. But this explanation misunderstands how the brain works. Our brains are trying to make sense of the many bits of input that come our way. And most of that information is unnecessary to us. Perception is the interpretation of this information, after filtering out what we perceive as unimportant or less relevant.

The Prisoner's Dilemma

In 2004, Varda Liberman, Steven Samuels, and Lee Ross conducted an experiment using the classic conundrum of game theory called the prisoner's dilemma. Imagine that you and your friend are arrested for committing a robbery. The police separate you into two interrogation rooms, and they give both you and your friend the opportunity to rat on the other and go free. If you confess first, your friend will receive a harsh sentence. But if your friend is the first to flip, then you will face a harsh prison sentence. There's also a third possibility: If neither of you talks, you both get a light sentence. And if both of you talk, you both get somewhat longer sentences. It's a test of cooperation versus self-interest.

Prisoner's Dilemma

You / Friend	Friend stays silent		Friend rats	
You stay silent	 −2	 −2	 −10	 0
You rat	 0	 −10	 −5	 −5

The Liberman group called their prisoner's dilemma experiment by two different names: the Wall Street Game and the Community Game. And the researchers modified the outcomes to represent monetary values rather than prison time. Thus, if you cooperate with your friend, you both get some money, but if neither of you cooperates, then nobody gets any money. However, if you cooperate but your partner doesn't, they'll gain a larger share of the money, and you'll have money taken away from you. This is reversed if you don't cooperate and they do. Another difference between the two is in their titles—and connotations. According to the researchers, the Wall Street Game would activate "rugged individualism," with the goal to maximize profits over cooperation. The Community Game, in contrast, was about a community's well-being, including the optimal outcome of making sure everyone participating got some cash.

Wall Street Game / Cooperation Game

	Player 2 cooperates	Player 2 doesn't cooperate
Player 1 cooperates	Player 1 + 40¢ Player 2 + 40¢	Player 1 – 20¢ Player 2 + 80¢
Player 1 doesn't cooperate	Player 1 + 80¢ Player 2 – 20¢	Player 1 0¢ Player 2 0¢

In this way, the concept of naïve realism—the idea that we see the world objectively—is put to the test when the name of the game is simply changed. The results showed that fewer people who played the Wall Street Game were willing to cooperate compared with those who played the Community Game. This was true even when the researchers assigned roles to participants as "likely cooperators" or "likely defectors." The labels didn't matter because the title of the game communicated to participants what the most useful strategy was.

Most of us like to think that we can see through these kinds of labels. But the evidence shows that even something as simple as the title of a game can change the way we think about things. We all have biases, and we can all

stand to benefit from a better understanding of the errors that plague our thinking and judgments. No one is immune to their blind spots. Think of the bias blind spot as a continuum, with each of us plotted somewhere on it.

In 2015, researcher Irene Scopelliti and colleagues concluded that humans' characteristic lack of understanding of their own biases changes the way we think about our decisions and judgments. This makes other biases more frequent and potentially more harmful, damaging, or costly. They referred to this as metabias—a biasing bias. Specifically, they concluded that the bias blind spot affects whether we're open to improving our decision-making and judgments. Of course, if we don't understand our biases, then we're less likely to change our thinking. This has downstream consequences, too. It makes us less likely to accept the advice of trusted sources or even experts. Ultimately, we'll be more prone to biases in our decisions, behaviors, and judgments. What do we do about the bias blind spot? First, we have to understand that we undoubtedly have one.

Reading

- Pronin, Emily, Daniel Y. Lin, and Lee Ross. "The Bias Blind Spot: Perceptions of Bias in Self versus Others." *Personality and Social Psychology Bulletin* 28, no. 3 (2002): 369–381. https://doi.org/10.1016/j.actpsy.2018.05.003.
- Scopelliti, Irene, Carey K. Morewedge, Erin McCormick, H. Lauren Min, Sophie Lebrecht, and Karim S. Kassam. "Bias Blind Spot: Structure, Measurement, and Consequences." *Management Science* 61, no. 10 (2015): 2468–2486.
- Stein, Randy, Alexander B. Swan, and Michelle Sarraf. "Hearing from Both Sides: Differences between Liberal and Conservative Attitudes toward Scientific and Experiential Evidence." *Political Psychology* 42, no. 3 (2021): 443–461. https://doi.org/10.1080/13546783.2019.1688188.
- Stein, Randy, and Alexander B. Swan. "Evaluating the Validity of Myers-Briggs Type Indicator Theory: A Teaching Tool and Window into Intuitive Psychology." *Social and Personality Psychology Compass* 13, no. 2 (2019): 1–11. https://doi.org/10.1111/spc3.12434.

2 Things We Want to Be True: Confirmation Bias

Earthquakes happen with greater frequency on the West Coast of the United States than in any other major region of the country. But have you heard about earthquake weather? Some people who believe in earthquake weather say that rainy weather brings on earthquakes. Others say that windy weather does it. It varies because it is the weather immediately preceding the earthquake people experienced that gets remembered as earthquake weather. This lecture discusses the bias that makes people feel this way: confirmation bias.

Introducing Confirmation Bias

Confirmation bias is the tendency for people to accept information that confirms their existing worldviews and to actively reject information that opposes those existing worldviews. These worldviews include beliefs, attitudes, values, and habits. We are constantly confirming what we know and what we do.

Consider a classic thought experiment. Imagine you are a quality assurance inspector for a novelty card game company. Your job is to make sure the cards follow strict rules—and you need to do this as quickly and efficiently as possible. One day, you are on the card line with cards that have letters on one side and numbers on the other. The rule for these cards is simple: If there is a vowel on one side, then there has to be an even number on the other side. If any card in the batch doesn't follow the rule, then you have to throw out that batch.

Down the assembly line come four cards, each with a different face. From left to right, you see a card with an *E*, a card with a *K*, a card with a 4, and a card with a 7. To do your job quickly and efficiently, you need to choose the fewest number of cards to turn over to make sure they all follow the rule. Which ones do you choose?

If you chose only the *E* card, then you might have fallen victim to confirmation bias. But why is it a bias if you're checking the back of the vowel card? Of course, you should look under the *E* card. If you find an odd number on the back, you'll know this batch of cards needs to be tossed. But do any of the other cards matter?

If you were interested only in confirming the rule and moving on, the answer is no. However, that action doesn't fully test whether that conditional if-then rule has been followed to the manufacturer's specifications. Before you move on to the next set of four cards, you'll need to turn over one more card. But which one? You need to turn over the card with a 7 on it because if there's a vowel on the other side, this card is a dud.

What you've done is called falsification—an important concept for any good scientist. Scientists test a rule by both confirming it and attempting to disprove it. If they want to be right in their conclusions, they hope to confirm it and then fail to falsify it. Confirmation bias usually keeps them from taking this second step.

Psychologist Peter Wason, the originator of this task, found that two sets of participants in 1966 and 1968 performed in similar ways. The majority of people chose to only confirm the rule rather than also trying to falsify it. But here's the important point: Going through the steps to try to disprove—or falsify—is far more important than falsifying or failing to falsify. Thus, looking at the back of the 7 card is important, not finding out what is on the back of the card.

Confirming Behavior

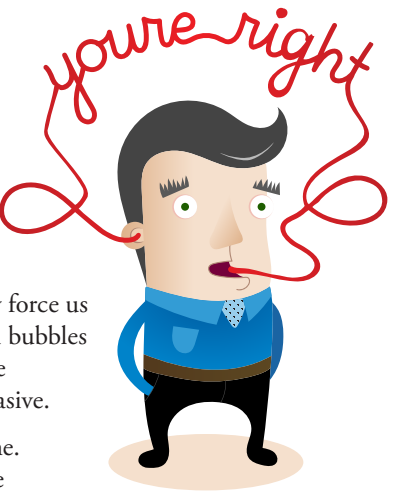
Here's another example: Imagine you are a bartender. Your job is to make sure people are only drinking alcohol if they're older than 21. One day, you get to work, and there are four people at the bar. From left to right, one person has a beer, another has a Coke, the third person is 22 years old, and the final person is sitting at the bar but is only 18 years old. Who do you card, or check to see what they're drinking?

You obviously need to engage in confirming behavior to make sure you're doing your job, and that means checking the customer with the beer. But going for the falsification process—asking what the 18-year-old has ordered to drink—is the only way to make sure you're following the rule. If you let this one slide, it's also more likely that you'll forget to card customers in the future and fall into the habit of only confirming behavior, such as thinking gray hair or a beard is enough to determine whether someone's old enough to drink. This makes the bias harder to recognize. Then, it becomes potentially harder to correct mistakes when you fail to falsify.

Interestingly, the kind of problem you're faced with changes the odds that you'll remember to double-check your results through the falsification process. In 1982, psychologists Richard Griggs and James Cox found that nearly three-quarters of participants made the correct choices in the bar example. But when they also replicated the Wason task, they found a stark difference: No one chose the correct solution to that task. When a person is put in the position of figuring out rules in real-world situations, they are more likely to solve the problem easily. They want to make sure everyone is following the rules set out by society. However, people generally don't seek to falsify in the course of their daily tasks or everyday encounters. This, of course, is where the problem of the bias lies.

Consider this question: "Are you satisfied with your work-life balance?" You might say yes without putting too much effort into considering your actual work-life balance. You're being asked to confirm how you feel. But consider this: "Are you unsatisfied with your work-life balance?" This is asking you to try to falsify this thought. You might be more inclined to examine your work-life balance and find instances of unsatisfactory balance. These two thought efforts are unequal, even though the question itself is functionally the same. We spend considerable mental energy to make sure our existing beliefs are constantly confirmed with outside information. Thus, humans have developed strategies both internally and externally to reduce this effort and keep our lives in full confirmation mode when consuming information.

Echo Chambers

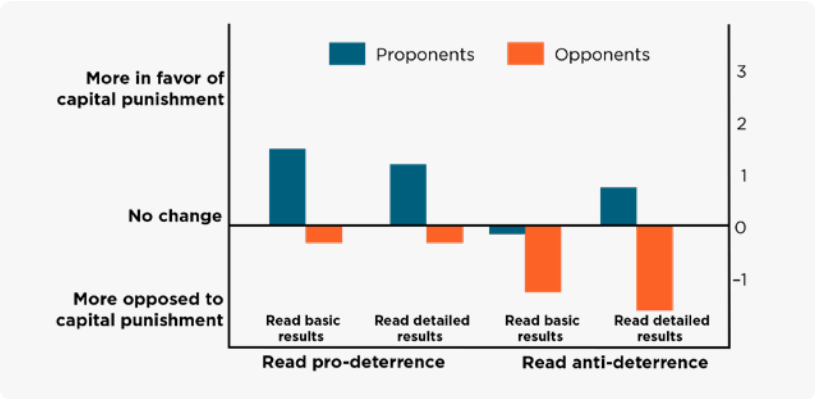


One way we unconsciously reduce our mental effort is by limiting our exposure to information that challenges our preexisting thoughts and viewpoints. Thus, we create information "bubbles" around ourselves, or echo chambers. These are insulating because they reduce mental effort by getting rid of information that may force us to engage in falsification. These information bubbles are getting smaller as technology grows more ubiquitous, making the bias even more pervasive.

We are all inundated with information online. However, we also have options to control the information we're exposed to through preferences, filtering, defriending, and unfollowing. Unless we actively take steps to attempt to falsify the information that comes our way, this control almost becomes algorithmic—and in some cases is controlled by an artificial intelligence. This leads to a confirming sphere of information. When in this echo chamber, we don't have to vet or investigate the information we see. We've vetted the sources, and now we trust those sources. However, this also means our attitudes and opinions become more polarized or galvanized toward the company we aim to keep. This is a situation where our information search is only confirming, not falsifying.

In 1979, psychologists Charles Lord, Lee Ross, and Mark Lepper asked college students to indicate their attitudes on capital punishment and then read the conclusion of two different studies. One purported to support capital punishment as a crime deterrent; the other purported to not support the punishment as a viable crime deterrent. These two studies were both fake—a deception that was explained to the students after the study ended.

The researchers found that students who supported the death penalty were more likely to agree with the study that showed evidence supporting the efficacy of the penalty. Meanwhile, students who didn't support the death penalty agreed more with the study that showed that capital punishment wasn't effective at deterring crime. In other words, the students' attitudes became more polarized after reading the study that confirmed their beliefs. They now had a piece of evidence—albeit fake—to strengthen their existing attitude. This aspect of confirmatory search affects everyone, even the scientists who study it!



The File Drawer Effect

The file drawer effect occurs when researchers publish their hits but bury their misses regarding some effect or phenomenon. By publishing only the hits, it makes it seem that the effect and the methodology were always right—this is confirmatory. Thus, these scientists are skipping the falsification step and giving a skewed view of their results. This particular publication practice has led to what some have called the replication or reproducibility crisis in psychology and other related fields.

Some well-established effects and theories in psychology are coming under intense scrutiny, as they are failing to replicate under similar conditions as the original research. This is striking when you think about examples of confirmation bias in publicly shared scientific literature, such as the claim that forcing yourself to smile will make you feel happier. Studies over the past decade have called into question this finding from several decades ago. Scientists actively participate in the bias when engaging in the file drawer behavior, while publishers perpetuate it.

One solution to this problem comes in the form of preregistration reports through journals: A researcher says exactly what they will do in a report before they do anything. The plan, methodology, and background are peer-reviewed by other scientists. If accepted for publication, the results of the study are accepted as is. That means if the confirmation worked, great! But it also means that if the falsification worked, also great! Either way, the study is published, and anyone can read the results. Negative results are published alongside positive results. This process removes confirmation bias from the publication-and-sharing part of the scientific method.

Parapsychology

No one is immune to confirmation bias, even when they're aware of it. And instances come up in important and serious ways, even in the field of parapsychology—the study of psychic phenomena—where scientists consistently see confirmation bias. In fact, the James Randi Educational Foundation used to offer $1 million to anyone who could objectively show psychic abilities under strict testing conditions. Those conditions included efforts at falsifying, which people claiming to have these abilities often do not want.

In 1973, Johnny Carson asked James Randi to help *The Tonight Show* producers set up an unbiased demonstration of self-proclaimed psychic Uri Geller and his abilities using falsification. Randi, a stage magician and scientific skeptic, told the producers to set up props for the demonstration and to keep Geller away from them. When Carson presented the opportunity for Geller to demonstrate his psychic abilities during the show, Geller backed away from the demonstration.

Another way confirmation bias appears is through our own memories. This is like interpreting things through a confirmatory lens. Most of the time, our memories are used to remember things that help keep us alive or advance us toward our goals. There is no possible way we can remember, or at least consciously access, every single event or circumstance we have encountered in our lives. Thus, we're more likely to remember things that reinforce our experiences and expectations, even if we engage in a neutral fact-checking behavior. This phenomenon goes by a few names, including selective recall, confirmatory memory, and access-biased memory.

Consider extrasensory perception (ESP): the ability to glean information outside of your actual physical senses. In one study, believers in ESP and skeptics of it were shown various descriptions of ESP experiments. In each group—believers and skeptics—half of the participants were told that these studies produced verifiable support for ESP. The other half were told that the studies produced no evidence. In a follow-up recall test, where participants had to generate the information without prompting, the participants were able to accurately indicate the methodology used across belief groups, except in the case of the believers who were told that there was no evidence.

	Believers		Skeptics	
	ESP Proven	ESP Disproven	ESP Proven	ESP Disproven
n	11	12	15	11
Recall	100%	39%	88%	91%

The study's authors, Dan Russell and Warren Jones, argued that participants' confirmatory memory of ESP's actual, real existence was in direct opposition with the information given to them by experimenters. Due to this opposition, recall was hindered. Thus, they performed poorly on the memory test. The participants ultimately misremembered the results of the study because of their bias toward believing results in support of ESP. However, this was not true for the skeptics—they had decent recall accuracy in both ESP conditions. Why didn't they get the same recall hindrance as the believers? The researchers don't offer a strong reason. Perhaps the skeptics were so named because they were waiting for good evidence. As the information was presented to participants as evidence from a scientific study, it may have been enough for this group of skeptics to accept the results—enough to maintain a strong recall.

How Confirmation Bias Appears

We all deal with information overload these days. It's hard to determine what's good information and what's bad information. But recognizing the effects and outcomes of confirmation bias is the first step to changing the impact the bias has in your life. Sometimes, when a value or belief is central to our core identity, confirmation bias might be the only defense we have to keep our identity from collapsing. If information that's the opposite of what we believe is presented, then it will get interpreted in a biased way. This may serve to solidify and potentially polarize your existing attitude, belief, or value, even if the counter-attitudinal information is truer or more factual. Luckily, most studies suggest that people can change their minds regarding beliefs or attitudes that aren't based on facts. But for some, it may take repeated exposure to the factual information for this to happen. And for others, it may never change.

Another outcome you might see is that discredited beliefs persevere because of confirmation bias. You can see this most clearly with cults that have a singular focus. Take, for example, Heaven's Gate. This religious cult believed a rumor that a spaceship was riding the galactic coattails of the Hale-Bopp comet, discovered in 1995. The Heaven's Gate followers purchased a high-powered consumer-grade telescope to catch the comet in its close-up glory and to find that spaceship. Perhaps not surprisingly, they never saw the spaceship in the tail of the comet. Instead of ditching their strongly held beliefs, the leaders of the cult immediately returned the telescope, saying it was defective.

A third way confirmation bias appears is when information presented gets preference in your mind. If you come across information you haven't seen or heard before, the initial stuff ends up getting processed first and has more time to solidify into a belief or attitude. This is sometimes referred to as the irrational primacy effect. The effect occurs regardless of the importance of the information. Subsequent information gets less weight than the information at the beginning, even if it is the more important info.

A final way confirmation bias manifests is with illusory associations or correlations between events. As humans, we like to notice patterns. If two events seem connected, we make a potential illusory connection between them. This takes you back to the question of whether earthquake weather is a thing. It probably isn't, but we make these connections when we search our memories for connections so that we can better prepare for the future.

Earthquake weather reminds us that our memories are biased. When we encounter something we believe already, it's easier to access later. When that encounter is coupled with something else we know, our brain connects the two, even if they're completely unrelated.

Confirmation bias feeds our pattern-seeking and sense-making brains. There isn't much you can do about its presence. You wouldn't be able to make the many decisions you make every day without it. But recognizing when the bias occurs is the first battle. The rest is a war of attrition, the back-and-forth of confirming and falsifying. It might not seem like anything is happening. However, the recognition of confirmation bias will eventually come easier, and bias will have less command over your decisions.

Reading

- Griggs, Richard A., and James R. Cox. "The Elusive Thematic-Materials Effect in Wason's Selection Task." *British Journal of Psychology* 73, no. 3 (1982): 407–420. https://doi.org/10.1111/j.2044-8295.1982.tb01823.x.
- Lord, Charles G., Lee Ross, and Mark R. Lepper. "Biased Assimilation and Attitude Polarization: The Effects of Prior Theories on Subsequently Considered Evidence." *Journal of Personality and Social Psychology* 37, no. 11 (1979): 2098–2109. https://doi.org/10.1037/0022-3514.37.11.2098.
- Russell, Dan, and Warren H. Jones. "When Superstition Fails: Reactions to Disconfirmation of Paranormal Beliefs." *Personality and Social Psychology Bulletin* 6, no. 1 (1980): 83–88. https://doi.org/10.1177/014616728061012.
- Wason, Peter C. "Reasoning." In *New Horizons in Psychology*, edited by B. Foss. Harmondsworth, UK: Penguin Books, 1960.
- ———. "Reasoning about a Rule." *Quarterly Journal of Experimental Psychology* 20, no. 3 (1968): 273–281. https://doi.org/10.1080/14640746808400161.

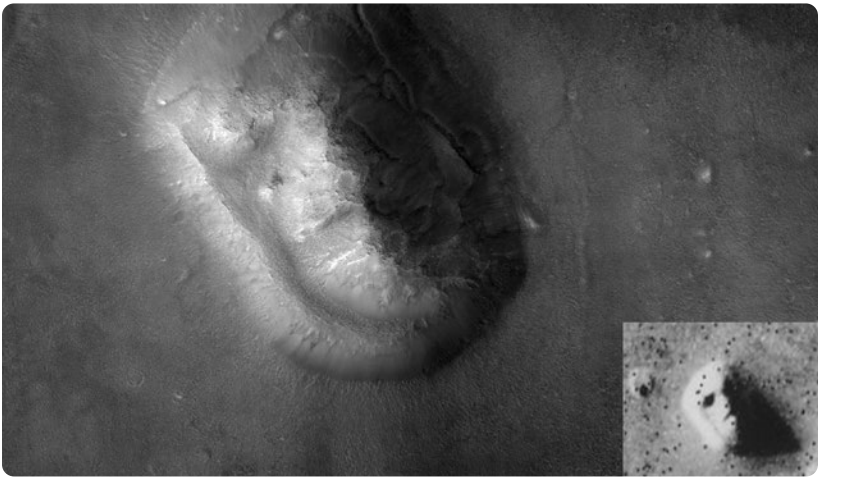
3

We See People In and Behind Everything

You might be familiar with the photograph of the face snapped in July 1976 by the Viking 1 spacecraft as it orbited the Cydonia region on Mars. The photo shows a collection of large rock formations, one of which looks like a human head. Part of the face is obscured by shadows, but your mind fills in those gaps. But why? This lecture explores two seemingly silly biases that are important to your thinking and your decisions. In fact, the biases you will explore today do have advantages—but also some shortcomings because they can prevent you from truly experiencing different, nonhuman perspectives.

Pareidolia

Pareidolia is a bias that causes us to see faces and recognizable shapes where they don't exist. It is the tendency to perceive meaning from vague and random stimuli—usually in things we see. The most common expression of pareidolia is perceiving faces in inanimate objects, such as a face on Mars. This happens for a couple of reasons. The first is that the human mind is oriented to search for patterns in everything. A pattern means something is predictable or regular. This is crucial for planning into the future or examining our memories. But why are faces the most common thing that our brain finds when searching for patterns?

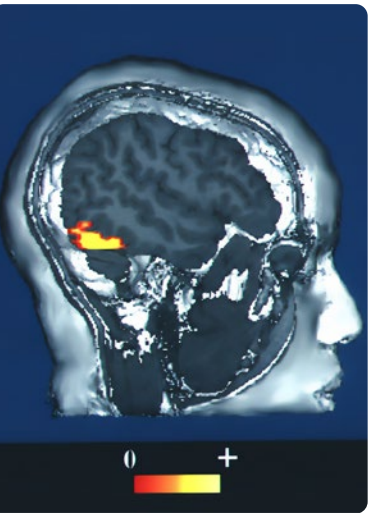


Imagine you're an early human trying to navigate the world. One thing you notice as you grow up is that things that are alive tend to have a predictable pattern of eye, nose, and mouth positions. You see two eyes, a central vertical line that breaks up the face—that's the nose—and a horizontal opening right below that. You see it in your family, in the animals you eat, and in the animals that want to eat you. The last point is perhaps the most important. Prey animals tend to have eyes on the side of their heads, which is a break from the general pattern described. Predators tend to look like people, with eyes facing forward.

As with pattern-seeking, the more often you see a pattern, the better you are at detecting and perceiving that pattern. If you see faces all the time, you get better at perceiving faces. Over time, the skill of seeing faces gets hardwired into our DNA as each passing generation sends that information about recognizing both the predator and prey faces onward. This pattern-seeking part becomes important as your large brain (compared to other animals) can handle more patterns as you grow and experience the world more. And it turns out that there's a small but mighty brain region that's consistently active during face recognition.

The Fusiform Face Area

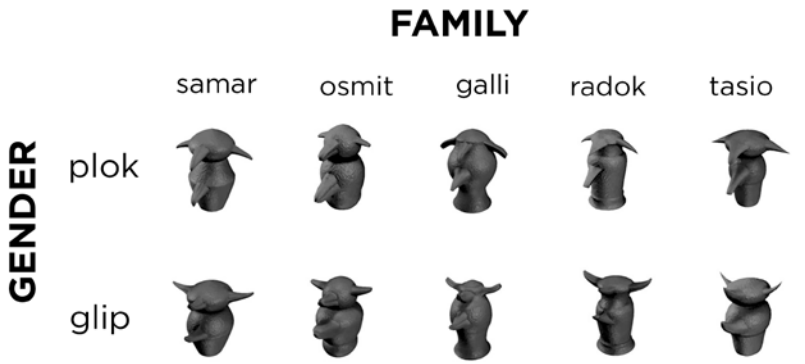
In 1997, psychologists Nancy Kanwisher, Josh McDermott, and Marvin Chun used functional magnetic resonance imaging (fMRI) to investigate how the brain perceives faces. After showing many different human faces to their participants, along with non-faces, they found a small part on the underside of the brain that was active each time participants perceived a face. Furthermore, this part of the brain wasn't active when the participants viewed different kinds of images, such as landscape scenes, that had no discernible faces. The researchers named this area the fusiform face area (FFA).



However, that study only tested participants' ability to recognize human faces. That doesn't address the question of why we can see faces in almost anything. Shortly after the FFA research came out, psychologist Isabel Gauthier was working on her dissertation. She wanted to test whether the FFA was only for recognizing human faces or if that particular brain area could be activated in any other ways. She and her colleagues created a fictional race of aliens called greebles. They were computer-generated figures made in two genders and five families.

The greebles all had a beak or nose, a head, and some form of additional spikes or protrusions on the top or sides of the head. The two genders were defined by whether their protrusions pointed up or down. Their families were defined by their overall shape.

For example, if a greeble's protrusions pointed up, it was of the glip gender. If they pointed down, it was of the plok gender. Any particular glip or plok could be from one of five families—samar, osmit, galli, radok, or tasio, depending on their overall shape. Thus, the 10 different basic greeble types were defined by their gender and family variations. However, numerous other smaller individual differences could exist within each of these 10 categories. What Gauthier wanted to know is whether, with sufficient training, participants could become experts at distinguishing not only these 10 basic greeble categories but also individual greebles. From this, researchers would discover whether participants could recognize the same kind of difference and diversity we see in faces but in something that wasn't a face.



Participants were tasked with learning the names that came with each of the variations and sub-variations of greebles. Each greeble was an individual, just as every human being is. Over the course of several training sessions, the researchers created greeble experts. When the new greeble experts were shown images of greebles, the researchers found that the same area in the brain that is normally associated with recognizing faces started activating for the greeble images as well. Remember, the greebles didn't have faces as defined earlier.

Importantly, they had no eyes. Perhaps the beak could be interpreted as a nose or, in the case of birds, the nose and mouth. There was ambiguity inherent in the design of these fictitious aliens. And that ambiguity leads to pattern-making attempts. But the key finding is that the so-called FFA of the brain appeared to be capable of making fine visual distinctions between different identical objects that weren't faces. The researchers concluded that this small area of the brain might primarily be associated with faces but could also be associated with other kinds of feature expertise. In other words, in our evolutionary history, fine-tuned object recognition was extremely important to our survival—it assisted with determining landscape features, whether a species of mushroom was edible, and who our families were.

More recent research confirms this idea, too. In 2012, psychologist Joel Voss and his colleagues wanted to know about how context and meaning change the activation of the FFA. They showed participants images while the participants were in an fMRI scanner. The images looked like various random squiggles, with no identifiable objects. Participants spent two separate sessions in the scanner, where they were shown several of these squiggles. During each session, they were asked to rate each image on a four-point scale to describe how meaningful each image was to them. Images that were rated as a 1 or 2 were marked as "not meaningful." Images rated with a 3 or 4 were marked as "meaningful." The researchers argued that these latter ratings were the result of some form of pareidolia. After a short break, the participants were shown those same squiggle images again along with a new set of squiggles. They were given the same meaningfulness scale to rate each image. In the second task, participants were instructed to answer as quickly as possible. This would give the researchers data about snap decisions that weren't present in the previous session.

1 or 2 = Not meaningful

3 or 4 = Meaningful

After this task, participants took a surprise recognition test. In general, a recognition task is a memory task that tests your ability to recognize information. This ability relies heavily on familiarity. However, true recognition separates familiarity from knowing. The real question was whether the repeated stimuli that had been given meaning—by the participants through pareidolia—could be remembered because it was known rather than familiar. Thus, the idea here was to have the participant give their own meaning to the squiggle images, code those images in their memory because of the meaning, and be able to recognize those images among a bunch of other images they didn't ascribe meaning to or had never seen before. In this recognition test, participants now saw another set of squiggles. Their job was to indicate which of the images they had seen before and which ones were new squiggles as quickly as possible.

The researchers found that the participants were able to remember the squiggles that contained meaning for them. The FFA played a role in recognizing some of these images. Overall, the participants thought the squiggles that looked like something they had encountered before, which likely had a face or some other common feature, provided meaning. This aided their memory better than the images they had seen before but had given no meaning to.

Anthropomorphism

Face perception in inanimate objects has some broader implications, especially when we start assigning emotions to inanimate objects. Anthropomorphism is the tendency to give nonhuman things human characteristics and human thought. It can even apply to abstract concepts, such as countries and weather. It's essentially thinking that any other thing that isn't human can and should have human qualities.

In 1944, psychologists Fritz Heider and Marianne Simmel attempted to find out why people assign human qualities to ambiguous situations that don't involve humans. They showed participants a one-and-a-half-minute film of several shapes, including triangles and circles, moving in and around a box. The box had a doorway that could open on one of its sides. The shapes moved back and forth, in and out of the box. They also changed location and speed as they moved. The researchers asked participants to describe the events of the film. What they got was a story of the shapes. The stories included personalities and motives. Participants explained various ways in which the shapes had moved with agency and intentionality. For example, Heider and Simmel reported one participant's description: "A man has planned to meet a girl and the girl comes along with another man. The first man tells the second to go; the second tells the first, and he shakes his head. …" Humans seem to want to give reasons for the natural forces we all experience. Heider and Simmel concluded that their participants attributed human intentions to the shapes and their movements because there was no other information present to clear up the ambiguity.

Recently, researchers have made similar arguments. Overall, the process of anthropomorphism is a bias because humans use their existing organized knowledge—called schemas—to make inferences about the world around them. As we engage with other humans most frequently, these schemas are the most accessible to us and are the ones we're most likely to apply when we encounter something new in our environment. However, the bias comes in because those inferences aren't always accurate. In 2007, psychologist Adam Waytz provided this interesting addition to the explanation of why we do

this: Humans are social animals. As we engage in socializing behaviors in all aspects of our lives, attributing human qualities to nonhuman things is a way to stave off loneliness. Waytz, along with his colleagues Nicholas Epley and John Cacioppo, developed a three-factor model to describe the psychological features of anthropomorphism. To explore how this works, consider why so many people believe in the existence of aliens who share remarkable physical similarities with human beings.

In the three-factor model, three concepts are identified. The first concept is called elicited agent knowledge. This concerns how much prior knowledge about the subject or object a person has and how much of that knowledge is accessible. In other words, how easy is it to remember that prior knowledge? In the case of aliens, it's likely safe to say we have absolutely no idea whether life exists anywhere besides Earth. And if it does, we have no idea what that life looks like. We have no information or knowledge about aliens. The second concept is called effectance—how much do you want to interact with your current environment? As humans have a drive to explore our world and worlds beyond, we have high effectance. For example, UFOs are unidentified, which makes us want to investigate them. We think aliens visit us because we think they also have high effectance.

Finally, the third concept is called sociality. This is the need to establish social connections. Since humans have a strong need to make these social connections, we create them in everything we see. We believe that UFOs must be carrying extraterrestrials who are also looking for the same thing we are: a way to contact us. The researchers showed that when elicited agent knowledge is low, and effectance and sociality are high, people are more likely to anthropomorphize the subjects of discussion. This is one of the reasons why the aliens shown in pop culture over the past several decades of film and television have been humanoid creatures. Although there is a practical reason for doing so—the human bodies of actors are hard to transform into something radically different—it also demonstrates a larger bias.

A useful film for exploring anthropomorphism is 2016's *Arrival*. It's about the sudden appearance of an alien ship with occupants who have octopus-like shapes and use a kind of language that doesn't make sense unless you undo your sense of time perception. It's hard to fully anthropomorphize these aliens because they lack human attributes other than the use of language and the need for exploration. The main character is a talented linguist, and she and her colleagues in the film have a difficult time figuring out what these aliens want. They don't look like us; thus, where did they come from? Their language is completely different from ours—how do we communicate? The linguist actively chastises other members of the exploration team for trying to attribute human qualities—such as warfare and conquering—to these aliens.

The Uncanny Valley

We tend to give our cars names because we see faces in their fronts and backs. Since we do that for all kinds of products we buy, marketers and advertisers use this knowledge to their advantage. People tend to have positive experiences when products can be given personality and other human qualities. Adding the ability to see a face is icing on this cake. There's some fascinating research in the marketing realm related to our uneasy relationships with robots. As artificial intelligence and robotics become more and more ubiquitous in our lives, more psychological issues pop up.

One such issue is called the uncanny valley, first coined by roboticist Masahiro Mori in 1970. This is when something that resembles a human in many ways is perceived in a negative fashion because we know the thing is not human. We like things that look human. That positive feeling increases the more human something appears—up to a certain point. When it gets close to human, but not close enough, we're uncomfortable. It feels strangely familiar and yet not quite right—this is the uncanny part. These are things such as zombies or robots with faces. This dislike is the dip or valley of our emotional response to these humanlike features. As things start to lose resemblance to humans, we no longer have the same fear, dislike, or disgust for their appearance.

Say you clear that hurdle by making a robot that looks like Honda's ASIMO. ASIMO has a humanoid torso with two arms and two legs. However, its head is rounded and kind of looks like a motorcycle helmet, with lit eyes to give the face a target for others to look at. We consider this pleasant because it's only meant to resemble humans somewhat, not be an exact copy. People will like robots more if they also complete tasks that are complex, precisely because we can't do them. However, if you layer emotions and behavior variability on top of those complex tasks, you have yourself a beloved WALL-E.

Pets and Anthropomorphism

The area of your life where anthropomorphism is the strongest may be in mental health, specifically in the growing field of emotional support animal training. This is because pets provide a safe outlet for those social connections we so desperately need. Training pets to respond to a panic attack by shoving themselves into your body can help to create something real and disarming for that person in panic mode. Anthropomorphism makes us think this animal wants to make us feel better no matter what when actual human contact may not be possible. We don't know if the animal wants to do that, but the animal knows that it was something they were trained to do. We give them the motivation after the fact.

These two biases, anthropomorphism and pareidolia, extend our internal experiences to the outside world in several ways. They're so far-reaching in most aspects of our lives that it's hard to disentangle their overlap or explain how to manage them individually. In fact, some might say that they have a significantly positive impact on the way we navigate through our natural

world by filtering everyday experiences through our human lens. Pareidolia is merely the word given to finding patterns—and particularly faces—in ambiguity. For most of our evolutionary history, that bias has kept us alive and procreating because we've been able to quickly determine if newcomers look like us or are us. And of course, we engage in anthropomorphism constantly. The only time it is problematic is when using the bias to explain and write about things that aren't humanlike and shouldn't have those human qualities.

Reading

- Epley, Nicholas, Adam Waytz, and John T. Cacioppo. "On Seeing Human: A Three-Factor Theory of Anthropomorphism." *Psychological Review* 114, no. 4 (2007): 864–886. https://doi.org/10.1037/0033-295X.114.4.864.
- Gauthier, Isabel, Michael J. Tarr, Adam W. Anderson, Pawel Skudlarski, and John C. Gore. "Activation of the Middle Fusiform 'Face Area' Increases with Expertise in Recognizing Novel Objects." *Nature Neuroscience* 2, no. 6 (1999): 568–573. https://doi.org/10.1038/9224.
- Heider, Fritz, and Marianne Simmel. "An Experimental Study of Apparent Behavior." *The American Journal of Psychology* 57, no. 2 (1944): 243–259. https://doi.org/10.2307/1416950.
- Kanwisher, Nancy, Josh McDermott, and Marvin M. Chun. "The Fusiform Face Area: A Module in Human Extrastriate Cortex Specialized for Face Perception." *The Journal of Neuroscience* 17, no. 11 (1997): 4302–4311. https://doi.org/10.1523/JNEUROSCI.17-11-04302.1997.
- Voss, Joel L., Kara D. Federmeier, and Ken A. Paller. "The Potato Chip Really Does Look like Elvis! Neural Hallmarks of Conceptual Processing Associated with Finding Novel Shapes Subjectively Meaningful." *Cerebral Cortex* 22, no. 10 (2012): 2354–2364. https://doi.org/10.1093/cercor/bhr315.

4

We Love It Because We Built It

This lecture discusses the IKEA effect, which is the tendency to love and place a high value on things you've built, whether those things were built correctly or ended up with some flaws. However, this bias is more about the amount of love and deference you give those labors than the fails or successes in the quality department. But why is that the case? Why not? You did put that work in, right? This is a crucial point. It's a psychological concept called effort justification. Effort justification is an attempt to show yourself that the effort you put into a task—especially a difficult one—was worth it.

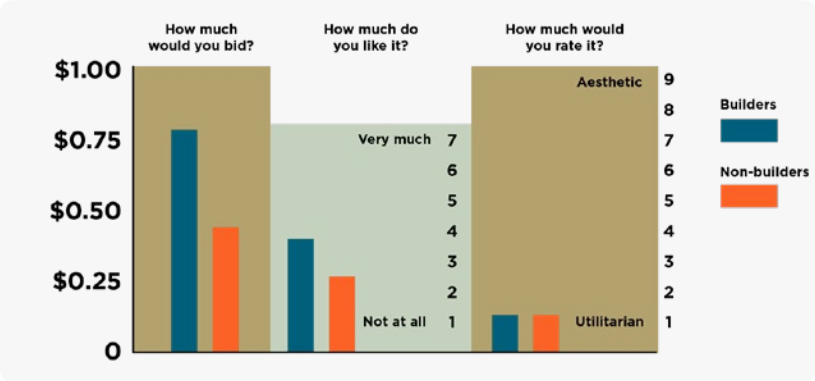
Effort Justification

Effort justification is rooted in the tendency to assign a value to your efforts and to convince yourself that the value of the outcome is greater than the value of the job itself. In other words, nobody wants to feel like they've wasted their time. This creates cognitive dissonance, which is an internal conflict you feel when your beliefs and attitudes don't line up with your actions. This mental state makes you feel bad. Thus, your brain performs mental gymnastics to give a higher value to the thing you made or achieved because of the effort you put in to get it. Add this effort justification to objects we build ourselves, and you get the IKEA effect. To add another layer, imagine you made a mistake along the way. This mistake may require even more justification.

To determine how building something impacts people's feelings about the objects they build—and how they distinguish between function, beauty, and personal value when effort is involved—researchers conducted a fascinating study. Participants were placed in one of two groups. The first group was given a small IKEA storage box to construct. This group was called the builders. The comparison group, the non-builders, was given an already constructed storage box—identical to the one the builders were going to make—with a chance to inspect it and answer some questions about it.

Psychologists Michael Norton, Daniel Mochon, and Dan Ariely asked three important questions. The first question was: "How much would you be willing to bid to buy this storage box?" The second question was: "How much do you like the box on a scale of 1 to 7, 1 meaning 'not at all' and 7 meaning 'very much'?" The third question was: "How would you rate the box itself on a scale of 1 to 9, if 1 meant the box was completely utilitarian and 9 meant the box was purely meant for aesthetic purposes and served no function at all?" Surprisingly, the results suggest that neither group thought the box was anything more than a box. All participants rated it as functional rather than pretty.

This is an important baseline comparison between the two groups because it puts the other two questions' differences into perspective. The builders were willing to pay on average 78 cents, while the non-builders were willing to pay on average 48 cents for their boxes. This is a 30-cent difference, but overall, this comes out to 63% more. Additionally, the builders liked their boxes more than a whole point more on the 9-point scale than the non-builders. The builders' thoughts didn't have anything to do with the quality, purpose, or state of the storage box itself. They put their effort into building the boxes, and in doing so, they valued them more. That's effort justification.



While these findings reflect researchers' basic understanding of the IKEA effect, Norton and colleagues took it a step further in that same 2012 study. They wanted to know how builders compare their creations of other things—such as origami—to those made by experts. They found that builders liked their own origami more than experts' versions. The researchers also asked

questions related to process and completion: What happens to the IKEA effect when a person builds something but then takes it apart? And what if participants aren't allowed to complete the building process? They found that, on average, the IKEA effect disappears when a person takes apart their creations or can't finish the building process. There's seemingly no need to justify the effort of the build itself if the object doesn't exist anymore or never fully existed in the first place.

Make-your-own-style businesses, such as Build-A-Bear, rely on the IKEA effect to help sell their products. Children and adults come into the store to construct a bear. Each aspect of the bear—from its color and style to its clothing—is chosen purposefully. The IKEA effect keeps us wanting more of these special connections, and we pay for the chance to make something unique. This is also true for anywhere else that you create a personalized product. The IKEA effect is a narrow bias. It's extremely situational and specific, but there's no inherent danger or negativity to it.

The Sunk Cost Fallacy

What happens when you invest your time and the outcome becomes increasingly negative? The answer to that question lies in what is called the sunk cost fallacy. You may have also heard it called escalation of commitment. This bias occurs when we've put effort, action, or investment in something and don't change course when the outcomes become increasingly negative. Rather than love or affection driving the sunk cost fallacy, it is driven by regret and obligation—two sides to the effort justification coin.

Say you're an avid skier and you plan ski trips every winter. This winter, you choose to purchase a ski weekend trip to Colorado for $500. A few weeks later, you also decide to purchase a weekend ski trip to Utah for $250. Obviously, the Colorado trip is double the price.

However, you think you'll like the Utah trip better. The week of the trip you realize, "Oh no, these trips are for the same weekend!" Which trip do you go on, and which ticket do you decide to sell? A purely utilitarian approach would be to head to the most enjoyable place because the value would be inherent in the intangible enjoyment. However, you spent more on the Colorado trip—double the cost. You think it would be silly to waste that money.

Psychologists Hal Arkes and Catherine Blumer asked participants a similar question in 1985. Surprisingly, fewer people decided to go on the ostensibly more enjoyable Utah trip, and instead most chose the more expensive Colorado trip. People tend to focus on the investment they've already made rather than the enjoyment they might have in the future. You spent double the money for the Colorado trip versus the Utah trip. In your mind, the Colorado trip equals two Utah trips. Thus, you justify the potentially poorer decision of the higher-cost ski trip because you spent more money on it. You're not even sure why you made that decision. However, now that you've realized it, that decision takes up more of your thinking window and attention, especially because of the attached dollar signs.

Here is another example. Say you go to the movie theater by yourself to see a movie that received critical acclaim. You spend $13 on this ticket. Midway through the movie, you think to yourself, "Oh man, this movie is so boring. I should leave." But your butt is glued to the seat. Why do we do this to ourselves? The original idea surrounding sunk cost is that it is an irrational choice. *Irrationality* is defined here as doing something that's opposite or antithetical to our own goals. In the movie theater example, the rational choice would be to leave if you're bored.

However, there are worse things than being bored. There are also greater sunk costs when the stakes are higher. For example, the Berlin Brandenburg Airport project in Berlin, Germany, was first planned in the 1990s. In 2013, this new international airport, which had started construction in earnest in 2006, was still under construction 7 years later—after 15 years of planning. It was finally finished in 2020 and didn't open for its first flights until late 2020. It took a total of 14 years to construct the airport. This is an example of a sunk cost because the German aviation agency continued to push back the construction deadline, year after year. In 2012, the delay came a month before airlines finalized their plans to move to the new airport from Berlin-

Tegel International Airport. Several other setbacks made the situation worse: General planners left; companies involved in the construction filed for bankruptcies; allegations of corruption began to pervade the reporting on the delays. But even by 2016, German officials were adamant that the project continue rather than diverting funds to upgrade the aging Tegel airport.

You might ask why the German aviation agency didn't decide to tear down the troubled construction project and start over. It is a possibility, just like you could get up from that movie theater seat and relieve your boredom. The thing that separates the airport example from the movie theater situation is the escalation part of the sunk cost fallacy. The effort justification increases, and the decision to stay the course gets stronger with more investment.

What to Do about These Biases

Overall, it's clear that we tend to weigh our physical and psychological investment, both when it comes to the little imperfections of what we create and the amount of effort we put in. So, what do we do about these effects and biases? There may be nothing wrong with the IKEA effect. This bias may only be an issue if you are asked to judge your own work against another person's work. Of course, you can't be objective in this case because you're likely to value your own work more, even if the other person's work is clearly better.

Concerning the sunk cost fallacy, why do we keep making the decision to stick with situations that lead to negative feelings? Most of the early research in sunk cost and escalation of commitment showed that the bias is rather universal and happens in many facets of life. However, in 2004, Thomas Kelly argued against the notion that people fall prey to the irrationality of sunk costs too often and too quickly. Kelly pushed that the traditional definition of sunk cost is too vague, ambiguous, and broad. His argument boiled down to the following question: Wouldn't finishing what we start be a goal in and of itself? Thus, give yourself the freedom to explore your effort justification. You might want to complete that airport. You also might want to keep watching that movie, even if you're bored. Sometimes, we don't need to continue doing those things, and that's okay. But sometimes, we do need to continue doing things, especially if that effort justification will make us feel better about our behaviors.

Sunk costs involving monetary investments also impact people differently. That $250 ski trip cost difference might not matter to someone with copious expendable income. However, if that investment represents a third of your travel budget for the year, then the $250 becomes quite the difference. These considerations are rarely mentioned in the research on these biases. However, they're essential for understanding the rationality or irrationality of the choices we make, especially if the sunk costs are actual monetary costs. Thus, a good piece of advice is to reflect. The IKEA effect is humanizing, especially if you truly do love the things you've made, flaws and all. And it's okay to reframe that boring movie experience as a great way to get some alone time.

Now, with respect to sunk costs, if you find yourself doing things more out of a desire to finish them, even if you're no longer invested, perhaps it's time to refocus your goals. Consider the various outcomes before starting a project. If money is involved, consider the outcome versus the value. What sort of psychological benefit will you receive? What happens if you don't finish? How will you feel if the outcome becomes negative? In answering these questions, you'll be more likely to avoid making irrational decisions and be more content with the outcome of your choices.

Reading

- Arkes, Hal R., and Catherine Blumer. "The Psychology of Sunk Cost." *Organizational Behavior and Human Processes* (1985): 124–140.
- Kelly, Thomas. "Sunk Costs, Rationality, and Acting for the Sake of the Past." *Nous* 38, no. 1 (2004): 612–640.
- Norton, Michael I., Daniel Mochon, and Dan Ariely. "The IKEA Effect: When Labor Leads to Love." *Journal of Consumer Psychology* 22 (2012): 453–460. https://doi.org/10.1016/j.jcps.2011.08.002.

5

Why We Think Differently in Groups

Say you're at work, leading a large room full of people who are all discussing the best course of action to take on an important issue. The group settles on a solution quickly, and you all agree. However, it turns out the group made a poor choice. It cost your company their reputation and plenty of money. But everyone agreed this was the best decision. Why did it go so wrong? This lecture explores group decision-making biases, including groupthink and group polarization.

Groupthink

Groupthink is the tendency of a group to make poor decisions when there is little or no discussion of alternative choices and the potential impacts of the decisions. The main effort is to maintain harmony and conformity within the group. Groups that make biased decisions want to conform and agree to the overarching perspective of the group. A famous example of groupthink occurred in 1961 when the John F. Kennedy administration decided to go through with the plan to covertly invade Cuba in the Bay of Pigs invasion.

In 1960, the outgoing Eisenhower administration had a plan to secretly invade Cuba. They were going to land at a minimally guarded bay—the Bay of Pigs. The operation's intent was to overthrow Cuba's new leader, Fidel Castro. In November 1960, John F. Kennedy won the general election to be the next president of the United States. Eisenhower, who was still president, brought Kennedy into the invasion discussions as an observer. By April 1961, Kennedy had taken office, and his new administration had to determine whether to carry out the mission. All of Kennedy's advisors, his cabinet, and even Kennedy himself agreed that they had to go through with the plan on the unsuspecting Cubans sooner rather than later to catch them off guard. To everyone in the room, it felt like the only path forward.

However, the small contingent of US special forces and Cuban rebel forces was immediately intercepted by Cuban forces at the beachfront. In a matter of three days, the invading forces surrendered. This foreign policy disaster destroyed the US's relationship with Cuba and solidified Cuba's alliance with the Soviet Union. The latter point brought about the Cuban missile crisis a year later.

How did this go so wrong? Groupthink. There are a few conditions that allow groupthink to occur. Psychologists Ramon Aldag and Sally Riggs Fuller, elaborating on ideas first presented by Irving Janis, determined that there are three main prerequisites that must coexist for groupthink to appear. The first prerequisite is high group cohesiveness. This is when everyone in the group values each person in the group and understands the strengths and weaknesses of the group members. If a group is already cohesive, then it is more likely to come up with a cohesive answer. This leads the group members to give up their individuality in the decision-making process to follow the thrust of the group.

The second prerequisite involves structural faults. These are the problematic elements existing in the group itself. One such problem is for the group to be insulated. Of course, secret invasion planning will not be front-page news. The only people who know about the operation are the planners of the operation itself. Thus, there is no outside pressure to do anything. A lack of norms that guide behavior is also a kind of structural fault. A crucial structural fault in the Bay of Pigs disaster is that the group itself was homogenous. They were all white men of similar political and socioeconomic backgrounds. Culturally speaking, there was only one answer for that group: stop communism in Cuba with military force.

The third and final prerequisite for groupthink to occur has to do with the situation itself. In a high-value situation, or a highly emotional or charged decision, there is more pressure to conform to the overwhelming decision. That could certainly be said about the Bay of Pigs invasion. Kennedy spent several days with 50 of the smartest, most experienced foreign policymakers. Every single one of them agreed that this was the only course of action to stop Castro.

Groupthink Characteristics

Psychologist Irving Janis created a way to test for conditions that make groupthink possible. Janis identified two aspects of group cohesiveness that lead to groupthink: invulnerability and overoptimism. He claimed that if a group thinks it is invulnerable to damage or bad press, or insulated by law, then this increases the chances of risk-taking as well as overoptimism in those risky decisions. This cohesion can also come from a feeling of moral superiority. If the group thinks its voice is the height of morality, then dissent from inside the group is ignored.

Janis also identified two characteristics of groupthink decision making: closed-mindedness and stereotyping. He argued that closed-mindedness is the enemy to the kind of effective leadership that helps prevent groupthink. If a group member raises a warning in a groupthink situation, that warning may be dismissed and rationalized as insignificant. Furthermore, this may lead to stereotyping of opposition within the group and turning the dissenters into caricatures that appear evil or weak.

Janis argued that closed-mindedness and stereotyping lead to an illusion of consensus in the group decision. As the group majority in any discussion could label a dissenter as weak or impotent, these people don't say anything. This is called self-censorship. Even if this isn't the case, there is extreme pressure from the group to stop fighting and accept the majority's decision. There might even be folks in the group that actively look for dissenters to silence them.

Groupthink in History

Consider the role these groupthink conditions played in a few other turning points in history. In 1941, Adolf Hitler ordered the German high command to invade the Soviet Union. Despite centuries of military experience suggesting that it's a mistake to invade the largest landmass with the coldest winters, the German military enthusiastically followed the Führer's orders. This didn't go so well for the Nazis. Hitler didn't make this decision in a vacuum. He had a cadre of some of the best military minds in Europe. Some of them had even witnessed Germany's costly invasion of Russia in World War I. However, no one in the German military objected to this plan. A simple dissenting opinion might have led the Nazis down a different path.

Note that groupthink doesn't only apply to politics. It affects all kinds of group decisions, including those in the collaborative world of science and engineering.

In January 1986, the space shuttle *Challenger* exploded into a fiery ball shortly after liftoff. Space flight historian Amy Shira Teitel discussed several instances of groupthink decisions by NASA that led to the fateful flight that killed seven astronauts. The tragedy was caused by a malfunction in the small rubber O-rings that sealed the chambers of the booster rockets. These chambers need to be perfectly sealed to make sure the giant fireballs created by the rockets are directed downward. But engineers had discovered that low temperatures had caused near failures on O-rings in previous shuttle missions. On the morning of the *Challenger* launch, the temperature had only risen to 36°F.

Despite the concerns voiced by several engineers, NASA administrators approved the launch and pressured their increasingly nervous outside contractor to sign off as well. The O-rings failed as predicted. According to Teitel, groupthink played a role in several key ways. The decision-makers at NASA, though themselves trained scientists and engineers, were insulated from the engineers and scientists who issued the warnings. They felt overconfident about their shuttle launch track record. In many cases, the glaring flaws were ignored by officials at several levels. Added to that was the pressure of getting it right—and without delay—because President Reagan wanted a win, and the country was captivated by a non-astronaut making the journey.

Overcoming Groupthink

What can you, as a group member, do to stop groupthink? How can you help create conditions that prevent groupthink from happening? The 1957 film *12 Angry Men* is a great example of how one person can change the collective mind of a group. The film is set in the jury deliberation room of a murder trial and follows the decision-making process of a group of 12 jurors. The basic plot is that an 18-year-old young man is charged with murdering his father. The jury is tasked with returning a verdict that must be unanimous. If found guilty, the young man will receive a death sentence. Eleven jurors are convinced that he's guilty almost from the start. The dissenter—Juror 8—believes that they should discuss the crime in detail before deciding to convict the defendant. He takes a stand against the group's initial quick decision.

And he pushes for a real discussion and demands that the group discusses the evidence. To prevent groupthink in any decision-making process, be a dissenter. Or assign a designated dissenter in each high-impact meeting.

Consider how President Kennedy responded to his own question: How could this smart group be so stupid? And what did he do to prevent groupthink in future decisions? Although many historians credit Kennedy with the solutions described below, they might have had other origins. However, credit is given to Kennedy himself for the way he implemented them in this specific case. In the wake of the Bay of Pigs invasion and during the subsequent Cuban missile crisis, Kennedy broke up his policy advisors into smaller groups to discuss different aspects and consequences of any decision. This allowed Kennedy to excuse himself from all but the highest-level talks where his own decision was required. These smaller groups had the potential to come to different conclusions without the influence of the entire group.

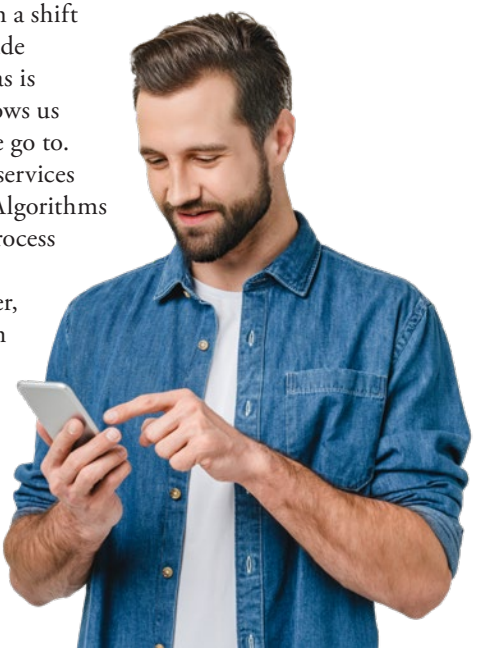
Kennedy also established a new prime directive for these meetings: If you have misgivings about any course of action, verbalize them to anyone, even if they are met with pushback. Kennedy's third technique is perhaps the most crucial step you can take to avoid groupthink: To break apart group cohesiveness in decision-making processes, introduce outside voices. During the Cuban missile crisis, Kennedy invited several historians, defense specialists, and other experts to share their unfettered and unfiltered viewpoints. Outside experts and opinions have a way of showing you new ways of thinking.

Group Polarization

Group polarization is the tendency for a collective group's attitudes to shift toward more extreme positions when connected in a group of like-minded people. The attitudes eventually get more extreme, and it's difficult to pinpoint where the shift comes in. One of the first explorations of group polarization was in the late 1970s. Recall the study by psychologists Charles Lord, Mark Lepper, and Lee Ross where they asked participants to first indicate their attitudes on capital punishment and then read another study's conclusions about whether this kind of penalty is a crime deterrent. They found that participants were more likely to agree with the study's conclusion that matched their own attitudes. This study is useful for discussing group polarization.

After the participants indicated their level of agreement with the conclusion of the study they read, they were asked to give another rating of their attitude toward the death penalty. This was done to measure the shift in their attitudes toward the punishment after reading either a pro- or anti-death-penalty research conclusion. Group polarization comes into play here because there were fake authors of these fake studies. Moreover, producing and evaluating research is a collaborative effort among individuals who come to conclusions about data and information. The researchers wanted to know how reading and engaging with this research finding—albeit fake—contributed to the participants' attitudes. Did they get more or less extreme? The finding that sticks out is that when a person saw the research conclusion that supported their original attitude, their subsequent attitude rating was more extreme than it was at the start of the experiment.

Where does the shift happen? It happens in all of us when we share the same attitude at the same time. It's the consensus and the resulting validation that strengthens our attitudes. Keep that circulating within a group, and you end up with a shift toward the extreme end of the attitude spectrum. Further increasing the bias is the fact that group polarization follows us around on every social media site we go to. Some of the most popular sites and services sell our information to advertisers. Algorithms have been developed to make this process as efficient for these companies as possible. Facebook, YouTube, Twitter, Amazon, Google, TikTok, and so on are gathering second-by-second data on your likes and dislikes to do two concurrent things: sell to advertisers and try to keep you on their platforms longer so that they can gather more data. These algorithms keep you seeing the same things repeatedly.



This tactic is also being used for insidious reasons. These processes and group polarization are leading to radicalization on several hot-topic issues. All it takes is one wrong click, and the algorithms start feeding you more of the same stuff. The incremental shift in your attitudes creeps in over time. In 2020, researchers Mehmet Bastug, Aziz Douai, and Davut Akca explored the role of social media in radicalizing some Americans to travel to Syria and Iraq to support the Islamic State (ISIS). According to a March 2021 National Public Radio report, a young Somali American began a school class assignment on Syria in 2013, discovered the civil war raging in that country, and kept reading and researching. Due to algorithms, he came upon ISIS propaganda videos, showing how they were, in their words, fighting for their freedom. He eventually consumed so much propaganda from these videos and pleas for assistance that he purchased a plane ticket to Syria. Had he not been intercepted by the FBI, he would have continued to Syria to join the terrorist organization.

Group polarization can happen anytime a group is large enough for an attitude shift to occur. When the attitude of the group shifts, the attitude of an individual within the group will likely shift too. It can be challenging to manage your relationship to group polarization, especially if you are in a group that is central to your identity and there's a shift to more extreme attitudes within it. But there are a few ways to help reduce the impact of the group's attitude on your own attitude. The first is to question members in your own group. Find out what their individual attitudes are. Many times, large organizations will issue press releases on their stance on a given issue. Members of that organization might disagree with how the leadership tackled that position. Thus, find that dissent, and then determine how to use it to foster discussion and improve decisions. Another way to reduce this group-based bias is to engage in out-group outreach.

In 2020, researchers Magdalena Wojcieszak and Benjamin Warner explored this tactic. They concluded that it is important to break out of your in-group bubble, which has the potential to become polarized, and explore the differing attitudes of people outside of the group. Listen to members outside of your group and try to determine why they have those attitudes. The point is to allow those perspectives in and not let your polarized attitude steamroll them.

Thus, the next time you're in a group, make sure the changes discussed here are present. That way, the time you spend in the group feels healthy and productive.

Reading

- Aldag, R. J., and S. R. Fuller. "Beyond Fiasco: A Reappraisal of the Groupthink Phenomenon and a New Model of Group Decision Processes." *Psychological Bulletin* 113, no. 3 (1993): 533–552. https://doi.org/10.1037/0033-2909.113.3.533.
- Bastug, M. F., A. Douai, and D. Akca. "Exploring the 'Demand Side' of Online Radicalization: Evidence from the Canadian Context." *Studies in Conflict and Terrorism* 43, no. 7 (2020): 616–637. https://doi.org/10.1080/1057610X.2018.1494409.
- Janis, Irving L. *Victims of Groupthink: A Psychological Study of Foreign-Policy Decisions and Fiascoes*. Boston: Houghton Mifflin, 1972.
- Sidey, H. "The Lesson John Kennedy Learned from the Bay of Pigs." *TIME*, April 16, 2001. http://content.time.com/time/nation/article/0,8599,106537,00.html.
- Wojcieszak, M., and B. R. Warner. "Can Interparty Contact Reduce Affective Polarization? A Systematic Test of Different Forms of Intergroup Contact." *Political Communication* 37, no. 6 (2020): 789–811. https://doi.org/10.1080/10584609.2020.1760406.

6

Learn Better with Cognitive Biases

This lecture discusses three cognitive biases that you can use to your benefit, especially when you're learning something new. These biases—which are merely tendencies to use information in specific ways—are only three of the biases that can help you improve your learning and retention. These can be useful at any stage of life and for learning anything. You'll learn how the testing effect, the generation effect, and spaced practice can propel you forward to better information retention, better test scores, and stronger knowledge in any field.

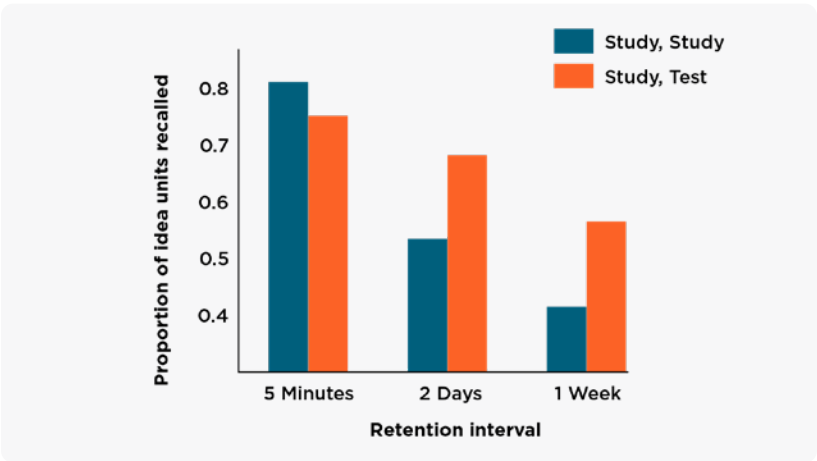
The Testing Effect

In early 2016, cognitive psychologists Megan Sumeracki and Jude Weinstein Jones created The Learning Scientists, a source of accessible cognitive psychological principles for both instructors and students. For this project, they developed a set of materials to spread around teaching resource spaces, in classrooms, and on social media. These resources distilled various cognitive psychological principles into six overarching strategies. This lecture will discuss three of them.

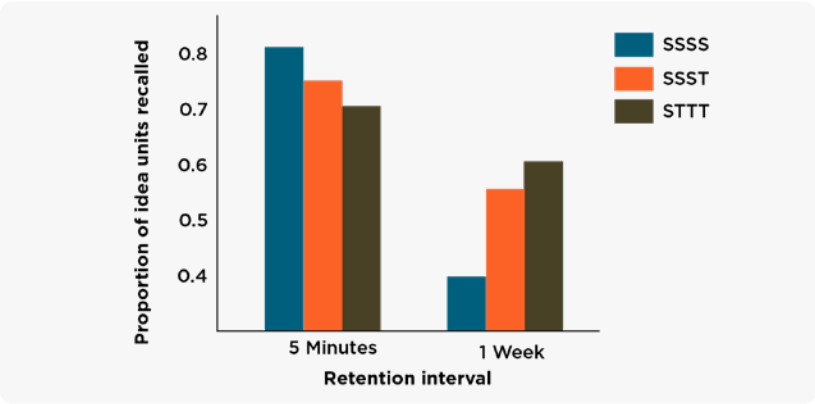
One of these strategies is the testing effect. According to psychologists Henry Roediger III and Jeff Karpicke, this is the tendency to remember information better upon repeated and subsequent viewings, especially if you know you'll need to remember the information for later use. If you've ever tried to learn a new language, you've probably seen the testing effect in action. The bias can be connected to a behavior called retrieval practice. Here, we practice remembering things, making use of the testing effect bias. Think about a test simply as a future situation where you'll need to remember the information you learned previously. If you engage in retrieval practice multiple times, you'll remember the info better because of the testing effect.

The research on the testing effect is massive because of its relevance to learning all things at all stages in life. In 2006, Roediger III and Karpicke decided to use a new research method to learn more about the nature of the bias. They had student participants learn two different passages from an English language proficiency test. All of the students, who were native English speakers, spent time with these passages and were given several study sessions to learn as much as they could from them. In some study sessions, the students were merely asked to reread the passages. In other sessions, they were given a blank sheet of paper to write down as much as they could remember from the passages.

These sessions functioned like practice testing periods and allowed the students to recall information they'd previously read. The students were then randomly chosen to take a final test to see what they'd learned—either five minutes after the final study period, two days later, or one week later. Overall, the researchers found that students who were tested five minutes after their last study session all did about the same on the test. However, two days later, the folks who were initially mini-tested during the study sessions retained significantly more information about the passages than the folks who only read and reread the passages. After one week, this effect was even larger. Although the testers retained more than 60% of the information from the passages, the studiers dropped below that accuracy mark to slightly more than 40%.



In a follow-up study, the researchers modified the process and made three different conditions to see whether they could replicate the results of their first experiment. In other words, is more testing better than more studying? If so, can more testing make an even greater difference? They put students into one of three groups. The first group had four defined study sessions in which the students read the material and had no practice tests. The second group had three defined study sessions for reading the material, along with a final practice test. The third group had one study session for reading the material and three practice tests.



The researchers found that the students who were given the most studying time did much better than either group with a practice test on the final test the students were given five minutes later. But after one week, the only groups to retain a decent amount of information—with an accuracy score of more than 50%—were the two groups that had at least one practice test. Moreover, the more practice tests the students had, the longer they were able to retain the information. In fact, the group that did the best one week later was the third group, which had three practice tests. These two experiments show that whenever we test ourselves, we bias our memory toward the information presented during the learning process.

More recently, psychologists Jeff Karpicke and Robert Ariel specifically focused on retrieval practice. This is the act of trying to recall or remember information that you previously took into your brain. They concluded that

retrieval practice not only requires repeated engagement with the material but also requires motivation and cognitive regulation. If you're tired or have too much information in your mind—cognitive load—retrieval practice won't work as well. Thus, it appears that our bias toward remembering the information we see and engage with repeatedly can improve our memories for things we want to remember. This sounds great from a language-learning perspective. Daily use and effortful retrieval are important for building conversational skills. As such, your first step toward better learning is to try to incorporate dedicated practice testing into your schedule.

The Generation Effect

The generation effect is the tendency to remember things we have conjured in our own minds better than any information we receive externally. This works because you need an active mind to generate ideas or thoughts. This is a powerful bias. And advertisers hijack your generation effect bias to sell their products or advance their message.

In one advertising campaign in the UK, a cancer awareness organization put up a billboard showing a word completion game. There was a word with a few letters missing. It was the job of the viewer to add the missing letters and determine the message. In this case, the billboard showed *O*, *B*, *S*, and *Y*, with blanks representing missing letters, followed by the phrase "is a cause of cancer." Add an *E*, an *I*, and a *T*, and you spelled the word *obesity*. The reader connected the word *obesity* to a cause of cancer. And the reader would remember this connection because they made the effort to determine the word themselves. Similarly, the American Red Cross ran the Missing Types ad campaign, encouraging businesses to partner with them to raise awareness about the need for blood donation. In this campaign, the Red Cross and its partners removed *A, B,* and *O* from logos and messages. The campaign then encouraged viewers to think about what happens "without *A*, *B*, and *O*," which are the letters associated with blood types.

Finally, the whiskey brand J&B had some fun with this generative advertising activity during the Christmas season. They created an ad campaign in which they removed *J* and *B* from the phrase "jingle bells." Your brain can quickly fill in the blanks and make the connection with J&B. J&B hoped readers would say to themselves, "I should buy some whiskey for the holidays."

Learning Strategies

In 2015, psychologists Richard Mayer and Logan Fiorella named eight learning strategies based on the generation effect, including drawing, mapping, imagining, and self-explaining. In each of these cases, the process is similar, and the results are clear. When these strategies are compared to traditional study methods—"read the chapter and take the test"—the generation effect consistently comes out on top.

This is because those privileged memories that you created are given a special status in your mind. You remember them because your brain thinks that this information that you created is important to you and keeps it more accessible than any other kinds of encoded and stored memories. Learning by teaching, or by preparing to teach, is another effective generation strategy. Research shows that this generative activity is critical for learning—all because your brain biases your memories based on importance. It doesn't work in all cases and can't be used hastily. But when done in a field in which you're actively trying to learn, it can be incredibly helpful.

In 2020, Logan Fiorella and fellow psychologist Celeste Pilegard tried to determine whether writing an explanation after studying a lesson plan that contained multimedia elements, such as images or videos, could help to influence study behavior. In one experiment, they asked college students to answer simple retention-based questions. In other words, they would repeat back critical aspects of the lesson. In a second experiment, they asked a different group of college students to try to apply the knowledge from the lesson to a new situation that was not discussed in the lesson itself. To track how students would study and review the information in the lesson plan, the researchers recorded their eye movements.

They found that eye movements didn't indicate a change of studying behaviors, even when the students were told about new strategies. The amount of time they were given to review the info wasn't long enough for them to connect the new material to their existing knowledge for an explanation to make much sense. These findings suggest that the generation effect, as a bias, doesn't exist in a one-off situation.

It requires time with the new material to produce better memory outcomes. Thus, if you're using the generation effect to improve your memory, you have to be willing to put forth the time and effort to do it.

The Spacing Effect

The spacing effect is defined as the tendency for memories to be better and stronger if learning is spaced out over time. Think of how learning in life is spaced out over years. We don't learn everything we know about life in one moment.

Imagine you're in school. You go to class one morning and find out there's a test that you forgot all about. You quickly whip out your textbook and begin to feverishly read. You get handed the test about 10 minutes later and draw a blank on each question, except for that one question that happened to be one of the last things you read. Why did this happen? Your brain didn't have enough time to make any sense of or connections to the material you just studied. Our bias is to stew on information to allow us to elaborate on it. This ends up being better for remembering in the long run.

This effect was first identified by Hermann Ebbinghaus at the start of psychological science in 1885. He found that if he studied consonant-vowel-consonant nonsense syllables over several weeks at a time, he'd remember them better than any consonant-vowel-consonant syllable that he'd only seen once or twice or reviewed the day before. These studies have been consistently replicated over the past 140 years or so. More time practicing means better memory.

Consider some of the newer research in spaced practice. In 2006, psychologist Nicholas Cepeda and colleagues completed a meta-analysis to identify the main requirements for successful spacing and, thus, successful memory. The researchers found that cramming helped with short memory intervals. Imagine a period of up to about a minute from reading to regurgitating the information on the test. But in the case of longer delays between reading and recall, this meta-analysis showed that spacing is your best strategy for remembering information if you have some time—up to 30 days of studying. In fact, the researchers concluded that any amount of spaced practice benefits your learning, up to a point.

Spacing does still require constant refreshing of the information. Why can't you study or practice once and be good a week or a month later? One reason is because you need to sleep on it. Most of the cognitive benefits of spacing occur when you're not consciously using the information you're practicing. During sleep, consolidation occurs. Your brain processes all of the information you encountered throughout your day, firming up new connections into long-term connections and then getting rid of extra or suspect connections that don't work with the current set of connections. Thus, if you're practicing or studying many times over the course of a given period of time, sleep to shore up those connections and make them stronger. However, if you stop studying, you won't be expanding or tightening those connections with connected nights of sleep. You'll see diminishing returns over longer periods of time in which you're not studying.

Reading

- Ariel, Robert, and Jeffrey D. Karpicke. "Improving Self-Regulated Learning with a Retrieval Practice Intervention." *Journal of Experimental Psychology: Applied* 24, no. 1 (2018): 43–56. https://doi.org/10.1037/xap0000133.
- Cepeda, Nicholas J., Harold Pashler, Edward Vul, John T. Wixted, and Doug Rohrer. "Distributed Practice in Verbal Recall Tasks: A Review and Quantitative Synthesis." *Psychological Bulletin* 132, no. 3 (2006): 354–380. https://doi.org/10.1037/0033-2909.132.3.354.
- Fiorella, Logan, and Celeste Pilegard. "Learner-Generated Explanations: Effects on Restudying and Learning from a Multimedia Lesson." *Educational Psychology* 41, no. 1 (2021): 45–62. https://doi.org/10.1080/01443410.2020.1755829.
- Fiorella, Logan, and Richard E. Mayer. "Eight Ways to Promote Generative Learning." *Educational Psychology Review* 28, no. 4 (2016): 717–741. https://doi.org/10.1007/s10648-015-9348-9.
- Roediger, Henry L., and Jeffrey D. Karpicke. "Test-Enhanced Learning: Taking Memory Tests Improves Long-Term Retention." *Psychological Science* 17, no. 3 (2006): 249–255. https://doi.org/10.1111/j.1467-9280.2006.01693.x.
- Slamecka, Norman J., and Peter Graf. "The Generation Effect: Delineation of a Phenomenon." *Journal of Experimental Psychology: Human Learning & Memory* 4, no. 6 (1978): 592–604. https://doi.org/10.1037/0278-7393.4.6.592.

7

Expectations Change Results: Observer Bias

There once was a horse named Clever Hans, and to many, he looked like he could count. Clever Hans lived in Germany and was owned by Wilhelm von Osten in the early 1900s. During this time in psychology, there was a large push to see whether animals in general were thinkers like humans are. This realm of study is called comparative psychology. This deals with the study of the similarities and differences in the psychological behavior of living things. This lecture will use the story of Clever Hans to explore observer bias, or experimenter bias.

Observer Bias

Observer bias, sometimes referred to as experimenter bias, is crucial in research settings because it has massive implications for the outcomes of studies and the science that is shared with the public. It can appear under two different sets of conditions. First, it can arise when one observer reviews subjective criteria differently from another observer. Second, it can arise when the observer has preconceived or unconscious assumptions about the outcomes.

Hans's owner, von Osten, was a math teacher and a horse trainer. After several weeks of training Hans to tap his hoof to count on command, he began to be confident that Hans could do it on his own. One day, von Osten was doing a math problem out loud in front of Hans, and Hans started to tap his hoof along with von Osten's calculations. According to the story, this was purely accidental. Every time Hans was counting, he had to tap his hoof, starting with one, until he got the answer for the mathematical question that was asked of him. Interestingly, Hans could be asked questions either orally or in writing. Either way, he would consistently get the correct answer; therefore, von Osten claimed he taught Hans to do these simple arithmetic problems.

For several years, von Osten paraded Hans around Germany. Large crowds would gather and ask Hans to do a math problem, such as a simple addition problem. However, von Osten was a math teacher. Thus, he had preconceived ideas about how to count. Moreover, he was a horse trainer. As such, he knew how to give Hans cues. To test whether Hans could do math, there would need to be an independent investigation.

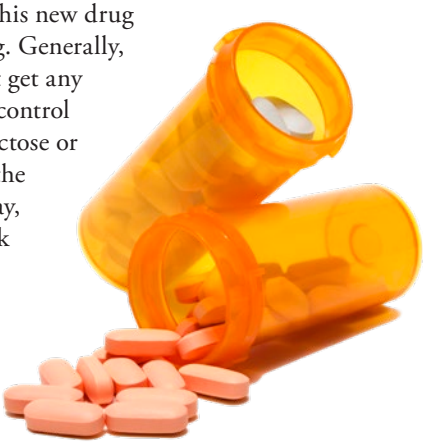
In 1904, psychologist Oskar Pfungst went to investigate the story of Hans. He was the graduate student of German philosopher and psychologist Carl Stumpf. They were both skeptical about a horse being able to count or solve math problems. They were even more skeptical of Hans's ability to solve other intellectual problems, such as a word problem about days of the week. To solve this kind of problem, Hans would have to know how to count and know the days of the week. Pfungst was granted permission to test Hans's ability independently. He gathered a group of 13 people—including Carl Stumpf, schoolteachers, vets, and the director of the Berlin Zoological Garden—to investigate by watching von Osten work with Hans. This group of people was called the Hans Commission.

In the end, the Hans Commission concluded that there were no tricks—von Osten wasn't defrauding people or performing magic. Pfungst had an idea of why and how Hans could count, and he devised several strict rules to test von Osten's claims. These rules introduced a set of roadblocks for Hans. First, Pfungst wanted to isolate Hans from von Osten and use questioners who had had no previous interaction with Hans. He also wanted to use blinders or blinkers on Hans's eyes; that way, Hans could see only the questioner. Hans would get no information or cues from his trainer. The second roadblock was that the questioner wasn't allowed to know the answer to the question beforehand. Hans would get no information or cues from the questioner.

When von Osten was the questioner, he knew the answer to the question beforehand. If Hans could see him, Hans did fairly well—he got 89% of those questions right. However, when the blinders were put on Hans and the answer to the question was unknown to von Osten, Hans only got 6% of the questions right. Clearly, when Hans and the questioner were blinded, Hans could not count, do math, or answer intellectual numeric questions. The idea here is that even when people have the best intentions, these biases can bubble up to the surface, clouding their perceptions.

Single-Blinding

Imagine that you want to test a new drug that has the potential to increase feelings of happiness and contentment without terrible side effects. In medicine, you first need to test this new drug against what happens when you do nothing. Generally, this is done with a control group that won't get any active substance. That's called the placebo control group. This group will get a pill made of lactose or some other sugar that is made to look like the other new drug that you're testing. That way, the people selected to be in this group think they're getting the new drug.



You're creating a system of what is called blinding. In this case, you're single-blinding. This means the participant doesn't know what they're getting,

active drug or placebo, but the experimenter does know. In Hans's case, he was figuratively blinded with the blinkers put over his eyes. But there's a problem with single-blinding. Remember that von Osten was the observer. He knew the answer Hans was supposed to get. Regarding the medication, this is like when the researcher knows whether the participant is getting the actual medicine being tested or the placebo.

Single-blind studies are generally fine. However, if you're trying to determine if a horse is smart or if a happiness drug works, the observer knowing what the participant doesn't is a crucial biasing situation. Do you tend to smile at others when giving them something or responding to their requests? The simple act of smiling might mean nothing, but what if you hand the happy pill to a participant, smiling, assuming you expect to see them feeling happier? And what if you don't do that to another person in the placebo group?

Smiling at everybody can also be biasing in a single-blind study. You still smile at the happy-pill group; they take that as a sign that they're in the happy-pill group and begin to act happier. You also smile at the placebo group folks, and they begin to act happier because they think that they're in the happy-pill group. Ultimately, the statistics in that case would show no meaningful difference between the two groups on a large scale. Interestingly, von Osten was likely giving Hans facial clues, even if they were micro-changes in facial expression.

Researchers cannot disregard these alternative hypotheses, even for something as potentially benign as subtle and unconscious movements, expressions, or assumptions. This related bias is called the observer-expectancy effect. It can create significant issues when determining the results of an observational or comparative experiment.

Double-Blinding

To overcome this limitation, you have to remove everyone's expectations. The participant shouldn't know what's coming. Hans had blinders, and the participants don't know which kind of pill they're getting. But now the experimenters and researchers should also not know anything about the task or how the drug is being administered. This method is called a double-blind experiment.

In the Hans example, Pfungst prevented the questioner from knowing the answer. The observer was now blind to the outcome. As soon as this happened, Hans was no longer able to produce the correct math answer. Going back to the happy-pill example, you'll create happy pills and placebo pills that look identical so that they won't tip off the researchers who administer the pills. The smiling situation will still be a bias, but it will be far weaker. The people handing out the pills don't know which pill the participants are receiving. To lessen the effect even further, protocols in double-blind studies often prevent extended interaction between administrators and participants. Perhaps the most interesting thing about double-blind studies is the data board that handles the observational data. They don't interact with participants at all. That way, the data can be examined objectively, without any expectations. You have removed the observer bias.

Psychologists Robert MacCoun and Saul Perlmutter wrote a plea in 2015 for social science researchers to adopt such a practice. They argued that reducing observer bias or observer-expectancy effects is critical for seeking truth and relatively simple to add to existing methods. This is especially important when laws or public policy is at stake. Overall, any situation where humans are the participants being studied has the possibility for preconceived ideas to run rampant. Consider Pfungst's follow-up to directly testing Hans. He needed to determine why von Osten was so critical to Hans solving math problems. So, he acted as Hans in a lab setting. Pfungst asked human participants to come to a lab and ask him complex math questions. Pfungst would then have to tap the answers out, starting at one, like Hans. The thing he noticed, after several trials and several different questioners, was that as he approached the correct answer, the participants would show a "sudden slight upward jerk of the head." The questioners reported to Pfungst that they didn't know that they were doing this. This crucially plays into the observer bias.

Imagine how many times Hans had been asked to do math over the years. The questioner, usually von Osten, if in full view of Hans, generally gave the answer away in several ways: He could jerk his head, begin to smile, or slightly nod as Hans got closer to the correct answer. Remember, Hans always had to count to the right answer by tapping his hoof, starting with one. Pfungst showed that once he took away this almost-invisible hint, Hans failed drastically and consistently. Later research would confirm that horses are good at looking at human faces and determining micro-changes and micro-expressions.

Researcher Leanne Proops and her colleagues specifically tested horses' ability to remember facial expressions from previous encounters. They did this one time with images of human faces and then another time with live human faces. The horses were extremely good at responding to the faces, especially if they had seen them before and in the proper context. Once the horses had learned certain facial expressions, they could even distinguish those expressions on faces they had never seen before. Hans realized that he should stop tapping his foot when the questioner, especially von Osten, started giving small cues for the answer. This story reveals the importance of observer bias in research settings, but this sort of bias can also influence people in many other domains, such as education and medicine.

Observer Bias in Different Settings

Imagine you're back in school, learning math. You're struggling with some of the concepts. Your teacher asks you to answer a simple math problem. You attempt to solve the problem, but you're unsure of how to continue. You begin to verbalize your thought process. Your teacher begins to nod and smile as you make your way closer to the solution. You blurt out your final answer, urged on by your teacher's giant smile. Success! You got the correct answer. This is called reinforcing. That is, your teacher gave you positive nonverbal cues to better approach the solution. You're now more likely to try to push through your anxiety to find an answer in the future.

That's exactly how von Osten trained Hans. Is this bias good? The answer is more nuanced than whether it is good or bad. If you're trying to find an objective answer to a problem that is unknown, then it isn't helpful. If you're trying to encourage any kind of learning, then it may be a wonderful bias that teachers can use to help students gain confidence and learn. However, it is a bias nevertheless. It can change the way we make decisions or engage with other people or our environment.

Another domain in which you can explore the observer bias is medicine. Consider two true stories that were made into movies. Actor Robin Williams portrayed two extremely important doctors in the 1990s. The first was Dr. Oliver Sacks, a British neurologist in *Awakenings*. In this film, a mysterious illness left victims catatonic and rigid. Sacks discovered that the drug L-dopa could possibly help these patients regain consciousness. In real life, Sacks started a clinical trial. The drug itself was successful. Sacks and his colleagues ultimately abandoned the strict blinding of the study and morphed the study into an open trial—where everybody knew all about the study, effects, and administration. In the film, Williams plays Dr. Malcolm Sayer, a dramatized version of Sacks. Sayer never ran a trial study. Instead, he gave his entire patient list the drug. This is a moment where the doctor's bias was a benefit rather than an impediment. That is, the benefit of the drug outweighed the risks in that particular situation, and the only person advocating those benefits was the doctor and his bias.

In the other film, *Patch Adams*, Robin Williams plays a version of Dr. Hunter Doherty "Patch" Adams. Adams believed it was important to ignore and abandon any process that reduced a patient to a statistic. This also meant the occasional blinding of patients to expectations, such as risks for a surgery. Do the odds change when seemingly bad news is given by a friendly or optimistic face? No, but people feel like they do.

These examples show that this bias can be used in charitable ways and that it isn't all bad. However, if you're ever in a position where the outcome of a study is crucial for your understanding of some scientific principle or natural phenomenon, it's important to follow blinding procedures. Researchers are often blinded by their own biases, expectations, and preconceived notions. If they don't first recognize this before doing any science, there's not much they can conclude about the world.

Reading

- Angrosino, M. "Observer Bias." In *The SAGE Encyclopedia of Social Science Research Methods, Vol. 1*, edited by Michael S. Lewis-Beck, Alan Bryman, and Tim F. Liao, 758. SAGE Publications, 2004. https://www.doi.org/10.4135/9781412950589.n651.
- MacCoun, R., and S. Perlmutter. "Blind Analysis: Hide Results to Seek the Truth (Commentary)." *Nature* 526, no. 7572 (2015): 187–189. https://doi.org/10.1038/526187a.
- Pfungst, Oskar. *Clever Hans, the Horse of Mr. Von Osten: A Contribution to Experimental Animal and Human Psychology*. New York: Henry Holt and Company, 1911.
- Proops, L., K. Grounds, A. V. Smith, and K. McComb. "Animals Remember Previous Facial Expressions That Specific Humans Have Exhibited." *Current Biology* 28 (2018): 1428–1432. https://doi.org/10.1016/j.cub.2018.03.035.

8

Bias Boot Camp for Better Decisions

Say you're ready to buy a car. Your job is to make sure you get out of the dealership having spent the least amount of money possible. The dealer also a has a job: to make the dealership as much money as possible. People all have a cognitive bias that can make this process a little easier. That bias, discussed in this lecture, is called anchoring. It is the tendency to use reference points in your decision-making. These reference points are usually numerical information that you encounter in everyday life, such as money. This reference point, which is the anchor, impacts the way you think of any future information related to it.

Dropping the Anchor

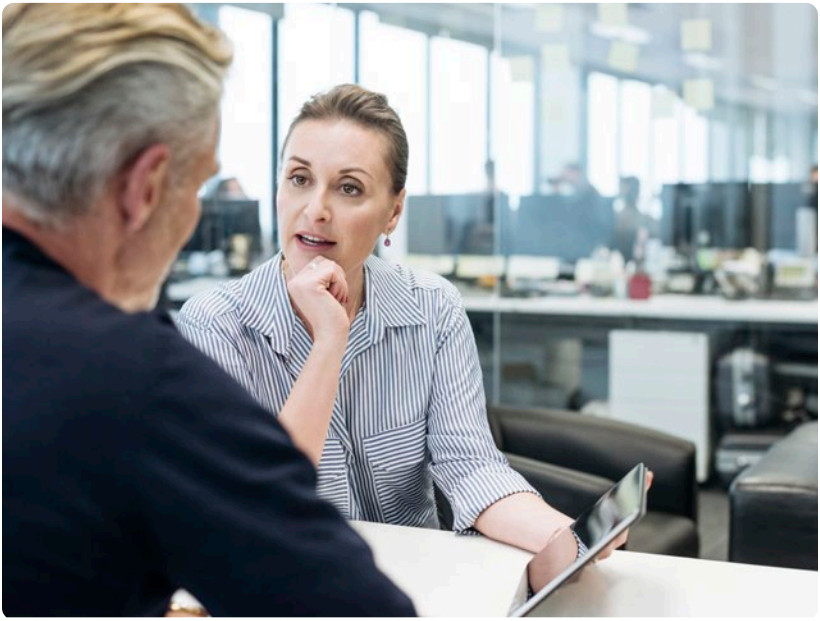
The first number you'll tend to find on cars is the sticker, or suggested retail, price that the car manufacturer suggests. This is an important anchor. It acts as a starting point for the remaining aspects of the decision-making process. As this is a bias, we tend to favor this information, and it becomes the prized information for all implicit, or nonconscious, thinking. It can even pervade your explicit, or conscious, thinking. Your job is to find that anchor first, before even heading out to the dealership. Once you're at the dealership, it's time to start negotiating. The research suggests you should always try to be the first to drop anchor because that anchor becomes the starting point for all negotiation.

Psychologists Adam Galinsky and Thomas Mussweiler investigated this negotiation strategy in 2001. In one experiment, the researchers gathered a group of business administration students enrolled in a negotiations course. The students were divided into pairs, with one identified as the buyer and the other as the seller in the negotiation. Each person was given the same basic information about the negotiation itself, which concerned the purchase of a pharmaceutical plant. This fictional plant up for sale was in an area that contained many biotech firms and had a ready and willing workforce. Also, the seller had only recently purchased the plant themselves, three years prior, for $15 million. It was appraised at $19 million.

The student buyer played the role of a chief financial officer of a company that was looking to acquire another plant rather than spending the money to build one itself. The student sellers were motivated to sell because of additional information that only they had received. Each participant was provided with a "stop alternative," which would allow them to stop the negotiation and walk away. Buyers had the alternative to build their own plant. This alternative was valued at $25 million and stated as the price tag for a completely new plant to be built. Any price higher than that amount would tell the buyer to recommend that their company build a new plant. Sellers had the stop alternative to strip the plant and reap the proceeds, stated to be more than the sale price from three years prior.

The experimental manipulation in this intricate scenario was a simple split down the middle. Half of the pairs of students received instructions that the buyer was to make the first offer. In the other half of the pairs, the seller was

instructed to make the first offer. A second manipulation of the scenario was also made. The pairs of students were told to focus on either their target price or the counterparty's stop alternative as their anchor points. When the target price was the focus for each party, the researchers found that, on average, buyers made a better deal when they got to make the first offer. Buyers tended to undercut the seller by a significant amount: $16 million. This became the first anchor in the negotiation. This means the seller couldn't change the nature of the negotiation by shooting their counteroffer far above the anchor. They rarely got up to the buyer's $25 million negotiation stop alternative when counteroffering. The sale price averaged to under $20 million. However, if the seller made the first offer—focusing on their target price—they usually hit that negotiation stopper for the buyer of $25 million in the first round. The buyer would say no in this case. Thus, the seller would come down a little bit. Overall, if the seller had the first offer, they would make out with a much higher selling price because they set the anchor themselves and it was at the upper limit of the buyer's price range. The average sale price in this case was right under $25 million.



Overall, if the buyer made the first offer, the seller made slightly above their minimum price for selling. If the seller made the first offer, they usually made out with slightly under the buyer's upper limit. The difference was about $5 million. This alone tells you how important making the first offer is in a negotiation to set the anchors. However, if negotiation stoppers are considered in the first offer, the situation changes. When student pairs were told to consider their opponent's stop condition, both parties came to approximately the same sale price—about $21.5 million—regardless of who made the first offer. The anchors in this case kept the discussion pinned within the brackets of the ultimate goal: to close the negotiation and make the sale. When final decisions were made with both starting anchors considered, both buyers and sellers generally settled on the sale amount rather quickly. Both sides could be interpreted as using the anchors as negotiation brackets, settling in the center from both sides. Neither side walked away from the negotiation feeling cheated.

The researchers did two more experiments to corroborate these findings. In each subsequent investigation, the person who made the first offer came out ahead in each scenario, even when the experimenters gave each negotiation partner their own anchors. This set of studies gives some rather compelling evidence for negotiating: Always go first. However, it might feel counterintuitive to an anxious person to drop the anchor first. Researcher Ashleigh Rosette and colleagues investigated the role of anxiety in anchoring situations. They found that people who identified as anxious about the process, or anxious in general, tended to value a wait-and-see approach to guide their counteroffer. They found that anxious people who made the first offer weren't as satisfied with the negotiation or outcome as anxious people who made the counteroffer. Essentially, anxiety changes the way the anchor gets placed in an anxious mind. If an anxious person makes the first offer, control of the situation is relinquished, and worry about being taken advantage of might creep in.

Thus, do you go first or second? Go first if you're confident and assured you can get psychology to work for you. Place the anchor in the mind of the dealer so that they don't deviate too far from your offer. And remember, that offer should be your expected out-the-door price, not a response to the manufacturer's suggested retail price. Most of the process is now negotiating between these two anchors until you agree on a price. The anchors represent the bounds of the negotiation. You're assuming each party is operating in

good faith and that neither party in this process can flippantly go above or below the stated anchors. The anchoring and framing bias affects pretty much any numerical decision you'll ever make. It can even be found in nonnumerical situations. Anchoring represents a set point from which all future decisions are based.

Anchoring

Anchoring was first identified in the literature by psychologists Daniel Kahneman and Amos Tversky. In 1973, they shared their research of this bias using a simple but effective methodology. The researchers asked two groups a single question: Find the factorial of the number 8. That's represented as 8! and means multiplying the number by every integer less than itself all the way down to 1. One group got the 8 factorial presented in the proper way: "8 × 7 × 6 × 5 × 4 × 3 × 2 × 1." The other group saw the multiplication presented backward from the usual form: "1 × 2 × 3 × 4 × 5 × 6 × 7 × 8." The participants had to quickly estimate—within five seconds—the answer in their heads. Kahneman and Tversky found that participants who saw the 8 first tended to produce larger estimates than those who saw the 1 first. The median estimate for the 8-first group was 2,250. The 1-first group's median estimate was 512. The correct answer was 40,320.

Thus, you have two things to consider here. First, the group that got the 8 first was given a larger anchor to start. This led participants to come up with a larger product. However, when they saw a 1 first, participants gave a smaller estimation of the product. The first number does have an effect. But both estimates were way off the actual product. Why? Consider that the factorial process is still about single digits. The largest number that all participants saw was an 8. This anchor, regardless of the group, was significantly lower than the product. It's almost as if participants stopped trying to do actual calculations midway through the process, leading to a gross underestimation for both groups.

Kahneman and Tversky also asked several other kinds of numerically based questions. For each question, they separated participants into two groups with larger or smaller numbers presented first. Again, researchers found that participants presented with larger numbers first tended to estimate larger values. Meanwhile, those getting smaller numbers first estimated smaller

values. However, note that the anchor's meaningfulness is crucial for this bias. People will not focus on an anchor if it's superfluous or not central to their judgments or decisions.

Several researchers have investigated this bias, giving participants anchors that were generated by random number generators or dice rolls. When participants were told that's where the anchors came from, the anchors were rendered meaningless. The anchoring bias disappeared. When participants weren't told where the anchor came from, researchers found the bias was still present. This situation doesn't come up frequently in real life because anchors generally have meaning for our judgments and decisions. However, it does reflect a situation in which this powerful bias is tamed. It's clear that numerical anchors have much impact and influence on our thinking, especially when they represent our real money.

However, the anchoring bias can appear in other realms as well. Consider life expectancy. Your estimate of how long you think you'll live is the ultimate anchor. It will affect the way you plan for retirement, how much money you save every month, and what you want to accomplish before your life ends. Clearly, numbers play a significant role in this bias. But anchors can also be found in abstract ideas where no numerical information exists. Consider decisions made by medical professionals. They see many people in short periods of time and have to make diagnosis decisions based on their education and experience. In this scenario, experience ends up taking priority.

Take the COVID-19 virus as an example. The symptoms related to COVID-19 are symptoms of flu and the common cold and also include loss of taste and smell. Say you start feeling sick. Your symptoms are a cough and a runny nose. From a diagnostic perspective, the anchor is what is most likely. Is it a cold? Add a fever to this list, and perhaps you add flu into the list of possible causes. Then you lose your sense of smell. What's most likely now? This decision-making process is anchored by previous experiences with a given set of symptoms and their appearance. The more experience a doctor gets, the higher the likelihood that they'll make an accurate medical diagnosis. And with COVID-19 spreading rapidly at several points during the pandemic, medical professionals became increasingly able to quickly assess

whether a patient had the disease. Though there are other viruses that cause patients to lose their sense of smell, this symptom has become an anchor for a COVID-19 diagnosis.

Framing Bias

Where anchoring is a factor, how messages are framed also changes the way we consider new decisions. Framing bias is the tendency to change our decisions based on whether we characterize the choices in a positive or negative way, such as gains or losses. Framing always occurs because of the way a message is presented. You can even frame a decision in either a positive or negative way without changing the underlying logic of the decision. And how you frame a message with anchors can guide a person's decision down the path you want.

Consider a classic problem. In 1981, psychologists Kahneman and Tversky built on their previous bias work with a comprehensive explanation for decision-making under biased conditions. The most famous of these problems was the disease problem. Imagine you're the mayor of a small town of 600 residents. There's a disease ravaging the world in a global pandemic. The disease finds its way into your town. Your advisors come to you with a proposal that has two options to combat the disease and its spread. Option 1, if adopted, would save 200 people, with no other tragedy or issues expected. Option 2, if adopted, is a dice roll. There's a one-third chance of saving all 600 people in the town and a two-thirds chance that no one will survive. Which option do you choose?

Now, consider this reframing of the options: If you choose option 1, 400 residents will die. If you choose option 2, there's a one-third chance that no one will die but a two-thirds chance that everyone will die. Now which option do you choose? If you changed your answer, you're part of the majority of participants.

Tversky and Kahneman's results in this second telling showed a stark reversal from the original results. Note that the actual numbers of people who live versus those who die are the same in the two problems. The only thing that's different between them is the framing, which is what biases us. When the focus was on how many people will be saved, 72% of participants chose the first option to guarantee the survival of a subset of the population, while 28%

chose option 2. When the same scenario was framed by discussing the deaths of residents, only 22% of participants chose the first option, whereas 78% chose the riskier option to try to save everyone.

This stark disparity between the two different frames comes down to how you perceive the message in terms of its framing. The first set of options framed "saving residents" as the gain. People tend to take fewer risks when there's a possibility to win or gain something. This is why many people play the lottery. They see it as less risky than other forms of gambling because the only thing a player is aware of is the significant monetary award. Moreover, the amount you stand to lose is relatively minor. But when things are framed with losses front and center, we are willing to risk more to try to avoid that loss. It's why the vast majority of respondents to the second version of the disease problem chose to take the chance that everyone could be saved instead of choosing to let 400 people die. We take more risk to avoid a loss than to achieve a gain.

You can even broaden this bias away from numerical decisions. People use framing to approach good things and avoid bad things. If a message contains pleasurable characterizations, we're more likely to engage in that behavior. For example, consider a bowl of ice cream. If it is three scoops of your favorite

flavor presented to you with your favorite toppings, you're likely to eat it. But if it is presented to you with the number of calories on a sticker attached to the bowl, you're likely to turn it down. Since we're biased by what we can gain or lose, combining it with anchors is either a recipe for greatness or a recipe for disaster. These two biases are deeply ingrained in efficient thinking. Thus, it's important to know how they trigger our memories and guide our judgments. This is more about recognizing when these biases appear so that you can be more mindful in your decision-making. An added benefit to that mindfulness is recognizing when these biases are being used against you.

Reading

- Fudenberg, Drew, David K. Levine, and Zacharias Maniadis. "On the Robustness of Anchoring Effects in WTP and WTA Experiments." *American Economic Journal: Microeconomics* 4, no. 3 (2012): 131–145. https://doi.org/10.1257/mic.4.2.131.
- Galinsky, Adam D., and Thomas Mussweiler. "First Offers as Anchors: The Role of Perspective-Taking and Negotiator Focus." *Journal of Personality and Social Psychology* 81, no. 4 (2001): 657–668. https://doi.org/10.1037//0022-3514.81.4.657.
- Rosette, Ashleigh S., Shirli Kopelman, and JeAnna L. Abbott. "Good Grief! Anxiety Sours the Economic Benefits of First Offers." *Group Decision and Negotiation* 23, no. 3 (2014): 629–647. https://doi.org/10.1007/s10726-013-9348-4.
- Tversky, Amos, and Daniel Kahneman. "Judgment under Uncertainty: Heuristics and Biases." *Science* 185, no. 4157 (1974): 1124–1131. https://doi.org/10.1126/science.185.4157.1124.
- ———. "The Framing of Decisions and the Psychology of Choice." *Science* 211, no. 4481 (1981): 453–458. https://doi.org/10.1007/978-1-4613-2391-4_2.

9

We Think Others' Behaviors Are Their Fault

Can you think of a time when you were angry about someone's behavior and tried to determine what was wrong with the person that led them to behave in that particular way? Now, think a bit harder about a time when you caused someone's anger. For some, that's far more difficult to do, because people tend not to internalize and remember these instances. This lecture covers what is called the fundamental attribution error. This bias is the tendency to attribute other people's behavior to their inherent qualities, such as their traits and mental abilities, and to attribute your behavior to circumstances and situational influences.

Attributions

An attribution is a causal explanation for another person's behavior. We can't know for sure why someone did the thing they did. We have to come up with reasons. The main difference is that you have access to your own thoughts; thus, figuring out why you did the thing you did is a bit easier. There are two components of attributions: how often does this person engage in this behavior, and is the cause of the behavior based on some inherent quality of the person or some external situational reason? Here, the fundamental attribution error is best described as the tendency to make an attribution that someone else's behavior is due to who they are as a person. Your own behavior is always in reaction to your current circumstances or environment.

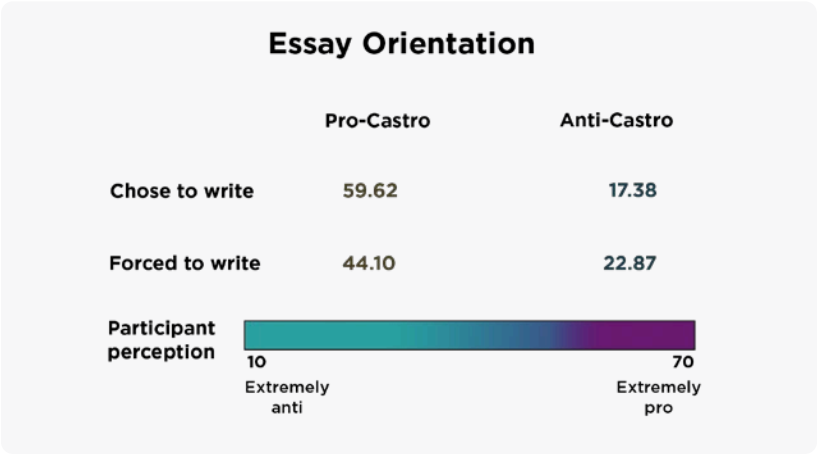
Imagine you know a person named Sally. One day, you find yourself walking outside in the rain and happen to pass Sally. You smile, but she doesn't look up. You begin to think of the reasons why she didn't look up when she clearly knows you. Perhaps Sally is a jerk. This would be an attribution of Sally's character. This attribution is dispositional because it speaks to who Sally is as a person. The fundamental attribution error works quickly in our minds. However, you had an umbrella, but Sally didn't. Perhaps she didn't see you because she was looking down to keep the rain off her face. Once you explore the situational factors that might influence your own conclusion, you start to recognize that the fundamental attribution error puts you in a bind. Is Sally that rude? Or was it a one-off case of perceived rudeness because of the rain?

The Fundamental Attribution Error

Moreover, even though the tendency of the fundamental attribution error is to attribute other people's behavior to their disposition, it also includes an overcorrection for situational factors related to our own behaviors. One of the seminal studies on the fundamental attribution error was conducted by psychologists Edward Jones and Victoria Harris in 1967. They asked participants to read one of two essays about Fidel Castro's Cuba. One essay was pro-Castro, and the other was anti-Castro. Furthermore, the researchers

told the participants that either the author was allowed to choose the point of view or the author was told which stance to write about. Thus, there were four groups of participants: one with a pro-Castro essay that was the author's choice, one with an anti-Castro essay that was the author's choice, a third one with a pro-Castro essay that the author had to write, and, finally, a group with an anti-Castro essay that the author had to write.

Jones and Harris asked participants to rate the author's attitude toward Castro. The results were striking. When participants read a pro-Castro essay written by an author who supposedly chose that point of view, participants overwhelmingly said that the author was an inherent fan of Castro. Similarly, for the author of the anti-Castro essay written by an author who was allowed to choose this stance, participants thought this author disliked Castro. Regarding the authors who had been forced to write for or against Castro, participants were still more likely to attribute pro-Castro attitudes to the pro-Castro writer, and vice versa. However, the difference was far less pronounced here. This result was replicated in two other experiments that followed. The participants didn't know anything about an author and still thought they liked Castro, even when the author had been forced to write a pro-Castro stance. Clearly, the fundamental attribution error is a knee-jerk judgment about people.



Here's another example of this bias at work. What attributes do we assign to villains? Communication researcher Riva Tukachinsky asked this question in 2020 using a series of film clips and a public service announcement, both starring actress Jennifer Aniston. Tukachinsky played clips from the movie *Derailed* to a group of participants. In the film, Aniston plays a two-faced villain trying to seduce unsuspecting men on a train to rob them. Tukachinsky also showed Aniston appearing as herself in a public service announcement (PSA) supporting St. Jude Children's Research Hospital. In the study, half of the participants were shown a clip from the beginning of the film, in which Aniston's character is seen as a relatively nice woman on a train talking to a guy. The other half were shown a clip in which the character's cruel tendencies are shown in full force. Then, both groups were shown Aniston's PSA for St. Jude Hospital.

The results showed that the fundamental attribution error was in full force here. The group that saw the clip of Aniston as the villain rated Aniston lower in "likeability" than the group that saw the clip in which Aniston's character appeared as a nice woman. Even though both clips were from a fictional film, participants were still influenced by seeing the character's villainous behavior, even after they saw Aniston—the real person—appear in a PSA for St. Jude. In other words, the participants in the villain-clip group made an attribution of Jennifer Aniston, the actress, to her role as a villain.

Why does the fundamental attribution error reign supreme in our minds? The explanations are rather fundamental to our perceptions of society in general. In fact, the most commonly suggested reason for the bias is because of our general belief in a just world. This idea is simply that people get what they deserve. But there's no such thing as a just world because there's no single objective definition of justice. For example, whenever you see a mean person get their comeuppance, you might have a moment of schadenfreude, the fallacious belief that justice has been served. It's the main justification for the fundamental attribution error. If we think people get what they deserve, then it's probably something about who they are on the inside that led to the outcome.

Another reason for the fundamental attribution error is how salient the behavior of the actor is. *Saliency* refers to how much something attracts and holds our attention. The more salient something is, the more attention we will pay it. This is a crucial part of the bias because we aren't able to pay

equal attention to everybody or how they're behaving. Think about the last time you were in a crowd. Unless somebody was being loud, boisterous, or gregarious, you likely ignored them. This is called actor-observer asymmetry. Only when a behavior of someone in a crowd is out of the ordinary, or a person is the only one around, will you think about attributions.

Is Fundamental Attribution Bias Fundamental?

In the end, we have access to our own thoughts but not to anyone else's. We only see or hear what they're doing. We have to start making inferences about the inside stuff. That's where this bias gets us into trouble. It certainly sounds like this bias is fundamental to our attribution and inference mechanisms. And *fundamental* here means that it's a universal trait shared by all human beings. In other words, this bias sounds like it's pretty ingrained into our thinking. Or is it?

This is a critical question as psychologists try to identify what human universals are. With a name like *fundamental attribution error*, is this bias one of them? It turns out that *fundamental* is a misnomer in this context. Cultural psychology attempts to study how culture influences individual human psychologies, and work on the fundamental attribution error has shown that this bias might be a uniquely Western phenomenon.

Psychologists Takahiko Masuda and Shinobu Kitayama asked typical fundamental attribution error questions of Japanese participants and compared their answers to those of American participants. Why Japanese participants? Most cultures in the world fall into one of two broad cultural categories, each with a clearly defined cultural center. There are individualistic cultures, which place the individual at the cultural center. People are free to be whomever they want to be with enough work and effort. This is the kind of culture that many Western countries have. The other broad category is called collectivism. This places the group at the cultural center. When making decisions, an individual considers all other aspects of the group as well. There's quite a bit of interdependence among individuals, and advancement within these cultures is first about the effort of the group, followed by the effort of the individual within that group. Many Eastern cultures, including Japan, are broadly collectivistic.

Masuda and Kitayama essentially replicated the Fidel Castro study mentioned earlier using a French nuclear experiment in Mururoa. This small atoll was used for several decades by the French government to test nuclear technology, including nuclear bombs. In the study, participants read essays on whether an author was for or against nuclear testing at this site. The researchers found that the American participants showed the classic fundamental attribution error effect. In other words, American participants thought the author of the pro-nuclear-testing essay was broadly a fan of nuclear testing, even when this fake person was forced to write the essay. However, Japanese participants didn't use this essay to infer attributes about the author—no fundamental attribution error was detected.

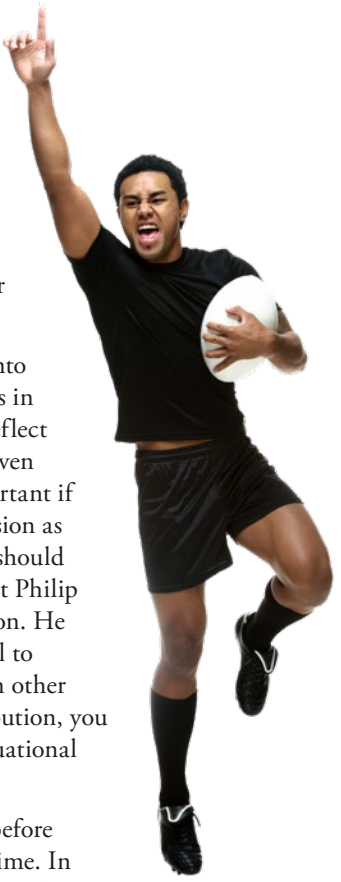
However, Masuda and Kitayama concluded in their paper that collectivistic-culture people may suspend their fundamental attribution error bias a little more easily in certain contexts than in others. Overall, it's critical to note that some biases interact with our cultural contexts. Thinking people act the way they do because of their inherent qualities does sound quite individualistic.

The Self-Serving Bias

A bias related to fundamental attribution error is called the self-serving bias. This bias is all about judging the reasons for our own behaviors. Think about one of your highest achievements. What were the reasons for this success? Did you work hard for it? Now think of one of your greatest failures. How do you now characterize that failure? The point here is that we engage in a self–fundamental attribution error when we characterize our successes as part of our dispositional qualities. However, we tend to characterize our failures as the result of external circumstances.

In 1980, psychologists Richard Lau and Dan Russell explored the self-serving bias among athletes across several different sports. This study had an archival research design, where researchers used previously collected data to draw new conclusions. For this study, they grabbed newspaper clippings that contained quotes about players' successes and failures. They found that players would generally give attributions of performance when the outcome of a game was unexpected. They needed to find reasons why they lost. Although researchers found that dispositional and internal reasons were made

for both wins and losses, it was clear that players tended to make far more internal attributions when they won. The data are less clear about external reasons for failures. However, self-serving bias does generally show up when a failure is unexpected. In other words, these players tended to self-serve when they won, but a loss might have happened because the field was too slippery or the stadium was too loud.



These two biases have the capacity to get us into trouble, but there are ways to rely on them less in our interactions with others. First, stop and reflect before making judgments about others'—or even your own—behaviors. This is especially important if you come to a misplaced dispositional conclusion as your first reason for someone's behavior. You should explore the situation a little more. Psychologist Philip Tetlock has offered a more in-depth exploration. He suggests that personal accountability is critical to avoiding the fundamental attribution error. In other words, he argues that when making any attribution, you need to explore both the dispositional and situational reasons for the behavior.

Another trick is to examine your own mood before assigning attributions. This takes a bit more time. In the time it takes to examine your mood, you may have already fired off an attribution. Psychologist Joseph Forgas explored the relationship between moods and attributions. When you're in a negative mood, you tend to turn inward, focusing more on your own state than on the states of others. This will typically shut off the fundamental attribution error and reduce dispositional attributions for others. It might flip the script on the self-serving bias, too. However, being in a good mood tends to increase the fundamental attribution error. You tend to ignore how you're feeling and spend more time interpreting your own circumstances.

Finally, perhaps the most difficult step is to recognize your cultural development. The fundamental attribution error isn't necessarily fundamental but rather a product of cultural impacts that affect our learning over time.

Reading

- Forgas, Joseph P. "On Being Happy and Mistaken: Mood Effects on the Fundamental Attribution Error." *Journal of Personality and Social Psychology* 75, no. 2 (1998): 318–331. https://doi.org/10.1037/0022-3514.75.2.318.
- Jones, Edward E., and Victor A. Harris. "The Attribution of Attitudes." *Journal of Experimental Social Psychology* 3, no. 1 (1967): 1–24. https://doi.org/10.1016/0022-1031(67)90034-0.
- Lau, Richard R., and Dan Russell. "Attributions in the Sports Pages." *Journal of Personality and Social Psychology* 39, no. 1 (1980): 29–38. https://doi.org/10.1037/0022-3514.39.1.29.
- Masuda, Takahiko, and Shinobu Kitayama. "Perceiver-Induced Constraint and Attitude Attribution in Japan and the US: A Case for the Cultural Dependence of the Correspondence Bias." *Journal of Experimental Social Psychology* 40, no. 3 (2004): 409–416. https://doi.org/10.1016/j.jesp.2003.08.004.
- Miller, Dale T., and Michael Ross. "Self-Serving Biases in the Attribution of Causality: Fact or Fiction?" *Psychological Bulletin* 82, no. 2 (1975): 213–225. https://doi.org/10.1037/h0076486.
- Tetlock, Philip E. "Accountability: A Social Check on the Fundamental Attribution Error." *Social Psychology Quarterly* 48, no. 3 (1985): 227–236.

10

How Memory Is Biased toward Misinformation

Imagine you're a justice on the Michigan State Supreme Court. A criminal case has come before you. You must decide whether to stick with the lower courts' decisions or overturn the ruling. However, two components present in the victim's testimony and the presiding officer's questioning—the weapon effect and suggestibility, respectively—feed into a memory bias called the misinformation effect. This lecture will discuss each component in turn and how they individually and collectively change the nature of people's memories.

The Misinformation Effect

The facts of *People of the State of Michigan v. Elisah Kyle Thomas* are as follows: One evening, the victim was walking to a nearby restaurant for dinner. He passed a man he didn't know. After 15 minutes of walking, the same man returned with a gun, threatening to shoot the victim unless he gave up his wallet. The victim handed the assailant the wallet, but it only contained $10. The robber wanted more. The victim threw a soda can and ran away. The assailant gave chase and fired multiple shots, with one piercing the victim's leg. The victim escaped to a church, and emergency services and the police were called. At the hospital, two officers questioned the victim, who described the assailant. One of the officers returned to the scene of the incident and found the defendant, Elisah Kyle Thomas, who matched the victim's description. The officer questioned Mr. Thomas and took his picture but ultimately let him go because he had no outstanding warrants. The officer returned to the hospital. She showed the picture of Mr. Thomas to the victim and said, "Was this him?" The victim answered, "That's him." The victim also described the weapon. He said it was a "black and gray 9-millimeter handgun," and "the assailant held it in his right hand."

In the initial trial, the criminal trial judge dismissed the charges before the trial began on the basis that the officer was overly "suggestive" in phrasing her question: "Was this him?" The State of Michigan appealed, and the State Court of Appeals reversed the earlier decision. This allowed the conversation between the officer and victim, including the suggestive question, to stand as factual evidence. The defense then appealed that reversal—bringing the case before the state supreme court.

Consider two important details. First, *suggestive* was used to describe the officer's phrasing, which was the basis for the defendant's dismissal. Second, the victim's description of the gun was very specific, including which hand it was held in. This suggestibility and the presence of a weapon feed into the misinformation effect. This reflects our tendency to trust our memories, even when they're impacted by the actions of others. In the Michigan case, the others were the police officers. Though the assault occurred prior to the police arriving, the police only used a single-suspect approach based on a single description.

The misinformation effect occurs because we think our memories accurately reflect what happened. But they reflect only some of what happened and are also influenced by our emotions, our expectations, our culture, and what others have to say about them. But overall, the general public tends to consider eyewitness memories more reliable than they are. This was evidenced by a 1992 study by psychologists Saul Kassin and Kimberly Barndollar. They asked college students and community members to rate several eyewitness statements from a previous study of eyewitness experts. They found that these laypeople, with limited law knowledge, were more prone to confuse confidence for accuracy of eyewitness testimony. They also thought women were better than men at remembering faces and that an eyewitness undergoing hypnosis could increase memory accuracy.

In the case of *People of the State of Michigan v. Elisah Kyle Thomas*, the state supreme court may have taken the malleability of memory into account, siding with the trial court's dismissal of the charges against Mr. Thomas. No further charges could be brought against Mr. Thomas for this case. Imagine that you're one of those justices in this example to explore suggestibility and the presence of a weapon. Your knowledge about the misinformation effect will help guide you as you explore the research behind these memory distorters.

Misleading Postevent Information

Much of what researchers know about the misinformation effect comes from the seminal research of psychologist Elizabeth Loftus. In the 1970s, she and her colleagues tested individuals on two seemingly mundane aspects of memory. These studies involved misleading postevent information (MPI). In one study, participants viewed films that showed automobile accidents. Then, they were asked one of five versions of the following question: "How fast were the cars going when they hit each other?" In place of *hit*, other versions of the question used *contacted*, *bumped*, *collided*, or *smashed*. The participants claimed the cars were going slower or faster depending on the wording of the question. When *contacted* was used, they answered about 30 mph—but when *smashed* was used, they answered about 40 mph. Such leading questions are designed to elicit a specific response, which is why they aren't allowed in a courtroom.

Verb	Mean speed estimate
Smashed	40.5
Collided	39.3
Bumped	38.1
Hit	34.0
Contacted	31.8

In their study, Loftus and her team also asked a follow-up question: "Did you see any broken glass?" The researchers asked this question of respondents who'd been asked versions of the first question as well as a control group that was never asked the first question. Again, the study found that wording makes a large postevent memory difference. More than double the number of participants who had heard *smash* said they saw broken glass compared to those who had heard *hit*. Those whose first question used *hit* responded in line with the control group: no glass seen. These results suggest that *hit* is a rather innocuous word. This means that the question could be leading viewers to assume there was minimal damage. The control group corroborated this, as they only had to know whether they saw broken glass. When *smashed* was used in the leading question instead, respondents suggested that there was glass everywhere. The implications are clear: If you're an eyewitness to an accident, questioners can control your memories through language choice.

Responses to: "Did you see any broken glass?"

	Verb condition		
Response	Smashed	Hit	Control
Yes	16	7	6
No	34	43	44

Loftus followed this first study up with another study involving cars. Participants were shown a series of images in a slideshow that showed a red car pulling up to an intersection. At the intersection was a triangular yield sign. The car rounded the corner as a person entered a crosswalk. The red car impacted the person at a slow speed but knocked them down. Another bystander raced in to help, as did the cops, who pulled up right away.

The driver got out of the car and checked on the person who was knocked down but soon ran away. After completing a 20-minute distractor task to clear recent information from their memories, half of the participants were asked this question: "Did you see the stop sign?"

Remember, the scenario originally had the driver encountering a yield sign. The leading question here intentionally contained the misinformation of a stop sign. Less than half of the participants correctly identified that they had seen a yield sign. When given the MPI, most agreed that's what they saw. This question was also asked indirectly by embedding the MPI so that it didn't draw immediate notice. For instance, the researchers asked, "Did a bus pass the red car while it was stopped at the stop sign?" Of the participants who received the misleading language about the sign in this question, more than half answered affirmatively that a bus passed the intersection (which was correct), even though the sign was described incorrectly.

This leading question could have enormous consequences. Imagine if it were asked of an eyewitness in court. The witness might answer that they saw a bus pass the red car. But by answering the question in the affirmative, they've now also agreed that a stop sign was present. Getting these inconsequential details wrong can discredit the witness's testimony. If a prosecutor or a defense attorney can catch you agreeing to something that isn't true, then they can damage your credibility as a witness. They can even make you believe something that isn't true.

A 2021 study by researchers Pascale Hodge and Axelle Philippon showed that eyewitnesses are prone to having their memories influenced by those around them, leading them to accept misinformation as fact. First, the participants watched a short video that depicted a staged robbery at a bank. Second, participants were given information about a fictitious fellow witness to a given crime. Some participants were given information about this witness's credibility, indicated to them as a detective for the local police department. The other participants were not given this information. One aspect of social influence played an important role here: conformity. The researchers observed that when participants were given information about their co-witness's credibility and subjected to additional MPI, such as leading questions, they made three times more misinformation errors than participants who were not

given credibility info about their fellow witness. The clear implication here is that information about a co-witness's credibility can change how witnesses reconstruct their own memories.

Weapon Focus

Our memories are also affected by the presence of weapons in an altercation. The weapons capture our attention, which can change the way we remember details after they happen. Loftus and her colleagues conducted one of the first studies of this aspect of the misinformation effect. They had participants watch one of two slideshow scenarios. In one, a young man approaches a cashier of a fast-food restaurant, holding a slip of paper, ready to pay for his food. In the second scenario, the young man is holding a gun instead of a slip of paper, as though about to commit armed robbery. After performing a distractor task to truly convert these slideshow scenarios into memories, participants were tested on their recall of the event. They were asked questions about what they saw, including what the young man looked like and what he was holding.

Loftus's study confirmed the expected effects of weapon focus on witnesses. In the version of the scene with the gun, participants were unable to describe the scene afterward as accurately as the participants who saw the man holding the slip of paper. They were unable to confidently identify the assailant. However, they were extremely confident stating what the young man was holding: a gun. Eye-tracking data showed that participants in the gun version spent the vast majority of the time staring at the gun as they watched the slideshow.

While weapon focus isn't the same as misinformation, it does complicate an already tenuous situation in which memory must be relied upon. It also further confirms that we're not good at reconstructing events as they have happened. Weapon focus and the misinformation bias are seemingly quite difficult to overcome. And as we've seen, the repercussions can be serious. But even outside of a courtroom, you can never be sure that you'll remember something the way it occurred because of how suggestible your own memory is.

Mitigating Memory Errors

There are few tips to mitigate the effects of memory issues associated with the misinformation effect. Consider a police lineup. If you ever find yourself having to identify people in a lineup, remember that there's no guarantee that the actual perpetrator is in the lineup. Consider a bit more about questioning, too. The police want to get as many facts as possible about any crime they investigate. That's where the leading questions begin. If you're being questioned, you're either a witness or a suspect. If you witness a crime firsthand, you might be implicated in it. Unless you have a good alibi, the leading questions and the anxiety of being a suspect could mean trouble. Questioning a witness can lead to charges against them due to leading questions and the misinformation effect.

Thankfully, changes are being made to the world of eyewitness testimony to mitigate these problems. One such change is having suspects appear one at a time before witnesses. This is called a sequential lineup, and the process has reduced false positives in identification over the past several decades. Importantly, this change doesn't appear to affect correct positive IDs by witnesses. Another reform involves the use of voice and body analysis rather than face analysis. This way, witnesses don't focus exclusively on faces when reconstructing their memory of an event. But how can we reduce the impact of the misinformation effect on our lives more directly? One way is to change the way we think about events so that we reduce our reliance on postevent information to recall our memories.

In 2019, Malwina Szpitalak and Romuald Polczyk asked participants to view a scene of a crime being committed. Then, the researchers provided participants with postevent information on it. One group received completely factual information, while the other group received false and misleading information. Half of the participants then completed a self-affirmation technique to focus their thinking onto themselves. For comparison, the other half of the participants wrote about the route from their home to their school. The participants who completed self-affirmations relied more on their own memories or perceptual abilities regardless of the factual or misleading information they might have received. The lesson? If, after witnessing a crime, you tell yourself that your memory and perceptions are strong and you trust them, you'll be less likely to rely on external information that may or may not be correct. However, this works only if you do the affirmations in real time. The researchers also noted that attorneys and judges can aid eyewitnesses by giving them positive feedback during courtroom questioning.

Another way you can reduce errors related to memory is simply by knowing that they exist. The same researchers performed another study, also in 2019, in which participants were trained on memory errors, including the misinformation effect. Across two experiments, the researchers found that warning participants against possible memory errors reduced the occurrence of those errors. This specifically reduced reliance on postevent information. The misinformation effect virtually disappeared. But bear in mind that being warned about bias doesn't necessarily mean it's present. Assuming that can lead to what's called the tainted truth effect, in which you make errors thinking you're preventing errors. This is most often observed when somebody is warned against possible MPI but none of the information is misleading. If you need to recall an event with great accuracy later, the best thing you can do is write down everything you have witnessed as soon as possible.

Reading

- Hodge, Pascale, and Axelle Philippon. "Informational Social Influence Intensifies the Misinformation Effect When Applied to Immutable Item and Temporal Order Memory." *Undergraduate Journal of Psychology* 32, no. 1 (2021): 101–116.

- Kassin, Saul M., and Kimberly A. Barndollar. "The Psychology of Eyewitness Testimony: A Comparison of Experts and Prospective Jurors." *Journal of Applied Social Psychology* 22, no. 16 (1992): 1241–1249. https://doi.org/10.1111/j.1559-1816.1992.tb00948.x.
- Lindsey, R. C. L., Jamal K. Mansour, Jennifer L. Beaudry, Amy-May Leach, and Michelle I. Bertrand. "Sequential Lineup Presentation: Patterns and Policy." *Legal and Criminological Psychology* 14, no. 1 (2009): 13–24. https://doi.org/10.1348/135532508X382708.
- Loftus, Elizabeth F., and John C. Palmer. "Reconstruction of Automobile Destruction: An Example of the Interaction between Language and Memory." *Journal of Verbal Learning and Verbal Behavior* 13, no. 5 (1974): 585–589. https://doi.org/10.1016/S0022-5371(74)80011-3.
- Loftus, Elizabeth F., David G. Miller, and Helen J. Burns. "Semantic Integration of Verbal Information into a Visual Memory." *Journal of Experimental Psychology: Human Learning and Memory* 4, no. 1 (1978): 19–31. https://doi.org/10.1037/0278-7393.4.1.19.
- Loftus, Elizabeth F., Geoffrey R. Loftus, and Jane Messot. "Some Facts about 'Weapon Focus.'" *Law and Human Behavior* 11, no. 1 (1987): 55–62. https://doi.org/10.1007/BF01044839.
- Szpitalak, Malwina, Adrianna Woltmann, Romuald Polczyk, and Magdalena Kękuś. "Memory Training as a Method for Reducing the Misinformation Effect." *Current Psychology* 40 (2021): 5410–5419. https://doi.org/10.1007/s12144-019-00490-9.
- Szpitalak, Malwina, and Romuald Polczyk. "How to Induce Resistance to the Misinformation Effect? Characteristics of Positive Feedback in the Reinforced Self-Affirmation Procedure." *PLoS ONE* 25, no. 7 (2019): 771–791. https://doi.org/10.1080/106831 6X.2019.1574791.

11 How Fast Thinking Leads to a Great Fall

On September 11, 2001, two separate planes crashed into the World Trade Center in New York City, eventually causing both buildings to collapse. Another two planes were directed toward Washington DC, where one ultimately hit the Pentagon. Passengers on the second DC-bound plane successfully thwarted the attack. However, the plane ultimately and tragically crashed in Shanksville, Pennsylvania. After these events, many people decided that they were not going to fly, now or in the future, because they didn't believe it was safe. Of course, this doesn't align with conventional wisdom about airplanes and traveling. This lecture deals with the availability heuristic, which is a mental shortcut that helps you make decisions based on information you've received.

The Availability Heuristic

In a national Gallup poll conducted a few days after the 9/11 attacks, respondents were asked if they were less willing to fly on airplanes than they were before 9/11. Almost half of respondents said they were not willing to fly. But by May 2002, that number had dropped to 27%. This can explain how recent events that are seared into our minds can play a role in how we perceive danger and make decisions. Statistically, flying is the safest form of travel. In fact, in 2019, more than 36,000 people died in auto accidents in the United States. There were under 500 plane accidents in the same year. Comparatively, because most people drive rather than fly, that's a rate of 11 deaths per 100,000 people driving versus a rate of way less than 1 death per 100,000 people flying. But why were so many people afraid to fly after 9/11? It's a complex question, but at least one factor is the availability heuristic. This is the tendency to use whatever information is the most available to us to make decisions. The most available information in our minds is the stuff that's easiest to recall from our own memories. Heuristics are mental shortcuts that make thinking easier and less effortful. This makes us biased. The more efficient we become with our thinking, the less accurate we may become.

You hear about plane crashes far more often because they're rare. Their rarity makes them newsworthy. If it's newsworthy, then it must be something to remember. And if we remember it, then it stays available. Put another way, if we can recall something, it must be important. If it is important, then we may think we should use that information to inform judgments and decisions. The older something is, the harder it is to recall, because we take the most recent information and use it to form our opinions and attitudes. When the memories fade, we update our opinions. We're no longer as concerned about an outcome like the one that had previously been so fresh in our minds.

This heuristic or bias can be tied to even the most mundane things, too. Consider this puzzle: If a random word is taken from an English text, is it more likely that the word starts with an *R* or that *R* is the third letter? You may have quickly blurted out that there are more words that start with *R* than have *R* as the third letter. However, there are more than 14,000 words that start with *R* and more than 25,000 words that have *R* in the third position. Psychologists Amos Tversky and Daniel Kahneman asked this question in the early 1970s. Participants in their study—about 150 people—were twice as

likely to answer that there were more words starting with *R* than words with *R* in the third position. This is because it is easier to think of words that start with certain letters than to track letters further into the words themselves.

These examples—fear of flying after 9/11 and the letter *R* question—show the same observable effect. What they have in common is uncertainty. Evolutionary theory suggests that as we evolved, our brains had to deal with a significant amount of uncertainty about the way nature worked and about how our memories and bodies worked. We had to remember the most important things—the things that kept us alive. To do that, our brains sent the less-important information into the background or forgot it altogether.

Uncertainty

In 1999, researcher Leigh Vaughn studied the relationship between uncertainty and the availability heuristic by asking a group of college students to try to predict an uncertain future related to their final exams. The students were asked to think of either three or eight examples of actions they had taken, were taking, or were planning to take to try to improve their final exam grades. They were also asked how likely they thought they were to get As on both their easiest and hardest final exams. Some students were asked these questions near the beginning of the semester. Some were asked at the end of the semester. The availability heuristic here was how easy—or hard—it was for students to come up with examples.

The results showed that students had a far easier time thinking of ways to improve their grades in their easier classes. It didn't matter whether they were asked to come up with three or eight examples. Students also had an easier time thinking of examples at the end of the semester. In both conditions, the future was more certain. As hypothesized, the students relied on the availability heuristic when the future was more uncertain—for harder classes or at the beginning of the semester. Vaughn found that when the future is uncertain, people fall back onto memories that boost their self-efficacy. For example, if you've been in this situation, you may have been able to think only about things such as reading the textbook, highlighting, or reviewing notes because those are decent attempts at studying. However, they're weak techniques when specific aspects of the course aren't factored in, such as whether it's a science course versus a literature course.

Availability bias can be found pretty much everywhere, even in the health profession. In the 1980s and '90s, little was known about HIV/AIDS. Doctors were extremely worried about contracting HIV or AIDS from HIV-positive patients. Things such as skin-to-skin contact wouldn't transmit the virus, but the doctors on the front lines didn't understand the process of virus transmission yet. Since it was such a large story at the time, they took many precautions that would seem silly now, such as quarantined rooms. How are these doctors relying on the availability bias in this case? One of the many things that physicians do in medical school is memorize a ton of information about current and past medical practice—but in this case, a virus like HIV wasn't known well enough. Doctors need to use their previous knowledge to grapple with possible ways the virus might spread so they can prevent an outbreak if necessary. When outcomes are uncertain, we rely on our availability heuristic to point us in the right direction, even if that direction is needless or unnecessary.

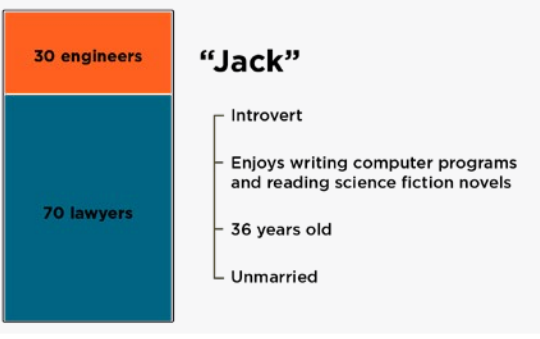
Availability bias affects our memories and is all around us. The more we think about things that are potentially dangerous or harmful, the more easily we recall them. This facet of the bias is widely apparent in our criminal justice system. Folks like lawyers and judges tend to have better recall of laws that reference victims of direct harm. They can recite these laws better than laws that aren't about harm or do not reference victims. This bias of law memory affects how people make decisions. For example, take this part of the bias a step further, from lawyers to jurors. The outcome of harm is extremely important to our decision-making about ourselves and others, and juries are made up of regular people. Since we remember best what happens most recently, jurors can be disproportionately swayed by whatever happens last in the courtroom. If a defense attorney can make a prosecution witness angry or agitated at the end of their testimony, the jury will remember that behavior most clearly. The jurors may unconsciously discount whatever the witness had to say.

The Representativeness Heuristic

The representativeness heuristic assists with chunking and categorizing memories for things we encounter frequently. The idea behind it is that when we come across something new, we want to determine what category it belongs to. Normally, it would seem like it's a good idea to categorize things

based on what they look like or seem to look like. But in doing this, we are also ignoring the base rates, or how common or uncommon things are in real life. Base rates are like numerical probabilities, but most of the time we don't know these numbers—we guess.

In the 1970s, psychologists Tversky and Kahneman investigated this bias. Participants were told that a random survey was conducted asking other people questions about their occupations, age, gender, and hobbies. However, there was no survey. All of the outcomes shown to participants were chosen purposefully by the researchers. For this fictional survey, the base rates for different possible answers to each question were presented. For example, for the occupation question, out of 100 people allegedly surveyed, 70 were lawyers, and 30 were engineers. Participants were told the base rates for each attribute that was measured by each question. These base rates varied from question to question and from attribute to attribute, and were usually around this 70-30 split. Next, participants were given a description of a "randomly" chosen individual, Jack. Jack was described as an introvert who enjoyed writing computer programs and reading science fiction novels. He was 36 years old and unmarried.



The question was whether it was more likely that Jack was a lawyer or that he was an engineer. Most study participants said they thought Jack was an engineer. But recall the base rates mentioned earlier. There were 40 more lawyers than engineers among respondents. Why did most participants ignore the odds and say that they thought this randomly selected person was one of the engineers? There are two reasons. First, randomness could,

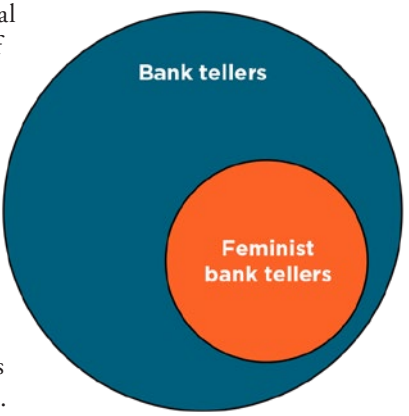
theoretically, yield one of the engineers. Second, the description seemed to be stereotypically engineer-like: He's a loner, writes computer programs, and reads sci-fi. But if the researcher states that the correct answer is lawyer, not engineer, then you've made an error. When you consider probability here, Jack is much more likely to be a lawyer because there are 70 in the sample. Researchers call this the correct answer. Stereotypes might make us think wrongly about how common or uncommon things are.

In addition to this problem, famously called the lawyer-engineer problem, several other dimensions of the survey answers had related stereotypes that were also incongruent with stated base rates. More recent research has suggested that the 70-30 split might be understating the effect of the bias on decision-making. Researchers have thought it would be interesting to see if the difference between the base rates could be much starker. Research on this topic has shown that people tend to favor stereotypical associations over base rates, even given the most extreme base rate amounts, such as a 995-5 split. Stereotypes are far more important to our judgments about group membership than base rates. To put it simply, the representativeness heuristic is a bias that helps us make our judgments quicker. However, it doesn't increase the likelihood that the judgment is right because representativeness does not equal likelihood.

The Conjunction Fallacy

Imagine you know a woman named Linda. She is active in civil rights protests, believes in gender equality, and drives a Prius. What is more likely: that Linda is a bank teller or that Linda is both a bank teller and active in the feminist movement? You might be inclined to choose the second option because it seems to match Linda's description and it's the only difference between the two choices. However, if you chose that option, a researcher running this study would state that you got it wrong. That's because this example illustrates a classic error called the conjunction fallacy. Its name comes from what the conjunction *and* does to probabilities. When you multiply two decimals together (that is, the probability of Linda being a bank teller and the probability of Linda being active in the feminist movement), you get a smaller decimal number. You also can't use addition here because you can never go above 1, or 100%.

You can visualize this using Euler circles, which are a bit like Venn diagrams. First, you make a circle of bank tellers. This is 100% of all bank tellers. Then, you add the modifier "feminist" as a smaller circle within the "bank teller" circle. This indicates that the probability of Linda being a feminist bank teller is smaller than the probability of her being only a bank teller. Every additional modifier leads to a smaller possibility of an outcome being true, no matter how much those modifiers may match Linda's description. You can't make feminists the larger circle because you aren't given that information in the choices that are given, and your decision is constrained by only these choices. You either have bank teller or bank teller with modifiers, such as feminist. The probability always decreases when you add these modifiers.



We use our own ideas of what constitutes a category to make judgments about how probable it is that a given person or thing belongs in that category. And many times we are wrong. If we're wrong about representative members of groups and our memories for various events are biased in favor of what's easiest to recall, how are these heuristics helpful? Simply put, these heuristics exist because we are constantly attempting to determine patterns in the universe. The more regularly things outside of our control occur, the easier it is to plan our lives and our daily behaviors. Availability helps us remember the things that occur often, and representativeness helps us judge the quantity, quality, and type of things we encounter frequently. These heuristics become a way for us to quickly make judgments about our next moves. But you already know that stereotypes are usually negative. Many times, we get in trouble for making a stereotypical judgment because the connotation is generally bad or derogatory.

How do we stop doing that? Slowing down and reflecting usually helps. Don't ignore the base rates if they're given to you, and don't be fooled by a conjunction of several probabilities or possibilities. It is important to

consider that probabilities do reflect reality. Much the same is true when it comes to availability bias. Most of the availability judgments we make are in the context of things that cause fear or harm because we're tuned to remember fearful or harmful events to prevent our own demise. But reflect on why you're even hearing about such events. Usually, it's precisely because they're rare that these occurrences are noteworthy.

Reading

- Gallup. "Terrorism." https://news.gallup.com/poll/4909/terrorism-united-states.aspx.
- Swan, Alexander B., Dustin P. Calvillo, and Russell Revlin. "To Detect or Not to Detect: A Replication and Extension of the Three-Stage Model." *Acta Psychologica* 187, no. C (2018): 54–65. https://doi.org/10.1016/j.actpsy.2018.05.003.
- Tversky, Amos, and Daniel Kahneman. "Availability: A Heuristic for Judging Frequency and Probability." *Cognitive Psychology* 5, no. 2 (1973): 207–232. https://doi.org/10.1016%2F0010-0285%2873%2990033-9.
- Vaughn, Leigh A. "Effects of Uncertainty on Use of the Availability of Heuristic for Self-Efficacy Judgments." *European Journal of Social Psychology* 29 (1999): 407–410. https://doi.org/10.1002/(SICI)1099-0992(199903/05)29:2/3%3C407::AID-EJSP943%3E3.0.CO;2-3.

12

I Knew It All Along: Hindsight Bias

Hindsight refers to understanding an event or situation only after the event has ended. You're probably familiar with the phrase "hindsight is 20/20." This phrase represents the fact that people's ability to know and understand the past is as clear as normal vision. Hindsight bias tricks you into thinking you knew more than you did at the time of some event, even though some reflection can show that's highly unlikely. When you look back on a past event, it's easy to piece together information that wasn't available to you at the time and say you should have known. But as this lecture will show, often, this simply isn't the case.

Hindsight Bias

Hindsight bias is defined as the tendency for people to interpret past events as being more predictable than they were in reality. Our own hindsight is more likely to appear when events are tragic, especially if they seem avoidable. People begin to form opinions on those two features, predictability and avoidability, using information that became knowable only after the event occurred. This is sometimes a confusing bias because it can look like our memory performing its usual function. Our memory allows us to use past information to help us with future decisions. The bias comes about because we use this old information to discuss what we know now that we didn't know then.

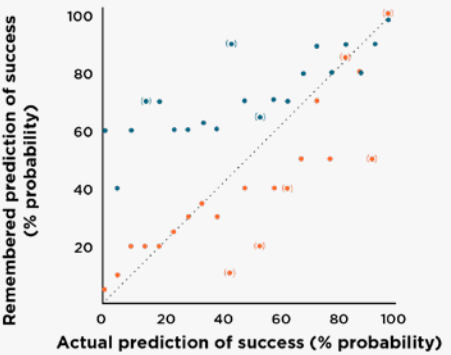
Consider a well-known tragic event. The *Titanic* struck an iceberg on April 14, 1912, and sunk into the icy North Atlantic waters. The cause seemed obvious: The ship's steel hull was no match for the large chunk of ice that it struck. More than 1,500 people lost their lives. You have the first ingredient in the bias: tragedy. Hindsight bias often comes into play when people try to find ways to make sense of horrific events. You know the *Titanic* hit an iceberg, split in half, and sank. But you don't definitively know why the ship struck the iceberg in the first place.

This missing piece of information allows hindsight bias to come into play. From your perspective, it seems like the crew should have been able to avoid hitting something as large as an iceberg. Of course, a tragedy this large and wild has led to endless speculation over the years, including the question of why the crew didn't use binoculars to find the iceberg in time to steer the ship to safety. Even though this occurred at night, there was some moonlight, and even without binoculars, the giant iceberg was eventually spotted, though too late to avoid crashing into it. We could then make the case that the contours of the iceberg should have been spotted with binoculars. Thus, according to our bias, all they would have needed to do to avoid this tragedy was use the binoculars. This is speculative, which is how the bias feeds itself. The spotter crew didn't use their binoculars because they may have been locked in a cabinet in the crow's nest. The key to this cabinet was in the pocket of a former crew member in the UK. He was pulled from the ship's manifest shortly before the voyage, and he forgot to put the key back before he left the ship. It is unknown whether the binoculars were actually in the cabinet, but of course, no one could get into the cabinet to find out without the key.

We could easily say, "Why would you lock up binoculars?" That's the bias talking. We couldn't possibly know if the use of the binoculars would have saved the ship and its passengers.

How do we understand this bias and learn how to reduce its influence? One early example involves President Richard Nixon. Early in his presidency, Nixon was eager to create open dialogue between the US and China and the Soviet Union. Psychologists Baruch Fischhoff and Ruth Beyth-Marom used Nixon's trips to those countries in 1972 to explore the idea of bias in political processes. Before Nixon left for the trip, Fischhoff and Beyth-Marom asked people various questions about how well Nixon would handle visits to these two countries and asked them to assess the likelihood of various possible outcomes of the trip. People were asked—before Nixon's trip—how well they thought he'd be received by the leaders in these two countries. Participants expressed their judgments of the event as probabilities.

A probability judgment is calculating how likely it is that something will happen. The researchers defined the outcomes as either favorable or unfavorable, with 50% representing a neutral outcome. Estimated probabilities above that meant Nixon would be viewed favorably, while below that mark meant he'd be viewed unfavorably. Interestingly, both visits went well and were received by Americans as successful. After the visits, these people were invited back to compare how Nixon was received to their original predictions. Fischhoff and Beyth-Marom found that most participants who had made prior predictions of unfavorability were more likely to state that they had expected favorable outcomes.



If you plot these outcomes, the results become clearer. If you compare the guesses of the participants to the median probability after the events occurred, you end up with a scatter of dots. You can draw a diagonal line that would reflect an even prediction—the same before and after judgments. If you're above the line, it means that you thought the event would go poorly at first, but after the event, which appeared favorable, you modified your prediction to be more in line with what happened. That's hindsight bias. If a participant suggested that the visit would go poorly, perhaps 20% favorable, they'd be above this perfect prediction line if they came back after Nixon's visit and suggested they thought it would be 80% favorable. That's a 60% jump in favorability after a favorable event. When people aren't told of the outcome, they tend to either have the exact same answer or underestimate their original predictions. This means the bias can't appear when you don't know what happened. Overall, this study showed that knowledge of an event's outcome impacts how we believe we previously thought of the event. Clearly, hindsight bias is pervasive.

How Hindsight Bias Works

There are three popular models that describe and explain hindsight bias's function and occurrence. For the most part, the models and explanations invoke a mix of probability judgments and memory distortions. Whenever we make probability judgments, we make anchors. Recall that anchors serve as starting points. If a boat has its anchor down, it won't go anywhere. The journey begins where the boat is anchored. That's how thinking anchors work, and they're usually numeric. These anchors are also merely estimates of actual probabilities. That's because we usually don't have knowledge of actual probabilities. The anchors are used for all future estimations, too. When you go to use the probability estimates to make a judgment or decision, the anchors are there, ready to help you make it more efficiently.

Memory is reconstructive. It's what happened plus all the other stuff in our heads. Thus, memory is distorted. When you retrieve those anchors from your memory, they're changed and distorted by what happened. As your memories are controlled by associations between events, your existing knowledge, and your perceptions, stronger associations between these things are easier to remember than weaker ones. It's that favoring of the stronger associations during memory retrieval that causes us to make errors. Our anchors are more

salient and accessible, kind of like a cloudy day might indicate rain. Cloudy skies are the anchor; rain is the result. If we anchor our judgment of the weather to the nature of the sky, we tend to remember those because rain is more likely when we see a cloudy sky rather than a clear sky.

The selective activation and reconstructive anchoring model was developed in 2003 by Rüdiger Pohl, Markus Eisenhauer, and Oliver Hardt. Consider their model using an example from their original research. Participants first answered 40 difficult general knowledge questions. All of the questions had numerical answers. After a week, participants were given half of the answers. They studied them carefully for a short period of time, and then the researchers took the answer key away. Participants were then asked to remember all 40 of their original responses from the week prior. Perhaps unsurprisingly, most participants who were shown the correct answers adjusted their responses to be closer to the correct answer when they were asked a second time. This is hindsight bias in action.

Another model suggests that the appearance of hindsight bias is related to how much previous knowledge of a subject a person has. This is foresight knowledge. If you have comprehensive knowledge of a subject, the bias tends to occur less frequently. More alternatives and possibilities are available in your mind well before any event occurs. Thus, whatever happens is less of a surprise. But this second model doesn't explain decisions made by novices without special expertise in a field. When we don't have the necessary foresight knowledge, we rely on shortcuts that can be right or wrong. This model is called *RAFT*, which stands for reconstruction after feedback, with the take-the-best heuristic. The latter heuristic essentially means that between any two choices, you will go with the one that you think is the best alternative. RAFT was developed by Ralph Hertwig, Carola Fanselow, and Ulrich Hoffrage in 2003.

An example of how RAFT works looks like this: Suppose someone asks you to estimate how many votes the incumbent president will get in your state's general election in the next presidential election year. Before the election, you suggest that this president will get 30% of the votes. Before you are tested again, the results come out, and this candidate wins 50% of the votes. After this, you are asked to recall your previous estimate. If enough time has passed, you might adjust your estimate upward from 30% to 40%. The take-the-best heuristic helps in this situation, too. There are two basic possibilities for this example: Either you remember your estimate or you don't.

However, even if you do remember your initial estimate, you will still update your knowledge with the final results of the vote. More importantly, if you have forgotten your initial estimate, you will rely on the new information, which is the best available piece of information, to determine your old estimate. This is what RAFT explores: how we constantly learn new information that replaces old information. This makes memory far more efficient but not more accurate. Thus, hindsight bias appears when we use that new information to reconstruct how we originally arrived at the answer.

The final model has to do with how we make probability judgments in general, which feed into hindsight bias. Generally, it explains that people don't have a good handle on making probability judgments. Your expectation of an event, its probability of happening, and the actual event occurring might be very different. But that's before the event occurs. This discrepancy likely falls into hindsight bias because the event did eventually happen. We adjust our probabilities of the event happening to 100% at that point. Our memories are further distorted. Another reason people make probability judgment errors is motivated forgetting. We don't like being wrong or accepting responsibility for being wrong. We're motivated to adjust our thinking about the event to convince ourselves that we knew the outcome all along. When the outcome is negative, we might also engage in retroactive pessimism. Here, we say, "Oh well, there was no way to prevent it." It's a way to regulate our disappointment about an outcome we don't like.

Surprise and Hindsight

There's no age limit or point in adulthood when researchers see hindsight bias develop. In a 2004 study of three- to five-year-olds, researchers showed children images of simple scenes and objects that gradually became clearer over time. For example, the children were shown an image that was either cropped, blurred, or pixelated. These images slowly became clearer to reveal a picture of a fish. Daniel Bernstein and his colleagues measured how quickly the children could name the image they had seen. For all modified images, these children displayed the same kind of hindsight bias that adults did. This means that the children would judge that they saw the fish before they actually saw it. The fact that children show hindsight bias means that we begin to use new information to inform past experiences extremely early in our lives.

The emotional quality of an event can make hindsight bias even more likely. Hindsight bias appears more often when events are negative than when they're positive. We also don't like to take responsibility when we're wrong. Negative events require someone or something to take the blame. If you say you knew it would happen, you might be able to smooth over a blame game headed your way. But of course, we generally can't predict the future. Thus, many times when positive or negative events occur, we tend to be surprised regardless. It's only natural to be surprised by unpredictable events. Surprise is a metacognitive emotion. This means we generally express the emotion after becoming aware of the surprising information. Consider how researchers Patrick Müller and Dagmar Stahlberg discussed the connection between surprise and hindsight.

When we're surprised, we immediately need to assess why we feel this emotion. We're trying to determine what the event is, why it occurred, and whether we know the answers to these questions at all. Surprise is also a biasing emotion. As we engage in our sense-making mission, we explore our memories. It is important for us to know if surprise is the appropriate emotion for the circumstance. Finally, the last piece of thinking we engage in when interpreting our surprise is figuring out how close we were to predicting the outcome we observed. Usually, the more surprised we are, the worse we were at predicting the outcome. Therefore, we have to engage in more hindsight bias to make up the difference. This bias also rears its head when things go wrong because we want to prevent tragedies. Surprise complicates our thinking.

What can you do to decrease the effects of hindsight bias? Hindsight bias has a purpose. Our brains require resources for every thought we generate. Thus, we need to be efficient about thinking so that we use the least amount of resources. This is called thinking efficiency. Some researchers argue that hindsight bias is valuable for humans' ability to update any existing information we might have. But if you ever feel compelled to say, "I knew it all along," stop and reflect on alternative reasons or hypotheses and how they might be correct instead. For example, you could say, "I could never have expected this to happen." This is called reverse hindsight bias. Some events are hard to predict. If we repeat this to ourselves, perhaps hindsight won't have as much influence on our thinking.

Reading

- Bernstein, Daniel M., Cristina Atance, Geoffrey R. Loftus, and Andrew Meltzoff. "We Saw It All Along: Visual Hindsight Bias in Children and Adults." *Psychological Science* 15, no. 4 (2004): 264–267. https://doi.org/10.1111/j.0963-7214.2004.00663.x.
- Fischhoff, Baruch, and Ruth Beyth-Marom. "'I Knew It Would Happen': Remembered Probabilities of Once-Future Things." *Organizational Behavior and Human Performance* 13 (1975): 1–16. https://doi.org/10.1016/0030-5073(75)90002-1.
- Fischhoff, Baruch. "Hindsight ≠ Foresight: The Effect of Outcome Knowledge on Judgment under Uncertainty." *Oregon Research Institute Research Bulletin* 14, no. 13 (1974): 1–34.
- Hertwig, Ralph, Carola Fanselow, and Ulrich Hoffrage. "Hindsight Bias: How Knowledge and Heuristics Affect Our Reconstruction of the Past." *Memory* 11, no. 4–5 (2003): 357–377. https://doi.org/10.1080/09658210244000595.
- Müller, Patrick A., and Dagmar Stahlberg. "The Role of Surprise in Hindsight Bias: A Metacognitive Model of Reduced and Reversed Hindsight Bias." *Social Cognition* 25, no. 1 (2007): 165–184. https://doi.org/10.1521/soco.2007.25.1.165.
- Pohl, Rüdiger. *Cognitive Illusions: A Handbook on Fallacies and Biases in Thinking, Judgement and Memory*. Hove, UK: Psychology Press, 2005.
- Pohl, Rüdiger, Markus Eisenhauer, and Oliver Hardt. "SARA: A Cognitive Process Model to Simulate the Anchoring Effect and Hindsight Bias." *Memory* 11, no. 4–5 (2003): 337–356. https://doi.org/10.1080/09658210244000487.

13

Even Random Outcomes Lead to Bias

What happens when your luck runs out in gambling? Do you believe that the universe has begun to fight back? In truth, it's more about your perception of external events outside of your control, but thinking situational causes have led to your bad luck is the basis for a cognitive bias called the gambler's fallacy. This lecture will discuss the gambler's fallacy and the hot-hand fallacy. These two biases concern how you perceive independent, disconnected events.

The Gambler's Fallacy

The gambler's fallacy is the tendency to believe that any particular random chance event, especially in games of chance, is connected to previous events. This false belief leads to a behavior called perseveration. For instance, if you're on a winning streak, you believe it's bound to continue. If you're losing repeatedly, you keep playing because you believe your luck has got to change soon. This second one is why it's given the moniker of *fallacy*. Generally, the fallacy is focused on a string of bad outcomes. However, games of chance, where you win or lose, are a string of independent random events.

For example, by all appearances, roulette is a fair game, but because so many outcomes have low winning odds on the wheel, patrons tend to lose their money. In roulette, there's a large table with numbers and colors. Connected to the table is a wheel or spinner, notched with a divot so that a ball can eventually come to rest inside one particular numbered notch. The wheel spins in one direction, and a croupier sends the ball in the other direction down a channel at the top of the wheel. The ball will do several laps around the wheel before falling into the middle section where the numbers and notches are. Eventually, the ball will come to rest in one of the notches, and the winning number is called. There are 38 numbers and 3 colors in American roulette. Most of the outcomes are either red or black. Payouts will be better if you select an outcome that is less likely.

The only strategy may be placing safe bets that end in a net gain. There are three even odds in the game of roulette: red versus black, odd versus even, and low versus high. However, when you look at the statistical outcome, the house has a slight advantage. Thus, over the long run, you'll still likely come out losing. Roulette has a dastardly element: Casinos will place the previous 10 spins on a digital display next to the betting table. This will likely include the number landed upon and the color. This creates the illusion that previous events, which are all independent rolls, subject to the laws of physics, will influence and impact future events. That's the essence of the gambler's fallacy.

What makes people rely on these past events to make their betting decisions in the present? Psychologists Amos Tversky and Daniel Kahneman identified a fundamental human belief that they called the law of small numbers. According to this law, people think that a small sample of outcomes represents a larger set of outcomes. If you see the previous 10 spins of the roulette wheel, you'll believe that any patterns you see are representative of a large set of outcomes. If there are 7 red numbers of the previous 10, with the most recent spin a red number, you might bet on black because you'll see that it's due. However, on a completely fair roulette wheel, no outcome ever comes due.

In 2011, researchers had people play roulette inside a functional magnetic resonance imaging scanner, which measures brain activity by detecting changes associated with blood flow. The researchers found that participants consistently went with more risky bets after they lost than after they won. Their brains also showed a lack of emotional control over decisions made after they lost. The researchers argued that the participants had cognitive control over the decision—they knew they were making the decision based on past and present information. However, brain areas associated with emotional control did not light up, meaning that those checks on their emotions weren't part of the decision-making process.

To be clear, the gambler's fallacy is a decision using information that isn't inherently emotional. It's not about actual probabilities but understood probabilities. However, without the emotional component associated with the previous roll, there's no reinforcing consequence. There's no joy from winning or sorrow from loss. What the emotion does is motivate you to keep going. The problem is that many people simply don't understand that in a random event, the odds are the same each time. However, not all gambling

games are the same. In 2017, Marko Kovic and Silje Kristiansen identified what they called the gambler's fallacy fallacy. This bias applies to games of skill—all forms of poker, for example. Here, the probabilities of previous events do impact subsequent events. This is why gamblers and players count cards or try to imagine the kinds of cards other players might have. The fallacy of the fallacy is that all events are independent and should be treated as such.

The Gambler's Fallacy Outside of Gambling

Economist Daniel Chen and colleagues explored the connection between the decisions umpires make and the gambler's fallacy in 2016. If a player doesn't swing at a pitch, an umpire must decide if the pitch was within the strike zone or outside of it. The researchers compiled, across more than 12,000 games, umpires' ball and strike calls when players didn't swing at the pitch and found a slight gambler's fallacy. If the previous two pitches were strikes, the umpire was more than 1% less likely to call the third pitch a strike. Potentially, that's more than 120 pitches that could have changed the course of these games.

Chen and colleagues also looked at asylum judges and loan officers. Asylum judges were more than 5% less likely to grant asylum if they had just granted two previous requests, on average. Was it because every third case was a dud? No. Rather, the judges seemed more concerned with granting asylum too much. Thus, they would say no to certain cases if they'd already said yes to several others to upend their "yes" streaks.

Moreover, loan officers who don't get bonuses for signing new loans are about 8% more likely to reject a loan request if they had just granted one, on average. Is that because every other loan request is a dud? Again, no. Apparently, their goal is to cancel streaks. Taken together, these decisions reflect the gambler's fallacy because people mistakenly believe that there's some external force that isn't random and thus can be controlled. It also reflects an erroneous belief that alternating or definable patterns in decisions are desirable outcomes. Moreover, studies have shown that even when falling into the fallacy results in negative consequences, it doesn't completely remove the fallacy from our thinking.

The Hot-Hand Fallacy

The hot-hand fallacy is the focus on good outcomes strung together. More formally, it is defined as the belief that if a person experiences a string of successful outcomes, they will continue to experience successful outcomes. In 1985, psychologists Thomas Gilovich, Amos Tversky, and Robert Vallone analyzed the Philadelphia 76ers' shooting from the 1980–81 season. They also tested Cornell University's own varsity basketball players.

The researchers found no connection between the 76er players' abilities to make any single shot and any subsequent shots or streaks of shots after that. That is, no shot had any influence on the player's ability to make the next one. Then, they talked to the Cornell players. These college players said that if they made a shot, they believed they would make the following shots. However, even if they believed they would make a subsequent shot—the beginning of the fallacy—this didn't materialize on the court. These players couldn't connect their perception of their abilities with the actual outcomes of the shots.

What about games of pure chance? Do people think they can control good outcomes after good outcomes? Participants were instructed to decide the outcome of a coin flip. They were also given the previous seven flips. The previous flips were either heavy tails or heavy heads. Participants were either told that the same person would flip the coin or that a different person would flip the coin next. However, there were manipulations here. It was either the same person or a different one making an eighth coin flip, and the participants knew the previous seven, either with more than half heads or more than half tails.

If you get a string of heads flips and you flip the coin again, do you think you'll get a heads or a tails? If you guessed that you would get heads, you might be thinking you've got a hot hand. Maybe you think you can will the coin to land on heads. This is called a continuation. If you give the coin to someone else, you might think the coin will turn tails in a reversal of the string of heads outcomes. This is primarily what psychologists Christopher Roney and Lana Trick found in 2009. This signifies that the hot-hand fallacy is more about the person than the outcomes. With the small sample size of a handful of coin flips, we think some sort of magical powers have been imbued in the person and that there's no stopping their good outcomes.

Two other biases play some small roles here with the hot-hand fallacy. The first is confirmation bias, which implicitly or unconsciously directs us to look for awesome streaks of good outcomes. We believe, erroneously, in the existence of streaks. The second is the illusion of control—the belief that we have control over external forces. This convinces us that this pattern-making must be impacted by our own influence on the environment.

Hot-Hand Fallacy Examples

Much like the gambler's fallacy, the hot-hand fallacy does appear in non-gambling or gaming situations. You also need only a handful of linked outcomes to start making decisions. Participants in a study conducted in 2005 made buy-or-sell decisions in the stock market. Participants were divided into groups of buyers and sellers. The buying group was instructed to use a $1,000 tax rebate to invest. The selling group was told they needed to buy a computer with the proceeds from an inherited portfolio worth $1,000. All groups saw two stocks: one that was on an upward trend and another that was on a downward trend. The crucial part was the other manipulation by economists Joseph Johnson and colleagues. They showed participants either 3, 7, or 11 days of trading information.

Folks in the buying group tended to prefer the gaining stock, with more days of information increasing their preference. This means they saw the stock as hot and wanted it because that meant a stronger investment for them. Meanwhile, folks in the selling group showed more of a gambler's fallacy. Overall, they preferred to dump stocks that were losing. However, when they saw a seven-day trend, there was a slight uptick in preference to hold on a bit longer before selling the stock. Why? Because it'll turn around, just wait! It'll bounce back! It can't keep going down forever!

As another example, recall the 2008 financial crisis that hit the US housing market. There's an interesting example of the hot-hand fallacy around the housing market in the film *The Big Short*. Behavioral economist Richard Thaler joins actor and singer Selena Gomez to explain how things got so bad so quickly. This is a quick out-of-film scene where these two people play themselves and break the fourth wall. They use blackjack as a proxy for those awful credit default swaps that led to the collapse. The example quickly moves past the blackjack table to side bets. Those were the collateralized debt

obligations that got Americans into the jam. Since it was bets placed upon bets several dozens of times, one outcome, thought to be on a hot streak, had implications on all other bets. The belief in the small number of positive outcomes in the initial investments led to ill-advised investments on top of ill-advised investments. One hot streak, real or not, shouldn't be the basis for bets that endanger the global economy.

Avoiding These Fallacies

Clearly, the law of small numbers has clear reign over our competitive decisions, especially when money is on the line. What's the good news? First, to avoid the gambler's fallacy, don't gamble. If you're in the business of decision-making, don't alternate decisions willy-nilly. The best thing to do is to treat independent outcomes as independent. But always remember that not all decisions are independent.

For example, if you ever find yourself on *Let's Make a Deal*, in the final round, take this advice with you. Picture it: There are three doors in front of you. Behind one is a new car. You make an initial pick. The host, Monty, tries to get you to deal out. He removes one of the doors from contention; this door isn't the one you chose. You're left with the door you chose and another door. You might think you now have a 50% chance of winning rather than the initial 33% chance. However, because Monty knows which door has the car, the probabilities are dependent. There's no gambler's fallacy if you switch your choice. That's because the door you chose still has a 33% chance, while the other door now has a 67% chance of having the car.

Do you stick with your door or switch to the other one? You double your chances by switching your initial decision. That does sound like a gambler's fallacy. However, in actuality, you double your chances of winning if you switch. This Monty Hall problem is counterintuitive because we don't want to fall victim to the gambler's fallacy but, simultaneously, we do want to feel confident in our initial choices. Again, the gambler's fallacy is wrong only when the outcomes are independent.

Research performed in the past five years sheds new light on the hot-hand fallacy. In 2018, economists Joshua Miller and Adam Sanjurjo used better statistical methods to reanalyze the outcomes of the 76ers from the same year that Gilovich and colleagues studied in 1985. The researchers found that the

basketball players would make several shots in a row, which defied random statistical chances of those shots being made. The economists concluded that the belief in hot hands isn't a fallacy. However, it does remain on this list of fallacies because while it's entirely possible that streaks can exist, you must consistently focus on the belief of the people thinking about the streaks.

Believing those good outcomes will continue because the person is "hot," while those outcomes are independent, still leaves you with a law-of-small-numbers issue. Overall, this law gets you into trouble. Remember that small sample sizes for either bad, alternating, or positive outcomes don't reflect the running lifetime average. Every distribution has an average. If you mentally collect all the times you've won or lost over an extended period of time, your decisions will be closer to that universal average.

Reading

- Chen, Daniel L., Tobias J. Moskowitz, and Kelly Shue. "Decision Making under the Gambler's Fallacy: Evidence from Asylum Judges, Loan Officers, and Baseball Umpires." *Quarterly Journal of Economics* 131, no. 3 (2016): 1181–1242. https://doi.org/10.1093/qje/qjw017.
- Gilovich, Thomas, Robert Vallone, and Amos Tversky. "The Hot Hand in Basketball: On the Misperception of Random Sequences." *Cognitive Psychology* 17, no. 3 (1985): 295–314. https://doi.org/10.1016/0010-0285(85)90010-6.
- Johnson, Joseph, Gerard J. Tellis, and Deborah J. MacInnis. "Losers, Winners, and Biased Trades." *Journal of Consumer Research* 32, no. 2 (2005): 324–329. https://doi.org/10.1086/432241.
- Kovic, Marko, and Silje Kristiansen. "The Gambler's Fallacy Fallacy (Fallacy)." *Journal of Risk Research* 22, no. 3 (2019): 291–302. https://doi.org/10.1080/13669877.2017.1378248.
- Miller, Joshua B., and Adam Sanjurjo. "Surprised by the Hot Hand Fallacy? A Truth in the Law of Small Numbers." *Econometrica* 86, no. 6 (2018): 2019–2047. https://doi.org/10.3982/ecta14943.

- Roney, Christopher J. R., and Lana M. Trick. "Sympathetic Magic and Perceptions of Randomness: The Hot Hand versus the Gambler's Fallacy." *Thinking and Reasoning* 15, no. 2 (2009): 197–210. https://doi.org/10.1080/13546780902847137.
- Sterling, Grant. "Gambler's Fallacy." In *Bad Arguments: 100 of the Most Important Fallacies in Western Philosophy*, edited by Robert Arp, Steven Barbone, and Michael Bruce, 157–159. Hoboken, NJ: John Wiley & Sons, 2019.
- Tversky, Amos, and Daniel Kahneman. "Belief in the Law of Small Numbers." *Psychological Bulletin* 76, no. 2 (1971): 105–110.
- Xue, Gui, Zhonglin Lu, Irwin P. Levin, and Antoine Bechara. "An fMRI Study of Risk-Taking following Wins and Losses: Implications for the Gambler's Fallacy." *Human Brain Mapping* 32, no. 2 (2011): 271–281. https://doi.org/10.1002/hbm.21015.

14 How Con Artists Exploit our Biases

"You have a great need for other people to like and admire you." This is but 1 of the 13 statements that psychologist Bertram Forer presented to his psychology students in 1949. He told them that the list had been individually created for each of them and that the items came from a diagnostic personality data bank. However, this data bank didn't exist. All human beings have biased minds. Thus, any justification or validation that comes from our own minds should be considered a tad suspect. It's an innate part of how our brains work, but when the forces of self-validation and gullibility combine, you get the bias discussed in this lecture.

The Forer Effect

Forer came up with his list of 13 so-called personality traits by pulling them from a newsstand astrology book. Every participant in the study received the exact same 13 items in what Forer termed a personality sketch. They were asked to rate the accuracy of each statement. In a test with 13 random statements, the law of averages suggests that participants would agree with about half of the statements—or 6.5 true statements for each participant. However, the average result was closer to 11. Moreover, all participants believed that this set of items was diagnostic. They also believed that the test had been reasonably accurate and that their personalities had been revealed.

But the set of items was not a diagnostic test or a personality test. The items were randomly pulled from horoscopes. What led participants to believe the results so strongly? This is related to their level of gullibility and also to a psychological concept called self-validation. This is a mental operation that we all rely on to recognize or validate our self-worth. This includes accepting things about our internal experience, such as our thoughts and feelings, rather than our external experience. Self-validation is one way we justify that we matter and that the things we do matter.

Forer's work in the field has led some researchers to call this bias the Forer effect. Other researchers call it the Barnum effect. P. T. Barnum, the circus promoter and showman, is famous for supposedly saying, "There's a sucker born every minute." Psychologist Paul Meehl coined this bias the Barnum effect because it appears when we hear a statement that could be true of anyone. Consider this statement from Forer's experiment: "You have a great need for other people to like and admire you." It's vague, which is the point. That's how you get a single statement to apply to as many people as possible.

These statements are referred to as Barnum statements because Barnum knew how to draw crowds to his shows using broad and generalizable statements that people would interpret in their own way. This led them to participate in—and pay for—whatever show or product he was promoting. This is where the idea of self-validation comes in. Perhaps the fake diagnostic personality test was self-validating. When you're validated in this way, it may give you a small boost to your self-esteem. However, this bias and the effects of self-validation from positively worded statements like the one above can combine—and that gets us into trouble. Fortune-tellers, astrologers, and mediums often try to make money by simply telling you Barnum statements and hoping you'll agree that they apply to you.

Con Artists

The monetary stakes of Barnum statements can be high. Elizabeth Holmes received millions of dollars in start-up capital for the health technology company Theranos. She stated that her new technology could revolutionize blood testing with a single finger prick: "We've created these little tiny tubes, which we call the 'nanotainers,' which are designed to replace the big, traditional tubes that come from your arm, and instead allow for all the testing to be done from a tiny drop from a finger." There are a couple of Barnum statement ideas present in that quote. First, what exactly are "nanotainers"? You can imagine these small tubes aren't nano-sized. Another Barnum aspect of this quote includes the tiny drop from a finger. It's vague—how does all this information come from a tiny drop of blood? In the end, it was discovered that there was little truth to her claims. Ultimately, she was found guilty of fraud on January 4, 2022. One of the major cases prosecutors made against her was that she specifically targeted powerful donors.

Barnum statements can also be used to gain power, status, favors, or prestige. When Prince Harry and Meghan Markle got married in 2018, an American named Thomas Muscatello convinced several news outlets he was a son of Kent, England, and a British royal expert. He even appeared on the broadcast of their wedding. Shortly after, *The Wall Street Journal* completed a background investigation of Mr. Muscatello. It determined that his actual past didn't align with his stated past. How do people like Holmes and Muscatello manage to fool so many people for so long?

Psychologist Ray Hyman defined some of the techniques that con artists rely on to get you to do what they want. The first thing con artists have is an air of confidence. All they have to do is believe what they're doing is real, and people will trust and believe them. Next, they'll use charts and figures to make you think that whatever they're pitching is more reputable than you might think. They might also employ some sort of gimmick. For example, a financial con man might tell you they use a "proprietary algorithm" to determine how to invest your money. They'll even make sure to note what you're wearing and reference it in their schtick—anything to make you feel like the most important person in the world at that moment. Finally, to achieve that importance, they'll use flattery. If someone is flattering you, you might want to think twice about whether they want something from you.

These biases and effects are extremely common and often far more subtle than the above examples. Several replications of Forer's experiment have yielded similar results. There was even a replication where the 13 items mentioned in Forer's experiment were changed to fit organizations rather than individuals. Instead of "You have a great need for other people to like and admire you," it was "Your company has a great need to develop positive brand awareness." Participants in this study were leaders of companies—more than 800 of them—each answering for their own company. They showed the same bias that Forer found in his students. These company leaders anthropomorphized their companies while evaluating the "sketch," and they agreed with that sketch overwhelmingly. In other words, the participants made their companies humanlike in their own minds and without prompting. The results were similar then to what Forer found decades before.

Credibility and Personalization

Credibility is another way to get trapped by this bias. Credibility gives us a reason to trust the con artist. If we believe what they're selling, we're more likely to give them our money. That's why so many people invested in Bernie Madoff's Ponzi scheme. He was a successful Wall Street financier and had just enough people vouch for his prowess as an investor. It's the exact same reason people in the 1990s called Miss Cleo, a fortune-teller and self-described Jamaican shaman. Her advertisements showed testimonials of people who were blown away by her predictions. However, if you called her, you ended up talking to somebody else on a phone service called the Psychic Readers Network. The issue here isn't whether Cleo's predictions were wrong or right. With Barnum statements, you're bound to be right sometimes. It's the persona and bait-and-switch of the whole setup that's the problem. It turns out Miss Cleo was born in Los Angeles, not Jamaica, and had a background in theater, not any sort of mystic arts.

Another reason we get duped by this bias is that we love hearing about our positive traits. However, we often don't like to admit that we even have negative traits. When people are asked to rate how well positive versus negative personality traits apply to them, they will accept the positive traits but reject the negative ones. This might be nothing more than self-serving. However, you may contend that it's more than that by arguing that these positive trait statements are merely a disguise for flattery—and you know where flattery leads.

One last way we're influenced by this bias is if the message is personalized to us. Overall, if your horoscope book includes your name, you're more inclined to believe what it is saying. There are horoscope apps that include your name in daily readouts. It's a small hook to make you feel like the most important person in the world in that moment. The reverse can also be true. Using the wrong personalization can undo everything. Personalization is a powerful tool for those exploiting this bias, but it can quickly become a liability if used incorrectly.

Avoiding Being Duped

Do all humans have the bias of being duped, or is it a product of certain cultures? Do we get duped and conned, as some have hypothesized, due to a particular Western brand of individualistic egotism? In 2009, researchers

Paul Rogers and Janice Soule used Barnum statements to ask both American and Chinese participants the same kinds of questions talked about in this lecture. Many East Asian countries have a different overall culture than Western countries like the US. China is more collectivistic. People from these countries are more likely to view the group and society as more important than their individual selves. They're more interdependent, whereas Americans tend to be more independent.

Because of the differences between the two cultures, the researchers expected to see that the Chinese participants wouldn't fall for Barnum statements in the same way that the Americans did. However, like the Americans, Chinese participants agreed with the Barnum statements at the same higher-than-average rate discussed previously. The researchers concluded that there aren't cross-cultural differences. In other words, it seemed to them that humans have a basic susceptibility to being duped. The bias is seemingly ingrained in our thinking.

So, how do you avoid getting conned? Knowing how Barnum statements work is half the battle. With social influence techniques, such as flattery, complaining, or reciprocation, you have an arsenal to get what you want from the people in your life. Sometimes, these techniques will work; sometimes, they won't—because humans are complex. However, be careful because these same techniques can also be used against you. Practice using these techniques. The better you get at getting compliance, the better you'll become at spotting its use against you. Other aspects of social influence go into this mix, too.

You'll have to be wary about conformity. The desire to conform and the Forer effect are dangerous because you might think it's your only option to agree with the con artist's pitch. Astrologers, fortune-tellers, and other psychic practitioners are usually looking for one thing only: your money. It might be easy to say, "I'm not that gullible," and that might be true. Just know that the Barnum/Forer effect weasels its way into the simplest of decisions. Everyone wants to feel validated in their thoughts and behaviors. Beware that feeling if someone else is asking you to self-validate. That's subtly different from that person validating you directly. They get you by flattery, and then you get the self-validation from whatever they say next.

Reading

- Birnbaum, Michael. "The Barnum Effect." http://psych.fullerton.edu/mbirnbaum/psych101/barnum_demo.htm.
- Forer, Bertrand R. "The Fallacy of Personal Validation: A Classroom Demonstration of Gullibility." *The Journal of Abnormal and Social Psychology* 44, no. 1 (1949): 118–123.
- MacDonald, Dany J., and Lionel G. Standing. "Does Self-Serving Bias Cancel the Barnum Effect?" *Social Behavior and Personality* 30, no. 6 (2002): 625–630. https://doi.org/10.2224/sbp.2002.30.6.625.
- Meehl, Paul E. "Wanted—A Good Cook-Book." *American Psychologist* 11, no. 6 (1956): 263–272. https://doi.org/10.1037/h0044164.
- Rogers, Paul, and Janice Soule. "Cross-Cultural Differences in the Acceptance of Barnum Profiles." *Journal of Cross-Cultural Psychology* 40, no. 3 (2009): 381–399. https://doi.org/10.1177/0022022109332843.

15

Stereotypes: See the Person, Not the Group

This lecture discusses stereotypes, which are cognitive biases. A stereotype is a generalization that is made about members of a group. *Group* here is defined as two or more people who share a common attribute, characteristic, or behavior. The stereotype is a generalization of a part of a group—how a person from that group looks, what they're wearing, what they do, or even how they sound—to the entire group itself.

Stereotypes

The Valley girl accent was a prominent feature of many Hollywood films in the 1980s. This style was copied and spread through media. Now, it represents a stereotypical southern Californian accent. Of course, most stereotypes are less fun to discuss. In many cases, they're mean and promote division between groups. However, we stereotype constantly. Most of the time, the bias is not only unhelpful but can also be incredibly harmful. Why do we do it?

It all comes down to our spectacular ability to categorize. Humans are categorization machines. Humans abhor a world characterized by randomness. One rule of thumb—or heuristic—is the representativeness heuristic. It's a quick shortcut to help us determine the group membership of any particular object or person. We are automatically inclined to assign anything new to an existing category in our brains. That's the underlying function of stereotyping: to quickly categorize. However, this doesn't explain how these stereotypes themselves manifest, especially in their more common harmful aspects.

Other information also comes into play when we categorize people, such as our existing knowledge of the group, the behavior of the person, and how closely the characteristics of the person resemble those of the group. Stereotypes also have a direct pipeline into our prejudice. That's the emotional component of this bias, usually negative. Two explanations for why humans use stereotyping have a large body of observation and research behind them.

The Kernel-of-Truth Hypothesis

The first explanation is called the kernel-of-truth hypothesis. The name comes from the corn kernel, of course. One corn kernel is part of a larger whole: the full ear of corn. Psychologists Robert LeVine and Donald Campbell explored this hypothesis in the early 1970s. The idea stems from the fact that a stereotype doesn't seem to be born out of thin air. Rather, someone witnessed a group member exhibiting the stereotype, and the observation spread far and wide. It gained a caricature-like quality based on this simple observed so-called truth.

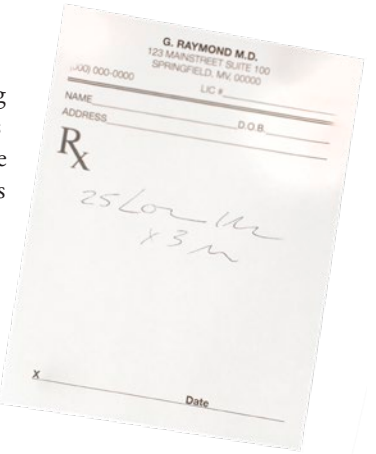
Take the following stereotype, for example: "Psychology students are always analyzing others." First, it is true that psychology students are taught several analytic theories about the treatment of mental disorders. However, not all psychology majors want to enter the helping professions. Many of them don't want to analyze others' behaviors. Thus, while there's a kernel of truth to that claim, this statement certainly can't apply to all psychologists. Even psychologists who are therapists probably aren't analyzing everyone they meet. However, that's exactly how the stereotype is used.

Note that the kernel of truth is misleading. Just because an example can be found doesn't mean it's the truth. It doesn't mean the stereotype isn't mean, rude, or harmful to the group in question. Stereotypes might seem innocuous, but real harm can be generated from them. According to some researchers, the mere mention of any kind of stereotype indicates harm, regardless of how innocuous another person finds it or regardless of whether a member of the group is present.

Illusory Correlation

The second explanation comes from a classic statistical issue. Stereotypes could be the result of an illusory correlation. This is when a single instance of a behavior or trait in a group member is thought to be related to the group's inherent qualities. However, the relationship is merely an illusion. Everything we interact with in our environment is the result of our internal perceptual abilities. We don't necessarily see the world for what it is but rather for what our brain thinks it is. The human brain is always looking for patterns. As such, we tend to see patterns where patterns don't exist. Once we have established a new pattern in our own brain, we begin to test this hypothesis by observing other group members.

Say you have a doctor who doesn't write too well, and she still writes out her prescriptions. When you read the note, you have no idea what you're reading because it isn't legible. You may form the connection that your doctor isn't good at writing. You might even extend beyond your doctor and think about other doctors' writing of prescriptions. That's enough for our brains to establish a pattern. However, what's a more likely explanation—that only your doctor has bad handwriting or that all doctors have bad handwriting? Since we aren't in the minds of others, we can only make inferences based on what we can observe. We guess what the reasons are, and because a profession is visible in many cases, it gets chosen as the correlation.



In- and Out-Group Bias

The following story from the history of psychology is helpful in understanding stereotyping and other forms of bias you might have toward others, whether they're in your in-group (having the same attributes as you) or in the out-group (not having the same attributes). In 1954, psychologist Muzafer Sherif and his colleagues used the boys' camp at Robbers Cave State Park for a groundbreaking study in group dynamics. Note that this study has

significant problems and is a product of the time in which it was conducted. It predates many of the human participant protections put in place after a series of unethical studies—including this one. Despite that, its findings are useful to discuss in this context.

The researchers wanted to test a hypothesis: "To reduce stereotyping and prejudice among groups, it's essential for members of different groups to spend time together." The summer camp was a great field experiment location and situation because researchers could control how the subjects interacted as well as the camp activities. When the boys, each about 11 years old, arrived at the camp, they were randomly assigned to one of two groups. The two groups were kept separated in different cabins. The first task for each group was to create a team name and flag to represent their group. One group chose the name *Eagles*, and the other group chose the name *Rattlers*.

The researchers were interested in how much disgust and dislike each team had toward the other team members at various stages of the experiment. After all, these two teams of boys were a proxy for all sorts of intergroup conflict. Scholars had noted for centuries that groups that were physically separated tended to express disdain for anyone outside of their own lands. After the boys were put into their teams, they were given plenty of time to engage in team-building activities. They slept in the same bunks, ate together in the cafeteria, and played cooperative games among themselves.

Next, the researchers decided to bring the two teams together in head-to-head competitions. The two teams faced off in classic games such as capture the flag. The winning team would get a trophy for each victory. This is critical: The competitions needed to have a tangible goal to ingrain the idea that the members of the other team were not good. After several days of competition, the researchers asked the boys individually to identify how many boys on the other team they found to be contemptible. Essentially, they wanted to know how many of the boys thought negatively about the other team members. The boys used words like *cheaters*, *stinkers*, *braggers*, and *sissies*. They were basically saying that the other team was less than them and cheated to win the competitions.

The Rattlers considered more than 50% of the Eagles to have the most unfavorable traits. The Eagles considered more than three-quarters of the Rattlers to have those same unfavorable traits. The boys gave researchers

classic examples of two additional group biases that feed stereotypes. The first is called in-group bias. This is when a person in a group favors the perceived members of this group more than anyone perceived to be outside it. At this stage in the Robbers Cave experiment, the boys were also asked how they felt about their teammates. The boys adamantly supported their own teammates, signaling they were beyond reproach. How does that jive with the other team calling them terrible names?

It's the other side of the coin: out-group bias. This is the idea that everyone who isn't perceived to be a member of the in-group is part of the out-group and that anything any out-group member does or looks like is the same for everyone else in the out-group. This is also called a homogeneity bias. It dictates that everyone in the out-group is the same. The interesting thing about the out-group bias is that while we think the members of the out-group are homogenous, we think that members of our in-group are as diverse and individual as ever.

The researchers at Robbers Cave attempted to study the idea that mere contact between groups is sufficient to reduce stereotyping and prejudice. However, it should be clear from this explanation that this isn't the case. When you give people a stereotype to use as a dagger, they will wield it against those outside their group. This occurs even if they're in constant contact with members of the out-group and must live among them.

The Cooperation Hypothesis

How do we reduce stereotyping and the resulting prejudice? By behaving and thinking in ways contrary to the tendencies that give rise to biases, we can actively reduce their impact. The researchers at Robbers Cave wanted to bring the boys back together for the rest of the summer. It was important for both ethical and scientific reasons that this rift didn't continue beyond the summer camp. The researchers were successful at showing that contact between groups isn't sufficient. Groups must do something different to reduce stereotypes and prejudice. One way is to create a shared goal among groups so that they must cooperate to achieve the goal. This idea is called the cooperation hypothesis.

The Eagles and Rattlers had reached a peak in their disdain for the opposite team members. What better way to disrupt that mix of camaraderie and animosity than by dissolving the teams and the conflict activities and instituting cooperative activities? Now, for instance, the teams had to choose the movie for movie night. If they didn't reach a consensus, they didn't get to watch the movie. Moreover, on the way to a supposed activity, the boys happened upon a truck in a ditch, placed there by the researchers. Neither team would be able to move such a heavy truck out of the ditch by themselves. The task required all of the boys to work together to move the truck. Some boys used their strength, and the other boys took planning roles. The cooperation hypothesis would predict that these practices would reduce conflict among the groups. Reducing conflict has a sobering effect on the use of stereotypes and prejudice. It's a slow process, but it's a place to start.

After a series of these superordinate goals, the boys at Robbers Cave were asked the same question they were asked in the previous conflict phase: "How do you feel now about the boys on your team and the other team?" This time, the boys stated that only a few of the boys on the other team were awful people. This makes sense: If you have now gotten to know people from the out-group and you explore their values, dreams, goals, and hardships, you quickly see that you are no different. The stereotype no longer retains the kernel of truth and no longer has the illusory relationship you first saw.

Another cooperation hypothesis example is the idea of creating a neighborhood or community goal. Imagine you live in a neighborhood that has a small plot of public land available. You can use this bit of land for something that could benefit folks and create a shared community goal. It's a superordinate goal because it can benefit everyone who lives in the neighborhood. This can increase cooperation within the community in other ways too. For example, say there's a city with food deserts—areas that don't have a grocery store or market where residents can buy fresh food within a reasonable distance of where they live. In one of these communities, there's active discussion about making community produce gardens—either on public or private land—for growing fruits and vegetables. Understanding that food deserts affect everyone can reduce issues of conflict associated with

reaching the goal. This includes things such as deciding which plots of land will be used and who will do the labor of tending the garden. Creating the garden and distributing food throughout the community can reduce food insecurity and other issues a lack of food brings, such as malnutrition. Everyone is happier. This single group effort can create a move toward cooperation in other aspects of community life and help prejudices fall away.

Reducing Stereotyping

How can we reduce stereotyping in our own minds? Consider a 2005 brain imaging study conducted by psychologists Mary Wheeler and Susan Fiske. The study investigated how the brains of white individuals were activated when shown images of Black faces for two seconds. These white participants showed activation in the amygdala. This indicated to the researchers that a threat response in the brain was activated. When these participants saw white faces for the same duration as Black faces, there was no amygdala activity, meaning no threat response. Then, Wheeler and Fiske showed another set of stimuli to the participants: They showed vegetable words at a fast speed, followed by a man's face. Then, they asked the participants which vegetable that man would prefer to eat. For example, if the word *celery* was shown, followed by the face of a Black man, the participant indicated whether that man would prefer to eat the celery. However, the researchers found that none of the vegetable words produced the same amygdala threat response as the Black faces. Why?

The researchers concluded that when we quickly categorize people, we assume they have the attributes we already have in place for people who look similar, which could mean negative things. The subjects had a negative assumption about Black people. The single image triggered that stereotype. What's especially important here, the researchers argued, is that we don't give a stereotyped person their own mind but rather the mind of a typical group member. If we make the effort to individuate people, the category response dissipates. If you can assess an individual's vegetable preferences, you can assess individual faces without stereotyping. You'll start seeing these faces as individual and unique.

You can use these studies to help reduce stereotyping in your daily life. One thing you can do is stop and reflect. Interrogate where a possible stereotype might have come from, such as your parents or what you are watching or reading. Finally, but perhaps most importantly, interrogate why this assumption about a particular other might exist. These are difficult questions to ask yourself. You are making yourself vulnerable, even if this is an internal monologue. Another solution is the contact hypothesis from the Robber's Cave experiment. Contact can reduce stereotypes. There's no time like the present to engage in this practice, and it's a practice you can continue throughout your life.

Reading

- Chapman, Loren J. "Illusory Correlation in Observational Report." *Journal of Verbal Learning and Verbal Behavior* 6, no. 1 (1967): 151–155. https://doi.org/10.1016/S0022-5371(67)80066-5.
- LeVine, Robert. A., and Donald T. Campbell. *Ethnocentrism: Theories of Conflict, Ethnic Attitudes, and Group Behavior*. Hoboken, NJ: John Wiley & Sons, 1972.
- Sherif, Muzafer, O. J. Harvey, B. Jack White, William R. Hood, and Carolyn W. Sherif. "Intergroup Conflict and Cooperation: The Robbers Cave Experiment." *American Sociological Review* 4 (1961): 229.
- Wheeler, Mary E., and Susan T. Fiske. "Controlling Racial Prejudice: Social-Cognitive Goals Affect Amygdala and Stereotype Activation." *Psychological Science* 16, no. 1 (2005): 56–63.

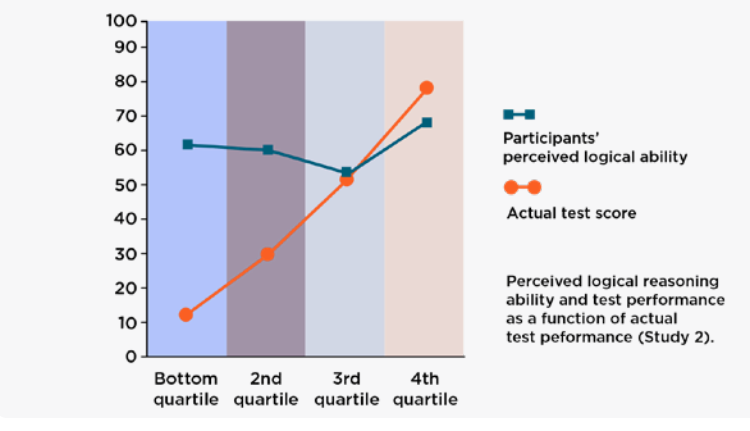
16 Biases from Knowing Too Much or Too Little

Picture it: You're in your nicest outfit, waiting in a long line outside of a studio in Los Angeles. You're ready to show everyone your amazing singing ability. You'll be the next American Idol! However, the truth is, you've never received singing lessons or vocal training—you merely like to sing. If this sounds like you, why might you think you have any chance of winning the singing contest? As this lecture discusses, people have a tendency to overestimate their own ability on any given task. The lower your ability, the higher your tendency to overestimate. This is called the Dunning-Kruger effect.

The Dunning-Kruger Effect

In the 1999 study of the Dunning-Kruger effect that gave the effect its name, psychologists David Dunning and Justin Kruger asked participants to perform several tasks. In each of these tasks, they asked the participants to evaluate their own performance before the participants received any feedback on how they'd done. For example, rate your own ability to recognize what's funny compared to the average person. This scale is from 1 to 11, with 1 meaning you're not good at recognizing what's funny and 11 meaning you're the best at recognizing what's funny. Now, say a series of professional comedians rated a joke as an 8.5; that means that joke is pretty good. Dunning and Kruger did the same in their experiment.

Then, they took participants' ratings of the jokes and correlated them with the experts' ratings. Next, they grouped those into quartiles of performance. In other words, if you were a participant and rated a joke as a 1.5 while the experts rated it as 8.5, you'd likely be in the bottom 25% because this isn't correlated with the experts' opinion. On the same graph, they plotted the participants' ratings of their ability to recognize how funny jokes are. The majority of participants said they were pretty decent at recognizing humor. However, that can't be true because the bottom 25% clearly didn't think the same jokes were as funny as the experts did. In other words, the bottom quartile overestimated their ability to recognize funny while consistently disagreeing with the experts' decisions.



Perceived logical reasoning ability and test performance as a function of actual test peformance (Study 2).

Does the Dunning-Kruger effect apply only to subjective things? Dunning and Kruger wanted to know the same thing. The psychologists followed up with another study. This time, they had the participants solve logic problems and then rate how well they knew the subject and also how they perceived they did on the test itself. The same observed pattern of results occurred with these logic problems. The people who scored in the lowest percentile thought they performed decently on the logic test and thought their logic ability was fairly decent—even higher than those of the third quartile group. Moreover, the people who performed better than 50% on the logic test—up to 75%—stated their ability and perceived performance were worse than those of the people who did worse.

This bias can affect many areas of life. For example, how well do you think you handle your personal finances? Before you answer that and potentially make a Dunning-Kruger error, consider the following: Every so often, the FINRA Investor Education Foundation, in consultation with the US Department of the Treasury, sends out a survey called the National Financial Capability Study to several thousand Americans. Data from 2012 is quite illustrative of the bias. Remember, the first part of the Dunning-Kruger effect requires low task knowledge or ability. Here, you're talking about financial knowledge; this is personal finance, such as loans, paying bills, and insurance. The other piece is confidence in your existing knowledge regardless of behavioral outcomes, such as making loan payments.

About 25,000 residents responded to the survey in 2012. They were asked several questions, such as how much a savings account with a stated percentage of interest would accrue over five years. This quiz is difficult if you've never heard of these terms before or how they work. However, in true Dunning-Kruger fashion, of about 800 participants who stated they had previously filed for bankruptcy, a quarter of them stated elsewhere on the survey that they had incredible financial literacy skills. In fact, these people stated they had the highest financial literacy. Even worse, two-thirds of the folks who declared bankruptcy in the past were more likely to endorse their false knowledge—through true/false items on the survey—than folks who hadn't declared bankruptcy. In this situation, you have the two pieces necessary for this bias to occur: low ability or knowledge in a given domain or task and the persistent confidence that keeps that knowledge and low ability there. There was a disconnect between the participants' cognitions and the outcomes of their decisions.

Why This Bias Occurs

Further studies confirmed the findings of the original 1999 Dunning-Kruger study. Then, in 2008, psychologist Joyce Ehrlinger and her colleagues, including Dunning and Kruger, investigated possible alternative explanations for the bias. They explored whether it was a motivational issue—whether low-task-ability folks weren't getting the right feedback or incentives to think of their own knowledge or abilities in a more objective way. It turns out, regardless of the amount of feedback or incentives to improve, low-task-ability performers couldn't break out of their own lack of understanding or competence in a given domain. The researchers argued that the subjects' low task ability essentially blocked their receptiveness to insight into their own shortcomings.

Here's another example: If you were playing *Let's Make a Deal*, what's the best strategy in the final game to have the best chance of winning? For one lucky contestant, they get to potentially win a car if they choose the correct door out of three possibilities. From the start, you have a 33% chance of winning, but it doesn't stay that way. During the deal-making process, the host, Monty Hall, removes a door from the pool after you've already made your selection. For example, Monty sees that you picked door 1, and he knows the car is behind door 2 and removes door 3 from the game. You might now think that you have a 50/50 chance of winning. However, your door still has only a 33% chance of winning, while the other door has a 67% chance of winning. This is because Monty knows that door 2 has the car, meaning the combination of doors 2 and 3 represents 67% winning odds. The contestant's final offer from Monty is to switch to the other door—from door 1 to door 2. Do you stay with door 1, or do you switch to door 2?

This problem, dubbed the Monty Hall problem, has stumped people for several decades. However, repeatedly, the math checks out: You have to switch. A surprising percentage of people still think the answer is to stay with their original pick. Some form of confidence or bias blocking mechanism prevents them from reflecting and changing their answer and behavior based on their own experience. There's at least one explanation of why the bias occurs. It first begins with an inability to think about your own thinking. That's called metacognition. If you don't have the self-awareness to think about your own thinking, you won't find the holes in your knowledge that need to be filled. Culture also plays a role in susceptibility to this

bias. Western culture is individualistic, which means Westerners place a high degree of importance on the individual rather than on the group. In collectivistic cultures, where the group is considered more important, the Dunning-Kruger effect disappears. The explanation for this appears to be based on how underperforming on a task relates to social group value.

Reducing This Bias

Ehrlinger and colleagues offered some paths to reduce the appearance of the bias. First, encourage learning at all ages but especially in young children. The younger you start, the better metacognition becomes. It takes time to cultivate metacognition and the self-awareness of metacognition, which isn't necessarily captured by an experiment that happens at only one time and then never again. This kind of data collection will never capture the fullness of metacognition growth because of how long the process takes.

Another solution is to encourage a growth mindset. This is the idea from Carol Dweck and others that suggests encouraging students to think that their traits, including mental traits, are changeable. You're not stuck with a specific kind of brain or mind or intelligence. Dweck and her colleagues found that the more you emphasize a growth mindset in children, the more accurately they assess their own knowledge and understanding of various topics.

The Curse of Knowledge

Is it only people with a low task ability in a particular area who show a thinking bias? No. On the other side of the knowledge coin is the bias that experts can exhibit: the curse of knowledge. This is the tendency for a high-ability person to unwittingly assume others have the same or requisite background to understand their area of expertise as well as they do. Remember, these two biases are about what's going on in the mind of a single individual. People tend to remain speaking at the level they use most frequently. The most common discussion for researchers is with other researchers. This is the entire nature of conferences. However, in a different setting, this tendency becomes problematic.

Consider an educational setting. To avoid this bias, a teacher must place themselves in the position of a student. That position changes the language and models they can use. It even changes depending on whether they're talking to a first-year student or a fourth-year student. Additionally, the more expertise they gain as a teacher, the greater the psychological distance between students and themselves because the students stay at the same age and relative novice ability level. This means the curse gets stronger. Though this seems like an anecdotal bias, researchers have observed the phenomenon in action.

The phrase was first coined in 1989 by economists. In 1990, psychology doctoral student Elizabeth Newton conducted a study on the subject. She divided her participants into two groups: the Tappers and the Guessers. The Tappers were given songs to tap out with their fingers. The Guessers were asked to guess the songs that the Tappers were tapping out. Before performing the main task, Newton asked the Tappers to estimate how many songs the Guessers would guess correctly. This was the most important variable in the study. The Tappers predicted that the Guessers would get about half of the

songs. The actual accuracy? Less than 3%. Why did the Tappers think so highly of the Guessers or their own musical tapping ability? They had the song knowledge in their mind, with the musical accompaniment and the lyrics. That musical base gets additional accompaniment from finger tapping, creating a musical symphony in the mind of the Tapper but only finger tapping for the Guesser. It is difficult to guess something by beats alone.

Reducing the Effects of This Bias

One aspect of daily life where experts must grapple with the curse of knowledge is in marketing. Think about the contestants on the show *Shark Tank*. They have a product that they have to pitch and sell to rich investors. The contestants likely know every aspect of their products. Their task is to convince these investors to give them the cash they need to ramp up production. Here's where the curse of knowledge comes in. The contestant comes up with a sales pitch. Maybe you explain how the product works using the specific language of the product. If that's technical jargon or a set of complicated actions, your pitch is rendered meaningless because the curse blocks your ability to understand why your audience is no longer interested in investing.

For that messaging to work, the experts have to recognize their bias. Much like the Dunning-Kruger effect, it takes a metacognitive action on the part of the experts—thinking about how their own thoughts work—to improve upon the outcomes and reduce the effect of the bias. This is incredibly important for any teaching situation. Teachers need to make an effort to reduce the use of things such as abstract language or clumsy transitions.

Why is it called a curse? Isn't having knowledge an amazing thing? Consider this: What good is knowledge if you can't share it? Some might

answer that power comes from unshared knowledge. Unshared knowledge creates a power imbalance, and that's a negative consequence. However, a foundational principle of science is that knowledge is produced to be shared so that it can be verified and objective. Its use is to explain how the universe works. That is where the curse part comes in.

In 1989, economist Colin Camerer and his colleagues investigated whether people with a higher knowledge state could accurately assess and anticipate the decisions of less-informed people. For example, does a soda company know what soda consumers will like before they go into production? The economists, using the stock market as their task and backdrop, found that better-informed market agents fail to sell their products at values that customers think is a good value. Say you have an amazing product that you know the ins and outs of, and you choose a value to sell it at. Your less-informed customers might think that price is too high for something they know little about. Therefore, your knowledge is "cursing" you in the process.

How do people with specific kinds of knowledge dispel the curse? As with the Dunning-Kruger effect, you need to engage in educational dialogue. One way to do this is for the expert to tailor their language to their audience using simple words and phrases. When everyone's on the same level, the curse of knowledge dissipates. There's some other good news about this bias too. In 2014, psychologists Rachel Ryskin and Sarah Brown-Schmidt tested several "curse of knowledge" situations. They found that the bias is relatively small in observable practice. Thus, while it's an important bias for someone who has a large amount of specialized knowledge to consider, researchers see it more strongly in these thought experiments than in real life.

Now you know how knowledge can bias the way experts engage in conversation with others. They are either blinded by their own ability or expertise in a task or domain. Always make sure you take a second to reflect on your audience and how their knowledge compares to yours.

Reading

- Camerer, Colin, George Loewenstein, and Martin Weber. "The Curse of Knowledge in Economic Settings: An Experimental Analysis." *Journal of Political Economy* 97, no. 5 (1989): 1232–1254. https://doi.org/10.1086/261651.
- Ehrlinger, Joyce, Kerri Johnson, Matthew Banner, David Dunning, and Justin Kruger. "Why the Unskilled Are Unaware: Further Explorations of (Absent) Self-Insight among the Incompetent." *Organizational Behavior and Human Decision Processes* 105, no. 1 (2008): 98–121. https://doi.org/10.1016/j.obhdp.2007.05.002.
- Kruger, Justin, and David Dunning. "Unskilled and Unaware of It: How Difficulties in Recognizing One's Own Incompetence Lead to Inflated Self-Assessments." *Journal of Personality and Social Psychology* 77, no. 6 (1999): 1121–1134. https://doi.org/10.1037/0022-3514.77.6.1121.
- Newton, Elizabeth L. "The Rocky Road from Actions to Intentions." PhD diss., Stanford University, 1990.
- Ryskin, Rachel A., and Sarah Brown-Schmidt. "Do Adults Show a Curse of Knowledge in False-Belief Reasoning? A Robust Estimate of the True Effect Size." *PLoS ONE* 9, no. 3 (2014): 1–8. https://doi.org/10.1371/journal.pone.0092406.

17 Is That Memory Mine or Someone Else's?

This lecture focuses on false memories. This memory bias concerns the tendency to think something comes from your own mind as a memory—something you think you have experienced—even though it doesn't. Remember, biases are tendencies for thinking and behaviors. You're at the whim of supposed details conjured up by a mind that remembers only the gist of situations and not every detail. Even when you're asked to give details, false memories can bias the results.

Facilitated Communication

In the early 1990s, facilitated communication, for those with autism that limited verbal abilities, seemed perfect. A nonverbal autistic child or adult was paired with a trained facilitator, who would help the person with autism communicate. Together, they used a device that included a keyboard and a roll of ticker tape so that the autistic person's typing could be immediately read by the facilitator. The facilitator lightly held the arm or sleeve of the person with autism—the actual person typing—while also adding physical guidance so that the text was correct and appropriate.

This practice became widespread around 1992. However, within a few years, a scandal rocked the community to its core. A nonverbal autistic client allegedly used facilitated communication, with the aid of their facilitator, to claim that their father had abused them when they were younger. This led to a criminal investigation. Shortly after, several other claims of abuse arose out of the facilitated-communication world. Eventually, the father was acquitted after a thorough investigation, and the other claims disappeared, along with facilitated communication. This left parents and medical professionals with questions. Because these autistic clients were nonverbal, it was difficult to know if they knew or believed the writing being generated with the facilitator's help.

Facilitated communication is one example of a memory bias called false memories. This bias makes us think that related ideas and concepts—many times from sources outside of our own minds—are actual memories. In the case of the allegedly abused nonverbal child, the facilitator essentially persuaded the nonverbal person and those around them that these events happened by sharing what was typed on the page. The argument at the time was that the facilitator was merely guiding the arm, helping to record thoughts that happened in real time. A modern example of this process would be when your phone attempts to offer predictive text to your message. However, in this case, a human brain full of biases was trying to predict what would appear on the ticker tape.

This false memory was implanted by the facilitator. Note that the facilitator merely thought they were doing their job—helping the nonverbal person communicate. Over time, more so-called evidence would appear on the text tape—or so the facilitator thought. Importantly, the hand that was typing

was meant to represent the intent of the nonverbal person but was always guided by the facilitator. This is the first step of false memory implantation: It seems like the information comes from the person's own mind. How did a facilitator accidentally implant a false memory into the mind of a nonverbal autistic child? If you've ever played with an Ouija board, you might have had a similar experience.

Ouija is marketed as a way to talk to ghosts or other spiritual entities. A group of people put their hands on a device that acts like a pointer and spell out words using letters on a board. The idea of the game is that even though people have their hands on the pointer, spiritual forces—not the people touching it—move the pointer. This is called the ideomotor effect—not knowing that you're moving something even though you are. That's what happened with the false memories and ultimately unfounded accusations in facilitated communication. In 2018, psychologists Bronwyn Hemsley and her colleagues concluded after exploring several decades of research that there was no evidence that facilitated communication represented the nonverbal person's thoughts. The text tended to correspond more to the facilitator's thoughts.

Facilitated communication is now widely regarded by autism specialists as pseudoscience. Thus, were the facilitators disingenuous or unaware of their own ideomotor movements? The question falls back to how our minds create the circumstances that make false memories possible. Recall that false memories occur when we think something comes from our own mind as a memory even though it doesn't. In the case of facilitated communication, the scandal was that the nonverbal client may have thought these awful allegations, perhaps even false memories, were real after repeated communication attempts.

The DRM Method

The current testing method for investigating false memories is called the DRM method because it was developed by psychologist James Deese in 1959 and then updated in 1995 by psychologists Henry Roediger III and Kathleen McDermott. In the DRM method, participants were asked to watch a computer screen, with words flashing on the screen every second or so. Participants were simply asked to remember as many words as possible for the next session. After participants studied the words—usually around 40—they

were given a distractor task for a period of a minute or more. This prevented anyone from regurgitating the last few words from the list they recently saw. The researchers wanted to keep participants from relying on their short-term memories.

After the delay, the participants moved into the testing phase of the experiment. During this phase, participants were shown one word at a time and were asked if the word was one they saw during the learning phase, marking it as old, or if it was a new word that they hadn't seen in the learning phase, marking it as new. Some of the new words were called critical lures, meant to catch participants like a fishing lure resting near the surface of their minds. For example, if the 40 words all had to do with being at a beach (*wind*, *sand*, *suntan*, *ocean*, etc.) but did not include the word *beach*, *beach* could then be used as the critical lure. These critical lures are crucial for researchers to determine if something can make it into your brain that you think you have experienced. Remember, participants indicated some of these lures as old in the testing phase, meaning they thought that they had already heard them in the learning phase. However, they had experienced the lure only in their mind and not as part of the word list, meaning it couldn't be a memory.

Even when giving details, false memories can bias the results. Many facilitated communicators may have erroneously thought they were discovering repressed memories in their clients. The idea of repressed memories stems from the work of Sigmund Freud and his daughter Anna, who believed that psychological disorders were the result of trauma experienced as a child. The brain would bury this childhood trauma using protective psychological measures so that memories of the trauma wouldn't become harmful later in life. Patients seeking care from folks who followed the therapy ideas of the Freuds would engage in practices that were meant to bring forth these repressed memories. Most of the time, suggestions from the therapist would lead to what they called breakthroughs. To many patients, those could be viewed, in retrospect, as false memories, placed there by a well-meaning therapist.

Note that repression may not be the same thing as false memory as a bias. They represent two different mind mechanisms. Repression is characterized as disordered thinking, and false memories aren't disorderly but rather show how suggestible our memories are. Furthermore, the idea of repression is largely discredited by modern psychologists and therapists. How does the bias of false memory work? Ultimately, it falls back on plausibility. Plausibility is all about how possible something seems. If it seems possible, then it's plausible.

The DRM method is able to seemingly implant false memories because it seems possible that the critical lure could have been a word you saw during the learning phase. In the original studies, significant numbers of participants always seemed to fall for the lure. Although the Freudian repression argument also sounds plausible, more recent psychological research shows that negative experiences often stay strongly rooted in our memories. In fact, we tend to remember our trauma or negative experiences more than we'd probably like to. Our propensity for assuming information comes from our own minds or memories and can lead to a related bias: cryptomnesia.

Cryptomnesia

Cryptomnesia is defined as the tendency for a person to falsely remember generating a thought as a new inspiration conjured from their own mind. It's a bias because of what researchers have referred to as a source monitoring error. This is a problem with storing the source of the information along with the information itself. For example, you might remember a story or

tune but not who sang the song or wrote the story. The bias jumps in when you remember a joke but forget the source. This leads you to then think to yourself: "That was such a great joke I came up with!" In fact, it might have been a joke you heard or read a few months ago, but your brain didn't include that information in your memory.

Cryptomnesia can lead to accusations of plagiarism. Plagiarism is when someone presents another person's ideas, words, songs, or art as their own without proper citation or recognition that the work isn't original. In some cases, plagiarism is inadvertent. It's a skill to properly cite other people's ideas in an academic paper or news article. Our memory biases don't care about that skill. Our minds use only what makes sense to us. Thus, it's entirely possible you have information in your mind that you think is yours when in fact it's someone else's.

There are several famous examples of this bias, especially in literary history. Helen Keller, the famous author who was deaf and blind, once wrote a children's story, which was published in 1891. It was later discovered that the story she wrote originated from a story that was read to her when she was 11 years old. In a lighter turn, Aerosmith's front man, Steven Tyler, loved the sound of a song he heard on the radio in the mid-1980s. He went to his bandmates and suggested they perform a cover version of the song. It turns out the song was their own, titled "You See Me Crying."

How do psychologists know that this bias exists in non-famous folks like you? In 1989, psychologists Alan Brown and Dana Murphy sought to observe cryptomnesia directly via an experiment. In groups of four, participants first came up with examples of items in a category out loud. This was called the *oral generation stage*. Each participant generated one different example for each category. They were not allowed to repeat examples. Once each person in the group generated four examples, they moved on to the next category. However, this time, participants switched seats. For the second category, person B went first. For the third category, person C went first. For the final category, person D went first.

The researchers then separated all participants for the remainder of the experiment. Each participant was handed a sheet of paper for each category with 8 blank spaces—thus, participants had to recall only half of the 16 examples that were generated in the previous group stage. In addition,

participants were encouraged to use the first four spaces on the sheet to write down new examples for each category before adding any others they heard previously. The general findings showed two important things: Some of the participants repeated an example that was previously said during the oral generation phase. Moreover, three-quarters of the participants included at least one of the examples said by another group member on their individual sheets, specifically where they were supposed to put new examples.

What does this mean? Broadly speaking, plagiarism can occur within seconds or minutes of learning new information. Some participants repeated examples even when they had sat next to the person who said them only minutes before. Here, the results showed a higher rate of cryptomnesia than can be explained by an attention deficit. The researchers found that overall, more than 7% of all participants' responses on these written sheets were inadvertently plagiarized. The point of the bias is that we fail to store the source of the memory with the details of the memory. Failing to recognize the source after the experiment shows pure, albeit inadvertent, plagiarism.

Reducing the Impact of These Biases

The best strategy to protect yourself from falling victim to false memories is to not let others manage your memories. When we have experiences with other people, we want to share our memories of that experience with them. However, try not to offload those memories to others. Here's an example using a line of memory research that focuses on collective experiences. The memories of these experiences are referred to as flashbulb memories due to the vivid images. Most people contend that these memories are some of the strongest they have because of the vividness. For example, many people will swear by their memories of experiences they had on September 11, 2001. However, study after study shows that people generally lose details of these experiences and memories like they do for run-of-the-mill memories.

What doesn't change, however, is our confidence in these memories. We still believe in the vividness our minds create around these flashbulb memories. Because these memories tend to be shared and repeated over and over again, false memories can creep in. This is what is meant about offloading memories. Eventually, through repetition of telling our experiences to others, as well as listening to memories of others' experiences, we may end up with memories that are plausible but not what we experienced on that day. The point is to not let others dictate the memories for you. Even if you try to prevent false memories from forming, you may still end up with a sense that you experienced something that never happened to you. One way to prevent this is to journal every day or take photos of your experiences with others.

The solution for cryptomnesia is far less difficult—record the source of the information with the information itself. This requires an extra bit of effort, but ultimately it will help you in the long run. Psychologist Sean Lane and his colleagues claim that a way to keep yourself honest with source monitoring is to test yourself. When learning new information, remind yourself that you may need to recall this information and its source later. This simple act strengthens the memory and the associated details of the memory—in this particular case, the source with the info.

Reading

- Brown, Alan S., and Dana R. Murphy. "Cryptomnesia: Delineating Inadvertent Plagiarism." *Journal of Experimental Psychology: Learning, Memory, and Cognition* 15, no. 3 (1989): 432–442. https://doi.org/10.1037/0278-7393.15.3.432.
- Hemsley, Bronwyn, Lucy Bryant, Ralf W. Schlosser, Howard C. Shane, Russell Lang, Diane Paul, Meher Banajee, and Marie Ireland. "Systematic Review of Facilitated Communication 2014–2018 Finds No New Evidence That Messages Delivered Using Facilitated Communication Are Authored by the Person with Disability." *Autism & Developmental Language Impairments* 3 (2018): 1–8. https://doi.org/10.1177/2396941518821570.
- Lane, Sean M., Cristine C. Roussel, Diane Villa, and Shelby K. Morita. "Features and Feedback: Enhancing Metamnemonic Knowledge at Retrieval Reduces Source-Monitoring Errors." *Journal of Experimental Psychology: Learning, Memory, and Cognition* 33, no. 6 (2007): 1131–1142. https://doi.org/10.1037/0278-7393.33.6.1131.
- Laney, Cara, and Elizabeth F. Loftus. "Traumatic Memories Are Not Necessarily Accurate Memories." *Canadian Journal of Psychiatry* 50, no. 13 (2005): 823–828. https://doi.org/10.1177/070674370505001303.
- Lilienfeld, Scott O., Julia Marshall, James T. Todd, and Howard C. Shane. "The Persistence of Fad Interventions in the Face of Negative Scientific Evidence: Facilitated Communication for Autism as a Case Example." *Evidence-Based Communication Assessment and Intervention* 8, no. 2 (2014): 62–101. https://doi.org/10.1080/17489539.2014.976332.
- Lilienfeld, Scott O. "The Ethical Duty to Know: Facilitated Communication for Autism as a Tragic Case Example." *The Neuroethics Blog*, March 8, 2016. http://www.theneuroethicsblog.com/2016/03/the-ethical-duty-to-know-facilitated.html.
- Roediger, Henry L., and Kathleen B. McDermott. "Creating False Memories: Remembering Words Not Presented in Lists." *Journal of Experimental Psychology: Learning, Memory, and Cognition* 21, no. 4 (1995): 803–814. https://doi.org/10.1037/0278-7393.21.4.803.

18

I Believe, Therefore I Think: Belief Bias

Belief bias is the tendency to judge arguments on their plausibility rather than on the whole argument. In a logical argument, each piece of the argument supports the conclusion. However, people sometimes accept an illogical argument when the conclusion seems plausible to them. This is called a plausibility judgment. It often happens when the argument lines up with someone's prior beliefs, current worldview, or preconceptions. The first step in identifying belief bias is to understand how a logical argument works. Logic is a systematic study of the rules of inference. An inference is simply the next step in a line of reasoning. This lecture focuses on Aristotle's notion of deductive logic and how it relates to belief bias. This form of logic includes three areas: logical necessity, truth value, and validity.

Deductive Logic

Consider three statements. The first two, the premises, set up the argument. The final statement is the conclusion. This statement combines the information from the first two statements and links all three statements in a deductive argument. Philosopher John Stuart Mill came up with this classic example of a deductive argument: All humans are mortal; Socrates is human; therefore, Socrates is mortal. Three terms in this argument combine into the conclusion: *humans*, *mortality*, and *Socrates*. The conclusion also has an important quality. Because it's a deductive argument, logical necessity is required.

Thus, the conclusion must follow logically from the premises. No other information can enter this system of statements to change the outcome of the conclusion in a deductive argument. These two premises and the conclusion create a closed system. This becomes essential for belief bias because most people don't think like this organically. We tend to bring our own beliefs and thoughts into the closed system. The flow of a deductive argument must make connections that take you from the first premise all the way to the conclusion. That's what keeps the system closed.

Deductive arguments also have another feature that's critical to your exploration of belief bias: truth value. Basically, this is whether the statements made in the argument are true or false in reality. Each statement in a deductive argument can be evaluated for its truth value. First, you would consider the premises and their truth values. If these are true, then the conclusion is definitely true since the argument is a closed system. If you agree that all humans die and you agree that Socrates was a human being who lived at some point in human history, then in this closed system, there's only one true thing to conclude. In this case, Socrates will die because he is mortal.

The final piece of a deductive logical argument is called validity. If you don't have a valid argument, there's no reason to go further with the deduction. All you have is a series of true or false statements that aren't connected in a closed system. A deductive argument, such as the one about Socrates, has what is called a form. All the information has to be arranged in a particular way to be a valid argument. If it isn't in the right form, then the argument is invalid. Validity is separate from the truth value of the statements.

Consider the truth value of each statement about Socrates. Remember, you need to examine each statement by itself, not in relation to any other statement. Saying that all humans are mortal would likely get consensus, in and of itself. Mark that as true. Moreover, you'll likely agree that Socrates was a human. The conclusion—Socrates is mortal—is true because he's no longer alive. Now, you've determined the truth of the statements. It's time to evaluate the validity of the argument. That is, you'll judge the argument as having a proper form versus an improper form.

A valid argument properly links the terms in the argument so that the only conclusion you can draw from the set of premises is the one you're reading. The first thing you do is link the first and second terms together. You establish that humans are mortal. Then, you establish that Socrates is one of those humans. Thus, the only thing you can conclude is that Socrates is mortal. Overall, this simple rule for deductive arguments is useful: If either the content or structure of the statements is no good, then the conclusion is no good. This is because you evaluate the truth and the validity separately.

You might be getting a small inkling of where belief bias makes its way into logical thinking. The problem arises when an evaluated truth value is at odds with the validity. It's fine when the conclusion and the validity line up, and you believe the conclusion. However, what happens in your mind when you don't believe the conclusion? What if the conclusion goes against your current worldview?

The Impact of Conclusions' Believability

In the 1980s, psychologist Jonathan Evans and his colleagues gave participants deductive arguments to evaluate. The goal was to see if the believability of the conclusions impacted thinking. Thus, the participants evaluated the conclusions' validity. In other words, they were asked to judge

whether the conclusions of the arguments were good/valid or bad/invalid. Remember, a valid argument has a form that lets the logic flow through both statements to the conclusion. An invalid argument form doesn't let the deduction flow to the conclusion. An example of this flow breaking is if you switched the terms *mortal* and *human* in the first premise of the Socrates argument: All mortals are human; Socrates is human; therefore, Socrates is mortal. Now, you're saying all mortals are human. In this new first premise, you have an issue with the truth value, but more importantly, you have an invalid form. You are saying how two things are human but not how they're related to each other. No information in this closed system leads to the conclusion that Socrates is mortal.

In the study, participants were shown both valid and invalid forms to evaluate. They also got an instruction booklet that explained to them everything you just did to set up the rules for their evaluation. That's where the elegance of the belief bias comes in. Evans and his colleagues also manipulated the conclusions' believability. This goes back to the truth value. Is the conclusion true or false in your mind? Consider two arguments from their research.

First, take the following argument: No cigarettes are inexpensive; some addictive things are inexpensive; therefore, some addictive things are not cigarettes. This argument is valid—remember, this relies only on form, which is where the terms of the argument are in each premise and how they relate to one another. If you take the statements at face value, the only thing you can conclude from the two premises is that some addictive things are not cigarettes. This conclusion is plausible if you cursorily assess the truth value. Importantly, people in these situations put more emphasis on the conclusion's truth value and essentially ignore the truth value of the premises. You're dealing with a closed system here. Thus, additional information isn't welcome in the conclusion.

Now, look at an invalid argument related to this same topic: No addictive things are inexpensive; some cigarettes are inexpensive; therefore, some addictive things are not cigarettes. There's a subtle difference in the form here. The term *inexpensive* stays in the same spot, but the other two terms move to different spots. Now, there's no relationship between the things stated as inexpensive. You can't come to the same conclusion that you did in the valid form. However, as the conclusions are the same, you can agree that it's believable or plausible: Some addictive things are not cigarettes. Although this

second argument is invalid, it's believable because you're relying on ideas you already believe to help you draw your conclusion. For instance, you believe that alcohol and gambling are both addictive. Thus, the statement sounds believable to you.

Now, modify the order of the conclusion to make it unbelievable. An argument with an unbelievable conclusion looks like this: No addictive things are inexpensive; some cigarettes are inexpensive; therefore, some cigarettes are not addictive. This is absolutely false, but the argument is valid. In the study, participants were told not to think about whether the content of the arguments was true or false. Again, evaluating validity means that the content of the argument does not matter. However, since most people don't understand complex logic functions, forms, and validity without formal training, they tend to rely on their beliefs and whether they agree with a statement on its own.

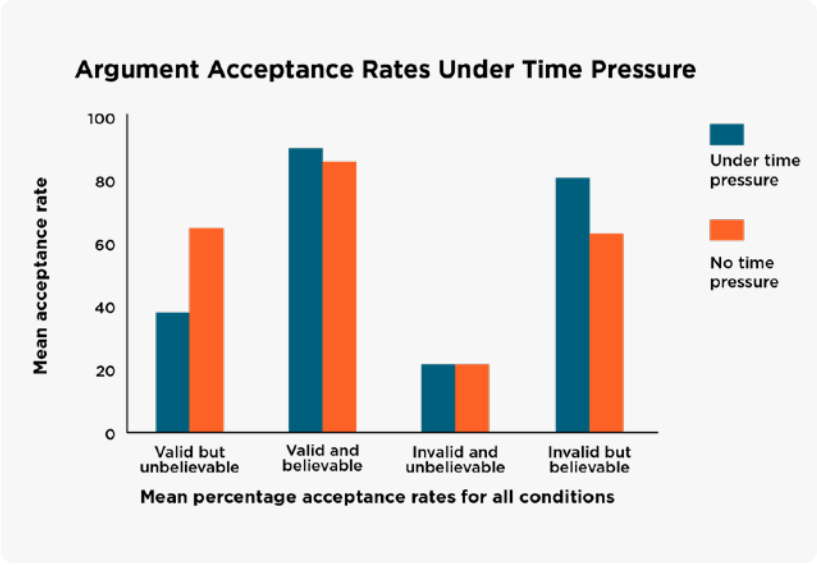
That's exactly what Evans found. When conclusions were believable, more than 90% of participants accepted them as valid regardless of their actual validity. More importantly, less than half of the participants accepted an unbelievable conclusion, even if it was presented in a valid form. Most people did correctly assess the validity when the conclusion was unbelievable and invalid, with more than 90% rejecting those conclusions. That's pretty definitive. When conclusions are believable, we tend to agree with the argument. However, when conclusions are unbelievable, we don't—even if it's a valid argument. Although the participants were told how validity worked before they started the task, they didn't have any formal logic training. Why should you care about unbelievable but valid arguments? Arguments tend to be more complex than three statements, and sometimes beliefs aren't synonymous with factual statements.

Percentage Frequency of Subjects Accepting Conclusion (Sample Size = 24)

	Believable	Unbelievable
Valid	92	46
Invalid	92	8

Time Pressure

You might notice that when you're under significant time pressure, you tend to make quick decisions. Sometimes, those decisions end up being bad. Time constraints also affect belief bias. Studies have shown that you make more belief-based errors when you're deciding quickly. Making good decisions can be a slow process. Unfortunately, in debates and arguments, there's no time to slowly come to grips with the nature of the arguments. In 2005, Evans and fellow psychologist Jodie Curtis-Holmes asked participants to evaluate the same kind of arguments used in the study from the 1980s. However, this time, one group of participants was given only two seconds to provide an answer. Another group was given as much time as they needed to evaluate each argument. The group working under time pressure performed far worse. When arguments were valid but unbelievable, the time-pressure group rejected those arguments far more often than the group that had all the time it wanted. The group under time pressure also accepted more invalid arguments when the conclusions were believable. This means that participants working under time pressure relied on the conclusion's believability rather than on the argument's form or structure.



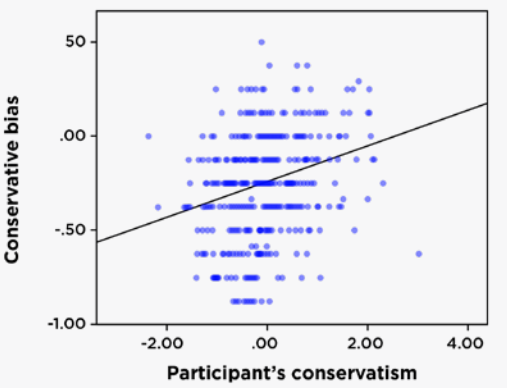
Another issue related to time pressure is the amount of memory load a person is working under. What is memory load? Imagine holding a bunch of stuff in your conscious mind at once, such as your phone number, your Social Security number, and a sequence of shapes. It's likely that you're unable to hold all of that in your mind at once. A similar outcome occurs when reasoning. If you ask participants to remember an arrangement of dots in a larger grid while doing reasoning problems, you'll see those participants have a hard time both reasoning and remembering. Overall, people under a high memory load rest on belief bias more than those not under a high memory load.

The kind of instructions a participant is given can also impact the outcome. If researchers highlight extensive instructions about logical necessity and explain each concept, the bias disappears. The instructions could even fail to mention the phrase *logical necessity* and the bias would still dissipate a little. In this case, the instructions serve a broader purpose. They highlight the need to slowly reflect on the arguments fully rather than paying attention only to the conclusion and its truth value or believability. Simply put, if you're asked to evaluate whether a conclusion of a classically structured argument is valid or invalid, you'll probably move directly to the conclusion—especially if you know you'll be doing multiple problems. However, if you go through an example explaining how a logical argument works and what each sentence in the argument does, you're more likely to spend time considering all statements. Naturally, this reduces the effect of belief bias. This is what researchers find in research testing when dealing with folks with university logic training. Although the bias never disappears completely, people with such training can significantly reduce its appearance. However, the validity of a deductive argument concerns only the structure of the argument.

Belief bias also appears when considering the content of arguments. Previous research has compared how people evaluate political arguments to how people evaluate the same kind of arguments mentioned above. They're simple and don't require any sort of specialized knowledge. During the 2008 presidential election, Alexander Swan spent a considerable amount of time condensing pundits' and commentators' arguments into three-statement arguments. He created arguments that were both valid and invalid, using forms similar to those that Evans used in his studies, and he manipulated believability by creating certain conclusions that would appeal to liberal evaluators and certain conclusions that would appeal to conservative evaluators. Several

dozen conclusions were pretested, and the strongest ones for each ideology were identified. First, Swan asked participants to describe their political ideology using a single number on a scale. Then, the participants were grouped into liberal or conservative bins. This allowed Swan to see exactly how their ideology impacted their acceptance of conclusions. The results showed that there was a preference for conclusions that aligned with the participants' political ideologies, even if the arguments were invalid. The reverse was also true. Conservatives were more likely to reject arguments as invalid if they were liberal-leaning, and liberals were more likely to reject arguments as invalid if they were conservative-leaning. This shows that no matter what we believe, we're more likely to have our judgment errors reflect those beliefs.

In 2019, Swan, along with Dustin Calvillo and Abe Rutchick, published this work. They used a slightly different measurement than the one just described to be more statistically sophisticated. However, the findings in multiple experiments across the decade consistently revealed the same outcome. They measured conservatism and compared that to the level of conservative bias. They condensed conservative bias to the following: accepting conclusions that were conservative whether they were valid or invalid. This could have been done with a liberal bias too. Overall, regardless of labels and naming, there was a clear relationship between a person's increasing amount of conservatism and their reliance on their previous beliefs for their acceptance—or rejection—of conclusions.



What about those general knowledge arguments they were compared against? It did not matter what the person's ideology was. The outcomes of these arguments were the same as in the Evans study. People made the same biased errors. In other words, there's no difference in the belief bias effect that would appear here even if the researchers didn't separate participants based on their political ideology. Everyone uses the same bias to accept believable conclusions and reject unbelievable ones. This means that belief bias exists in multiple facets of your thinking and decision-making. It means you're more likely to agree with and accept conclusions and arguments that you already believe rather than assessing the argument itself.

Reducing the Impact of Belief Bias

The best strategy to reduce the impact of belief bias is to slow down. Reflect on how an entire argument, not only the conclusion, works. We have such biases to help us think quickly and efficiently. That's how many of them developed over generations. However, we still retain the ability to reflect and slow down our thinking. This split between two ways of thinking is an interesting divergence.

The concept here is called dual process thinking. Essentially, the idea is that you have two different but parallel types of thinking. One type is fast, automatic, and heuristic processing. This is where many of your biases are formed to keep you thinking and moving quickly from event to event. The other thinking process is slow, deliberate, and logical. Thus, if you stop the heuristic process, where belief bias lives, you're more likely to start the logical, deliberative process. The most important thing to recognize is that logic was created by humans. It's a skill that must be learned. If you're taught to invoke this form of processing, the belief-bias effect dissipates.

Newer research suggests that we are generally more logical than previously believed in that fast and shortcut-reliant thinking mode. Researcher Wim De Neys argued in a series of experiments that some people can deliver a fast response that is both logical and confident. Other researchers have shown that belief-based judgments can still arise after several minutes of deliberative, verbal exploration. Many times, when preconceived beliefs are at the forefront of your mind, there's little motivation to use your slower processing skills.

Reading

- Calvillo, Dustin P., Alexander B. Swan, and Abraham M. Rutchick. "Ideological Belief Bias with Political Syllogisms." *Thinking and Reasoning* 26, no. 2 (2020): 291–310. https://doi.org/10.1080/13546783.2019.1688188.
- De Neys, Wim. "Dual Processing in Reasoning." *Psychological Science* 17, no. 5 (2006): 428–434.
- Evans, Jonathan St. B. T., and Jodie Curtis-Holmes. "Rapid Responding Increases Belief Bias: Evidence for the Dual-Process Theory of Reasoning." *Thinking and Reasoning* 11, no. 4 (2005): 382–389. https://doi.org/10.1080/13546780542000005.
- Evans, Jonathan St. B. T., Julie L. Barston, and Paul Pollard. "On the Conflict between Logic and Belief in Syllogistic Reasoning." *Memory & Cognition* 11, no. 3 (1983): 295–306. https://doi.org/10.3758/BF03196976.
- Newman, Ian R., Maia Gibb, and Valerie A. Thompson. "Rule-Based Reasoning Is Fast and Belief-Based Reasoning Can Be Slow: Challenging Current Explanations of Belief-Bias and Base-Rate Neglect." *Journal of Experimental Psychology: Learning, Memory, and Cognition* 43, no. 7 (2017): 1154–1170. https://doi.org/10.1037/xlm0000372.

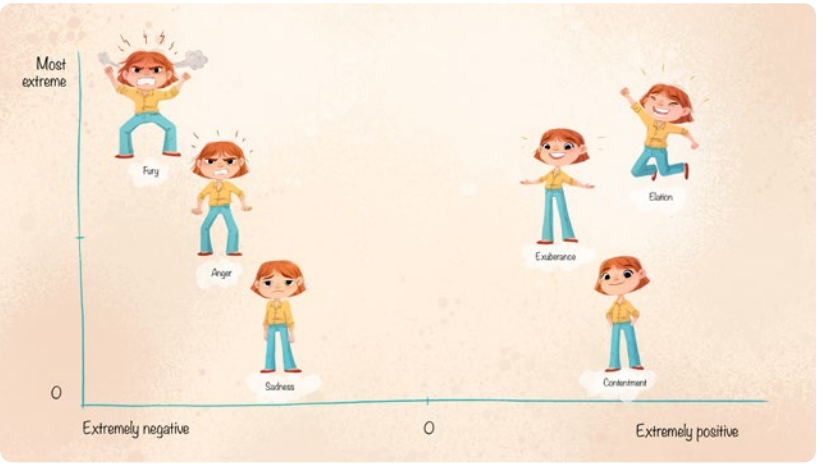
19 Why Emotional Peaks and Endings Matter

What people remember about an experience is influenced by their expectations, previous experiences, sensations, and emotions. The peak-end rule is what causes you to judge an experience based on how you felt at the most intense moments—the peaks—as well as how the experience ended instead of basing it on the experience as a whole. This bias plays an important role in everyday life. It affects how you recall memories, how you describe your life experiences to others, and the future judgments and decisions you may make based on this biased information. An example of this is childbirth. Women often give birth more than once, despite the painful and difficult parts of pregnancy and labor. This lecture focuses on the two main causes for the peak-end bias: the bias for emotional events and the bias for more strongly remembering the end of any experience.

Valence and Intensity

When discussing emotions in a scientific sense, it's important to describe two features. The first feature is the type of emotion, or its valence. Think of valence as a continuum, with extremely positive emotions, such as exuberance and joy, at one end. At the other end are extremely negative emotions, such as sorrow and despair. In the exact center, you can characterize valence as zero, or no emotional content. The second feature of emotions is intensity. Essentially, this concerns how much of the emotion you felt at the time of the event or experience. Again, you have a continuum, with zero intensity reflecting no intensity—or no emotional feeling—at one extreme. Increasing values of intensity reflect how strongly the emotion is felt, leading to the most extreme feeling possible at the other end.

People generally don't focus on these two features when discussing events among themselves. We've developed words that fold the valence and intensity together. For example, contentment versus elation—these emotions are generally associated with positive valence. However, elation carries more intensity than contentment. Consider the use of the terms *valence* and *intensity* to compare two different emotions—say, sadness and exuberance. Sadness is a negative feeling with low intensity. Exuberance is a positive emotion with high intensity. What does a negative and high-intensity emotion look like? Anger or fury.



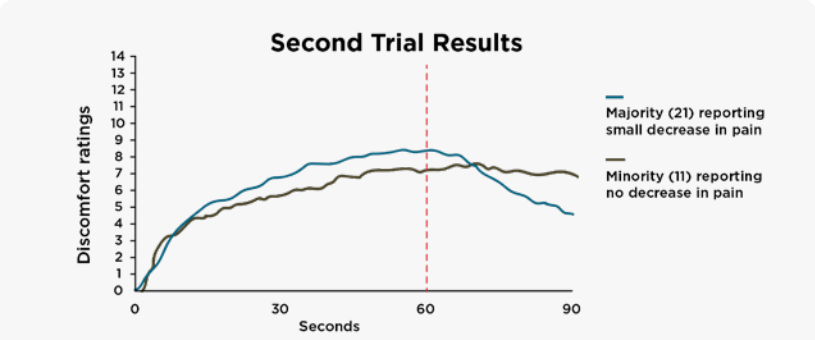
Remember, the peak-end rule is defined as the tendency for a person to remember the highest emotional peak or lowest emotional valley from the experience as well as the emotions felt at the end of the experience. Your brain gets rid of all but the most important information to help you answer this question: What does the experience you just had mean for your future thinking, planning, and decision-making? Many of our daily experiences don't warrant remembering because they aren't useful for the future. Our brains are good at making things that require no emotional input fairly automatic. However, throw in emotional valence and intensity, and you get a situation that your brain thinks warrants encoding and storing away for future use.

In some early research on the peak-end rule, psychologist Daniel Kahneman and his colleagues asked participants to stick their hand in a cold pressor. This is essentially an ice bath for a participant's upper or lower extremities. In the world of psychology, this task is a pretty standard way to assess pain perception and behaviors in a way that won't result in permanent damage to participants. The researchers wanted variability in experiences; thus, they made their cold pressor only as cold as 14°C, or around 57°F. Participants completed two trials, one trial per hand. In the first trial, participants submerged one hand in the cold pressor for one minute. Then, they were asked to submerge their other hand into the same cold pressor but keep their hand in the container for an additional 30 seconds while the temperature in the container was raised an additional degree to 15°C.

Participants rated the pain they felt on an electronic device, where they used a dial to light up more red LED lights to represent more pain while their hand was in the water bath. The researchers translated these LED lights to numerical values. Thus, pain was defined as a range from 0 to 14, signifying how many red LEDs were lit. The researchers sampled the readings five times per second to give an accurate recording of pain from moment to moment. After the first two trials, participants were asked which of the two trials they would prefer to do for a third trial. They then drew their own graph, indicating their pain over time, to accompany their choice.

However, there was no actual third trial. The researchers were trying to determine how participants' memories of those previous experiences would impact a future decision. The intuitive response for anyone considering this from the outside would be to choose the shorter of the two trials. However, the majority of participants chose the 90-second trial. Why? Crucially, the pain recordings showed little difference between the two trials. However, most of the participants preferred the longer trial because they indicated that pain decreased when the temperature was raised that one degree.

These findings are explained by the peak-end rule. For all participants, the peak of discomfort came right before the 60-second mark. In other words, that was when the pain was the greatest in both trials. However, knowing that the end of the second trial was less painful than the entire experience, they chose to repeat that trial even though it still included the part they found most painful. Participants ignored or neglected the time factor and prioritized their feelings associated with the end of the experiences when making their decisions about a future similar experience. This is how the peak-end rule works.



Nostalgia

Newer research suggests that nostalgia plays an important role in how and why we remember some events better than others. This is the idea of fondly remembering the aspects of a time in the past that are no longer present. It is specifically about past experiences and memories that brought us joy. It also signals a motivation to return to that time.

What does nostalgia have to do with the peak-end rule? Psychologist Carey Morewedge investigated this in 2012. The participants in her study were adults with an average age of slightly older than 30, meaning they were children in the '80s and '90s and adults in the 2000s. Participants were asked what they thought of television shows from the 1980s, the 1990s, and the 2000s. The idea was to contrast the shows from the '80s and '90s with the shows from the 2000s. The participants rated these TV shows on a scale from 1 to 10, with 1 representing "not at all good" and 10 representing "very good." Then, participants recalled their favorite show from each decade and rated that show's quality on the same 10-point scale. Finally, they rated how the show they named compared to the shows in general from each decade.

The results of this survey showed that these participants believed that past-decade shows were better than current or recent TV shows. This means that participants had more favorable feelings for shows that were representative of their childhood than those of their adulthood. This newer research shows that in the case of nostalgia, the peak is joy, and the end is the joy felt from childhood experiences. It dictates that of the memories we keep and recall, we get this sense of joy when we engage with things we once did when things weren't so difficult and life felt different. Here, again, you're looking at the two major reasons that the peak-end rule dominates our memory recall: First, we have a tendency to remember events with emotional aspects to them. Second, we have a memory bias toward things that happened most recently. In this case, the end part of the peak-end rule comes from the fact that the emotional quality at the end of an experience is, by definition, the most recent thing about the experience.

In 2014, researcher Emily Garbinsky and her colleagues, including Carey Morewedge, asked participants to rate the pleasantness of tasting experiences, once at the beginning and again at the end of the experience.

Participants rated 3 types of crackers. The researchers were concerned with how long it would take for the participants to eat the crackers again. After trying all 3 crackers, participants chose their cracker of choice out of the 3 and were then split into two groups: a small-portion group, in which participants each ate 5 crackers, or a large-portion group, where they each ate 15 crackers.

To compare how their level of enjoyment at the beginning of their eating experience differed from their enjoyment at the end, participants were further separated into three subgroups. The first subgroup was a control group that either ate 5 or 15 crackers and then was asked the next day when they would likely eat the crackers again. The second group was specifically asked to think about the beginning of the initial consumption experience before answering the same question as the control group. Finally, the third group was asked to think about the end of the initial consumption experience before answering the question. When the participants ate the large portion of 15 crackers in both the end-recall and the control conditions, they reported wanting to wait a greater number of days until they wanted to eat them again compared to the participants who ate only 5 crackers. In other words, the end experience of satiation from the large portion of crackers indicated to these people that they were not interested in eating those crackers again anytime soon.

When participants in the beginning-recall group were asked about how many days before the next time they thought they'd want to eat the crackers again, there was no difference in the number of days between the groups that had eaten 5 or 15 crackers. Think of the results like this: When you specifically think of the end of an event and the emotions and feelings those bring about, or not prompted at all, those feelings will impact future decisions. When you think of the beginning, decisions are much different. The feelings were different at the beginning and end of the experience. If you were forced to eat 15 crackers, you might feel the same as these participants: "I don't want to eat these crackers for a while because I've had my fill!" However, if you were asked to purposefully think of the beginning, even after 15 crackers, you'd be more likely to say, "I'm hungry just thinking about those crackers!"

Benefiting from the Bias

Think about being on the phone with customer service. It's cumbersome, laborious, and stressful. To top it off, you rarely seek customer service when things are pleasant with a product or service. You're usually upset. You'll remember how mad they made you, pretty much every step of the way, because that's the peak. However, it could just as easily sway the opposite way at the end of the call if you get a positive resolution to your problem or are given a freebie. The memory of how you felt during the phone call could shift to a positive emotion, even when the peak was negative. The most recent part of your memory wins out here.

Now, think about a restaurant visit. We have high expectations for fancy dining experiences. We're paying for the food, the atmosphere, and the experience. However, because the food is the centerpiece, we will always remember the peak highs or peak lows of the meal itself. Moreover, the end is a hit to the wallet. For many, that's not a terribly positive part of the experience, and it certainly won't be the part that brings most people back. Thus, the peaks become the focus of these experiences and the reason you'd return to the restaurant. If the food isn't good, you probably won't return to the restaurant and may even shy away from trying fancy dining again.

Now, consider situations that last longer. How do we remember experiences that last several days? It depends on what happens during those several days. In 2008, Simon Kemp and his colleagues asked a few dozen students to text the researchers every day while they were on a week-long vacation about how they felt about the previous 24 hours. The researchers found that the peak-end rule didn't manage to predict how the participants remembered the experience as a whole or for each day of the week. The researchers' explanation boiled down to how the vacation, as a whole, was ultimately remembered: in a biased way. We tend to reconstruct memories of what happened, plus our thoughts, experiences, and emotions. The peak-end bias may not be the only impact on our memories of vacations. However, if a vacation ends with satisfaction and contentment, the peak-end rule may still be supplying the memory of the vacation with those feelings for future recall.

How can you use this bias to your benefit? If you're looking for a better way to remember more details of an experience rather than only the peaks and valleys and the ending, consider the method given by Kemp and his colleagues.

It makes practical sense to journal your vacation days in this way. If you examine each day for its peaks and valleys, you're less likely to rely on your biased memories after the fact. During a multiple-day event, journaling about your experiences can help lessen the bias of the peak-end rule. Alternatively, you could take photos. The idea here is that the photos are connected to the experiences themselves. The more images there are, the less the peak-end rule will come into play in your mind. You may find that photos help you remember more of the emotions you felt during an experience as well as the events in between the peaks and the end of the experience.

Reading

- Baumeister, Roy F., Ellen Bratslavsky, Catrin Finkenauer, and Kathleen D. Vohs. "Bad Is Stronger Than Good." *Review of General Psychology* 5, no. 4 (2001): 323–370. https://doi.org/10.1037/1089-2680.5.4.323.
- Garbinsky, Emily N., Carey K. Morewedge, and Baba Shiv. "Interference of the End: Why Recency Bias in Memory Determines When a Food Is Consumed Again." *Psychological Science* 25, no. 7 (2014): 1466–1474. https://doi.org/10.1177/0956797614534268.
- Kahneman, Daniel, Barbara L. Fredrickson, Charles A. Schreiber, and Donald A. Redelmeier. "When More Pain Is Preferred to Less: Adding a Better End." *Psychological Science* 4, no. 6 (1993): 401–405. https://doi.org/10.1111/j.1467-9280.1993.tb00589.x.
- Reed, Andrew E., and Laura L. Carstensen. "The Theory behind the Age-Related Positivity Effect." *Frontiers in Psychology* 3 (2012): 1–9. https://doi.org/10.3389/fpsyg.2012.00339.
- Rozin, Paul, and Edward B. Royzman. "Negativity Bias, Negativity Dominance, and Contagion." *Personality and Social Psychology Review* 5, no. 4 (2001): 296–320. https://doi.org/10.1207/S15327957PSPR0504_2.

20 We Lie to Be Socially Desirable

In social psychology, an attitude is how you feel about something. It's usually positive or negative. People form these attitudes through experiences. Perhaps the most important feature of attitudes is that they motivate thoughts, meaning they lead to behaviors. Although people cannot observe attitudes directly, they engage in behaviors that indicate their attitudes. As discussed in this lecture, the thinking behind engaging in those behaviors includes a bias that can lead to people being less truthful about their attitudes and behaviors: the social desirability bias.

The Social Desirability Bias

The social desirability bias is the tendency to tell people fibs and half-truths about our attitudes or behaviors so that we appear more socially desirable. The desirability part comes in when we think about the norms and rules of the communities we're a part of. Why do we want to be socially desirable? It stems from the deep biological need to associate with other members of our species and bond with them. As many social psychologists have said, we are social animals. Without the acceptance of our fellow members, we can end up ignored, banished, and excluded. Thus, we handle that fear by engaging in a little social smoothing program: We say that we do things in the same way that we think other people are doing them or believe things that we think everyone else believes.

A good example concerns the following yes/no question about voting behavior: I exercise my right to vote in every election. Why? Most people don't exercise their right to vote in every election. In recent decades, 20% more of the electorate voted in presidential elections than in midterm elections. Across the US, the average local election turnout tends to be around 15% to 27% of eligible voters. However, people say they vote in every election, as indicated in studies where such questions were asked. That's because it's desirable to say you engage in this ideal behavior.

Many of our attitudes, whether they align with our behaviors or not, are socially driven. Input from those around us helps shape our attitudes—especially input from people we like and respect, like our parents, teachers, and friends. We want to be liked and allowed to participate fully and without hindrance in public. Thus, we create attitudes that allow us to do that. We want to be able to have societal interactions with relative ease. To do that, we publicly proclaim attitudes that may not match our behaviors or actual attitudes. Maybe you are biased in the privacy of your own head or home, and that's okay. However, the bias becomes a problem when you want to

hear real attitudes from real people, especially on taboo or hard-to-discuss topics. That's when the bias becomes a smoke screen for actual behaviors and attitudes. For scientists who want to know how people think and behave, these real behaviors and attitudes are far more important than what's socially desirable.

On the surface, social desirability doesn't seem to cause much harm. We lie to ourselves and others all the time. Most of the time, there are few consequences to these little lies. There are many different reasons why your attitudes might not match your behaviors or the norms and expectations of your society. However, one place where social desirability bias becomes a real problem is in research. Surveyors and researchers ask you questions to get your actual attitudes or behaviors or both. It is potentially harmful to the research or outcomes when people fib in a socially desirable way.

For example, take the use of scheduled drugs—these are substances that the US government has deemed illicit with no medical value and, as a result, legally prohibited their use and possession. Attitudes toward these substances have slowly been shifting in recent years. Marijuana, up until only a couple of decades ago, was seen as a gateway drug to stronger substance abuse and was illegal in the US. After a series of legal decisions and laws enacted since the early 1990s, marijuana has been slowly decriminalized and allowed for medical use. In this past decade, in some states, it has been allowed for recreational use. However, people are still wary of talking about their own recreational marijuana use. It's still illegal at the federal level, and it's hard to know what that means for employment opportunities or medical benefits and care.

Imagine that a person who has mixed feelings about marijuana will be surveyed about their own use. Perhaps they partake occasionally. The researchers want to know how often. The respondent is scared, even under the assurance of confidentiality or anonymity, that their response will become public somehow. Because they want to be socially accepted, they answer that they don't partake at all. Now imagine more people with the same attitudes and behaviors answering the same survey questions in similar ways. When the researchers use these responses to quantify the rates of marijuana usage, they end up with a rate that's lower than the actual rate. If a survey is full of taboo or risqué topics, people don't necessarily want to be totally truthful. However, society needs accurate answers to make appropriate decisions, from research decisions on what to study next to policy decisions to address societal problems.

Cultural Norms

Sociologist Ivar Krumpal compiled several reasons, including gender, that people might be shy about various topics. For example, take a survey asking folks about their sexual activities, with questions related to the number of sexual partners they've had. In Western culture, there's a common belief that it's okay for a man to have many sexual partners while a woman should have few. The belief is tied to the traditional idea that women are to be child-bearers and homemakers. The paternity of children can be known only if the woman is monogamous. The cultural norms that have spawned over the centuries from these beliefs indicate how we, as a society, should feel about them. When asked a question about sexual partners, women might feel embarrassment or shame when thinking about their answers and—most importantly for the social desirability bias—feel guilty.

Why guilt? Society demands purity and chastity of women. Thus, when a woman fails to live up to those standards, guilt forms. That guilt might then change to shame. Ultimately, these respondents may not answer honestly depending on how these negative feelings meet up with their actual experience. As a result, the researcher asking these questions may not get an accurate representation of the average number of women's sexual partners for their research. The undercount or miscount of participation in taboo activities could lead to backfiring. In other words, the actual societal sentiment may be to dismantle the traditional ideas of sexual activities or to increase personal drug use if not harmful to others. However, the data doesn't show that. Thus, proponents of traditional ideas use that as evidence that public sentiment still backs traditional views.

Detecting Social Desirability Bias

In research situations, psychologists try to deflate the bias by creating a way for other researchers to exclude the biased responses from the more truthful responses. A famous questionnaire that can help detect social desirability bias is the Marlowe-Crowne Social Desirability Scale. This is a set of statements developed by Douglas Crowne and David Marlowe in 1960. The questionnaire consists of more than 30 statements meant to capture the sense of societal pressures and norms. For example, statements include "I like to gossip at times" and "When I don't know something, I don't at all mind admitting it." For each of these statements, the susceptibility to societal pressure is measured

in the form of a true or false response. Each statement is pre-marked with the response that's more socially desirable—or the response that a participant would give if they were more susceptible to social pressure.

Consider "I like to gossip at times." As a society, and especially in 1960, gossiping was seen as rude and tacky. Thus, this item is pre-marked as "false" by the researchers on the questionnaire. If a person answers "false," they might be lying to be more socially desirable. The other statement can also indicate susceptibility to social pressure: "When I don't know something, I don't at all mind admitting it" is marked as "true" in the key. Humans aren't good at detecting when they are wrong. Even when they know they're wrong, they may have trouble admitting it. Thus, the socially desirable answer is to suggest that you don't have this problem.

What do researchers do with these statements? Take the following example: Instead of asking participants to answer all statements in a survey, which weren't necessarily relevant to the research task, Alexander Swan chose several statements to embed within the main task. These questions looked similar enough to the other survey questions that they didn't seem out of place within the survey. This allowed him to exclude two or three participants from the study. Since they answered the questions in a socially desirable way, this made their other answers suspect. Instead of trying to get into the minds of anonymous humans, Swan easily excluded them from further data analysis.

In the case of taboo or difficult subjects, adding these items when the researcher is standing next to the participant can be helpful to weed out possible falsehoods. Researchers may sometimes use the full set of questions. They may sprinkle these questions between their other questions to hide the scale's true purpose. Crowne and Marlowe did this latter process when designing and testing their scale. They were curious, from a clinical psychological perspective, whether people were being truthful about their own personality traits when answering questions on the Minnesota Multiphasic Personality Inventory (MMPI). The MMPI is a large assessment that tries to get the fullest clinical picture of a person, including their personality. Researchers embedded questions that required people to agree or disagree with statements about their own traits, such as "I am … lazy, critical, open-minded, agreeable, and helpful." Crowne and Marlowe included both positive and negative traits in these statements.

The researchers wanted to know whether people answering these questions were being truthful about their negative traits. Their tests were successful at finding a strong correlation between desirable answers on their new scale and a lack of agreement for negative traits on the MMPI. Although this scale is generally good at detecting the bias, there was some debate about whether it was strong enough to detect differences in how people may lie to inflate themselves in public or how people lie to themselves about their own traits.

Psychologist Delroy Paulhus developed a newer social desirability bias scale in the 1980s to separate these two ideas. This scale reflects how the social desirability bias is not only a social bias but also an internal, attitude-based bias that manifests when we try to align our attitudes with our personal morality and values. The Balanced Inventory of Desirable Responding, developed by Paulhus, asks two different kinds of questions. It has 40 items, with an agreement scale from 1 to 7 for each. The first half of the scale measures self-deception qualities and behaviors, such as "I never regret my decisions." If you agree with that statement, it's entirely possible you may be deceiving yourself. Regret is completely normal and completely human. However, for some reason, there's a societal pressure to live life to the fullest and not regret anything.

The second half of the scale has items related to our social impression management. That's the way we try to control how we're perceived by others, either consciously or unconsciously. It plays a role in determining how we think and behave in public within the imaginary bounds of societal and cultural expectations. Statements that reflect our social impression management are items such as "I have never dropped litter on the street." The wording is pretty extreme—"never." It's hard to disagree with that one but also hard to agree with it. Several of the items are also worded in the negative direction, where it's a behavior that we will disagree with if we're under the influence of the bias. For example, "I have some pretty awful habits." If a respondent enters a 1 or 2, they're disagreeing with it. However, don't we all have some pretty bad habits? This kind of scale offers a glimpse of how the social desirability bias can change the way we answer attitude or behavior questions. We don't want to engage in these things that might cast us out of our society, culture, or immediate family and friend groups.

Reducing the Bias

How do you reduce this bias in your life? It depends on the circumstances. Say you're participating in research. If confidentiality and anonymity are assured, then be yourself, even if you don't necessarily think it's wise in a social situation. Your truthful response helps researchers gather accurate data about human behaviors and attitudes. If you're hesitant to tell the truth, consider this: You will be only one data point in a sea of data points. Your answer will be averaged with others just like you. Those data points combined give researchers and policymakers tools to change the world in ways that benefit everyone.

If you expand this bias to a new social situation, the "it depends" answer still stands. It depends on who you're with, what the attitude or behavior is, and what the consequences are. The vast majority of people have likely already internalized socially desirable responding. We mostly follow laws and regulations, we tend to not say things that would get us into trouble, and we are generally nice to others in public. This last situation has more to do with how much need you have for belonging and social capital. If your life is full of supportive others, you can be you. If you're looking for more social capital than you currently have, the bias might be somewhat helpful. However, you may need to walk back some of the bias as you get to know a new person in your life better.

Ultimately, understanding this bias is a critical means for you to know yourself best. Although it is important for responding to surveys, understanding this bias is more for you than for researchers or thought experiments. This kind of understanding is far more impactful for your growth because it's one of the easier biases to detect. Thinking about the ways it can impact your life can help you prepare for situations in which social desirability might appear. It can also help you think differently about your flaws and shortcomings and understand how impossible it is to live up to the socially desirable benchmarks that society has created. This work is time-consuming and ultimately a lifelong test of your attitudes and behaviors.

Reading

- Crowne, Douglas P., and David Marlowe. "A New Scale of Social Desirability Independent of Psychopathology." *Journal of Consulting Psychology* 24, no. 4 (1960): 349–354. https://doi.org/10.1037/h0047358.
- Krumpal, Ivar. "Determinants of Social Desirability Bias in Sensitive Surveys: A Literature Review." *Quality and Quantity* 47, no. 4 (2013): 2025–2047. https://doi.org/10.1007/s11135-011-9640-9.
- Paulhus, Delroy L. "Measurement and Control of Response Bias." In *Measures of Personality and Social Psychological Attitudes*, edited by J. P. Robinson, P. R. Shaver, and L. S. Wrightsman, 17–59. Cambridge, MA: Academic Press, 1991. https://doi.org/10.1016/b978-0-12-590241-0.50006-x.

21 Why Emotional Gaps Cause Trouble

The movie *Eternal Sunshine of the Spotless Mind* is about two people—Joel and Clementine—who meet, date, fall in and out of love, and attempt to erase their relationship from their minds. They employ a company that erases memories using a fancy machine. In fact, they go to such great lengths to erase each other from their memories that they ultimately drive themselves to engage in behaviors that bring them back together at the end of the film. This leads to the next bias you will learn about: the empathy gap.

The Empathy Gap

In *Eternal Sunshine of the Spotless Mind*, the other characters, including Joel's friends and the employees of the memory-erasing company, are antagonistic toward Joel and Clementine's relationship. Joel and Clementine cannot express to their friends how much they love each other in their own dysfunctional way. Meanwhile, the friends can't understand how madly in love this couple is, considering how poorly they treat each other and how different their personalities are. On Joel's side, this love ultimately leads him to do everything possible to not forget Clementine. At the end of the story, it becomes apparent that Clementine behaved similarly to not forget Joel.

As viewers of this story, it's entirely possible we see ourselves in Joel and Clementine. The movie's focus on emotions hooks us by conjuring similar emotions in us. However, there's also a thinking bias that separates you into either the Joel-Clementine group or the group of others who don't understand. This bias is called the empathy gap, or the empathy bias. It's the tendency to allow, in your own mind, a disconnection or reduction of empathy toward others in situations where empathy would be expected or typically felt.

Empathy is a complex psychological concept. It's your ability to recognize, understand, and explain that other people have their own thoughts and feelings that exist in their own minds, which are different from your own. We commonly refer to empathy as the ability to put ourselves into other people's shoes. However, even before we're able to do that, we need to recognize that other minds exist apart from our own. That's where the bias lives.

In the film, Joel and Clementine are thinking about their relationship as they have experienced it. Meanwhile, the other characters fail to recognize or understand why these two characters are thinking this way. The failure of Joel and Clementine's friends to understand their feelings is an example of the affective empathy gap. It's the part of the empathy gap that focuses on emotions. In this realm of the bias, people have a reduced understanding or recognition of someone else's emotions or emotional state; they may even lose that understanding altogether. Affective empathy bias also includes mental processes that attempt to estimate either your own or someone else's attitudes and preferences as well as subsequent behaviors that stem from emotions. Thus, it is both a personal bias about your emotions from now until a time in the future and a bias between your emotional state and another's emotional state.

This bias is about the fact that, in some circumstances, we don't get why people feel the way they feel. For example, you likely believe that you see the world objectively and accurately. The other part of this belief is that you assume other people have the same belief—albeit with the same biases—if you perceive them to be reasonable people. According to psychologist Leaf Van Boven and his colleagues, the past four decades of research in empathy and perspective-taking show that the empathy gap is less about the other person's thoughts and feelings and more about your lack of ability to perceive what your own thoughts and feelings would be in the same or similar situations. For example, if a policymaker is creating a zero-tolerance drug policy but has never consumed psychoactive drugs, they might underestimate—or overestimate—the effects of the drugs. This misestimation ignores the consequences of actual addiction and the attitudes, preferences, and behaviors of those whom this new policy or law would affect.

That's the heart of the bias: We make these errors about other people because we cannot fully perceive our own emotions and thoughts accurately in the moment or in some imagined future. We underestimate the strength of our own attitudes and preferences and what behaviors we would perform in various situations. This applies to situations that we'll have to engage in that we have not yet experienced.

Hot and Cold States

Emotions are broad. Consider George Loewenstein's description that groups emotions into two states: cold and hot. Cold states are when emotions are calm and quiet. We're generally in these states when feeling content, tired, or pensive. Hot states are when emotions are charged and running hot. We are in these states when we're feeling angry, joyful, or infatuated. Essentially, a person in a cold state will have difficulty understanding the feelings of a person in a hot state, and vice versa. It can also apply to a person's understanding of their own feelings, such as being in a cold state and being unable to think about what would happen if they shifted to a hot state. This is a directional bias because humans can go from one state to another.

When the empathy gap is defined as cold-hot, a person is attempting to think about moving from a current cold state to a hot state. In 2012, Van Boven and his colleagues asked college students to imagine themselves in a public

performance scenario. Some students read this scenario immediately before engaging in an aerobic exercise task. Others read through it immediately after completing the aerobic exercise. Then, all students were asked if they would be willing to do a dance to the song "Shake Your Booty" for $5 in front of a crowd of 20 to 30 other students for 2 minutes. The participants told the experimenters whether or not they would do it. Then, they estimated the lowest amount they'd do it for, even if they said no.

The researchers found that when students exercised first, the exercise boosted their confidence and momentarily reduced their anxiety; therefore, they were more likely to ignore the social anxiety inherent in an embarrassing situation. This is because during this short window, the two hot states matched. However, students who hadn't exercised were in a cold state and overestimated the hot state of anxiety and embarrassment. On the other side, the researchers concluded that those who had just finished exercising, assuming they were in a hot state, were feeling the illusion of courage when the scenario was merely hypothetical. They were underestimating how they would feel if they had to do the embarrassing dance after having not exercised.

Here's another example of a cold-hot empathy gap: People who gamble with hypothetical money are more likely to engage in riskier gambles than people who gamble with real money. Risk becomes irrelevant as a factor that would produce a hot state. We are unlikely to consider what the risky loss would mean or how it would make us feel if we make that bad bet. People who gamble with real money don't have that empathy gap between the cold state and hot state. The risk of losing real money causes great pain to many people. We don't underestimate our misery, the hot state, in this case.

When considering how this affects interactions between us and others, return to Joel in *Eternal Sunshine*. His friends are in the cold state—they aren't madly in love with Clementine, as Joel is. Joel is in the hot state. He can't stop thinking about Clementine because he is so deeply in love with her. In the film, Joel's friends are there to act as foils for how Joel is feeling. They can't understand, in their cold states, how Joel feels. They tell him to let her go, to go on with his life. Cleverly, these two friends of Joel have their own marital dissatisfaction, which leaves them colder still. Thus, they underestimate how Joel should act in what they perceive is a similar situation to theirs. Added to this cold state is that they no longer feel the same infatuation and passion they likely once had earlier in their own relationship. It's a classic cold-hot empathy gap between people.

The other variation, a hot-cold empathy gap, is the opposite but an equally likely source of empathy bias. Remember, this is a person who is in an emotionally hot state. They're trying—and failing—to think about either their own preferences, attitudes, or behaviors in a cold state or those of someone else in a cold state. Imagine you're famished. Consider this state of hunger uncomfortable and hot—you're ready to act upon it. Now, think about this question: If you had just finished a large meal, would you also eat a large piece of chocolate cake? If you're hungry, you might forget your eyes are larger than your stomach. You forget that you'd return to a cold state once you're full. The point in this example is that we aren't good judges of how we'll behave or want to behave in a future cold state when we're currently in a hot state.

What about in cases of empathy gaps between two people? An example could be someone excitedly wanting to buy a new car—the person in the hot state—and their partner feeling more cautious and less enthusiastic—the person in the cold state. For the person in the hot state, the cold state doesn't make much sense. Being in the hot state is also referred to as being in the heat of the moment.

The Empathy Gap Bias in Medicine

The empathy gap bias has critical implications in the field of medicine, where the heat of the moment can involve a life-and-death situation. People often seek medical help when they're in pain. That person is in a hot state due to their pain. The healthcare professional is not in pain and therefore is likely in a cold state. Although the medical provider likely has some empathy for the patient's pain, unless they're feeling the exact same pain, there's a gap there. In several cases, such as when there's a gender, race, or age difference, this gap widens because of stereotypes and prejudices.

Here's an example: According to the Prostate Cancer Foundation, if a man has been diagnosed with prostate cancer, there's a good chance he'll survive if the cancer is detected early. However, a cancer diagnosis would definitely put any cancer patient in a hot state. There are several treatment options for this cancer. Chemotherapy, radiation, or surgery to remove cancerous tumors are all common and successful. However, recent research suggests that surgery, which is the most invasive procedure, may not always be necessary. It might not even offer additional benefits over less invasive therapies. However, surgery does offer the fastest treatment outcome.

If a man were in the hot state of a fresh cancer diagnosis, he might feel inclined to take this option, despite the warnings of the risks of surgery from medical providers who are in cold states. Because we make our own medical decisions and doctors only offer advice, most men choose the surgery option, which carries more risk than some less invasive procedures or treatments. We cannot see past our own hot states. Whatever decisions we make or behaviors we exhibit in hot states do not translate to future cold states.

Take this idea and consider the intersection of age and medical decisions. More specifically, this concerns the incorrect belief among young people that they are invulnerable to many negative health consequences. Part of this thinking is rooted in the empathy gap bias. A recent example can be found in the early parts of the COVID-19 pandemic in 2020. Though experts weighed in, stating how easy it was to spread the virus through simple interactions, many young people decided to go ahead with their spring break plans. They were in a hot state. They couldn't think about the sobering new reality of a pandemic as well as how vulnerable they truly were in this situation.

Closing the Gap

How do we reduce the impact of this bias in our lives? In 2003, Van Boven and his colleagues investigated this question with an interesting experiment. Participants were randomly assigned to one of two roles: a buyer's agent or an owner of a commodity, such as a coffee mug. Owners were instructed to consider a base price that would make them willing to sell that mug to the buyer's agent. In a series of five rounds, the buyer's agent was instructed to offer a sale price. In each round, the owner could choose to keep the mug or sell it to the agent, who would give the mug to the experimenter and receive the sale price.

After the fifth round of negotiation, this buying session was brought to a close, and the decision between the buyer's agent and mug owner was complete. Then, there was an additional series of offers. The instructions for the owners and buyer's agents were the same. Importantly, either the same commodity from the first five rounds was used or a new commodity was used. After the tenth round, the market was closed, and the experimental session finished.

In the context of the empathy gap, the owner is in a cold state and the buyer's agent is in a hot state. The owner is under no obligation to give up the mug, while the buyer's agent is given specific instructions to purchase the mug. The results of this experiment show how the empathy gap can potentially be bridged. Overall, the buyer's agents were generally cheap with their money. In the first five rounds, they consistently offered the owner of the commodity only minimally more than the lowest selling price. When the second set of five rounds contained the same commodity, agents learned from this experience. They began to offer more to the owner because they had failed to successfully close the deal in the first five rounds. However, when the commodity switched to something new, the agents offered similarly low amounts to the owner.

The buyer's agents could not understand the mental states of the owners. Imagine if you were a buyer's agent who didn't acquire a mug because, in the first five rounds, you underestimated the owner. You didn't know what the lowest price they'd be willing to sell it for was. That's a gap in understanding. Not having something changes the way you think about that thing. This leaves you with a biased understanding of those who have the thing. Now, if you were a buyer who successfully bought a mug in the first set of five rounds, then in the second set of five rounds, you had a basis for future offers on another mug. The gap is bridged. The buyer's agent and the owner have a mutual understanding, which leads to higher offers. This even goes further: Having bought a mug as a buyer's agent predicted how much that person would be willing to sell the mug for if they switched roles to an owner.

What does this mean for bridging the gap in empathy? First, because empathy is a trait that is measurable, it can be practiced. This comes down to perspective-taking. Understanding where someone is coming from has the potential to clarify a situation and bring all parties to an agreement or consensus. Even in situations where the gap is simply you thinking about the future, it's helpful to explore and understand that states are fluid.

Psychologist Loran Nordgren conducted a large-scale study on bullying with college students acting as either bullies or victims. In one experiment, participants played an online ball-tossing game. In the middle of the game, some participants were excluded from participating. In other words, the computer was programmed to not toss the ball to the human player during this time. Instead of receiving the ball a third of the time among the three players, they received the ball only 10% of the time. When the game was over, participants were asked questions to evaluate how they would feel when other negative events occur. The researchers concluded that participants who weren't excluded didn't feel much negativity toward possible future negative events. However, those excluded felt these separate negative events were far worse.

The point here is that bullying and social exclusion not only impact how a person feels in the moment (bad) but also increase the negativity they associate with future or other negative events. Bullying others leads to difficulties for the bully, too, such as failing to adequately empathize with the people they bully. Participants who were excluded ultimately had a greater appreciation for the effects of exclusion. They indicated that it was

more distressing to experience that social pain than to think about negative feedback at the prompting of the experimenters. The experience of social pain was more enlightening about others' experiences of social pain than merely receiving negative but truthful information. Therefore, if we want to reduce the empathy gap bias, we must work to put ourselves in other people's shoes.

Reading

- Loewenstein, George. "Hot-Cold Empathy Gaps and Medical Decision Making." *Health Psychology* 24, no. 4 (2005): S49–S56. https://doi.org/10.1037/0278-6133.24.4.S49.
- Nordgren, Loran F., Kasia Banas, and Geoff MacDonald. "Empathy Gaps for Social Pain: Why People Underestimate the Pain of Social Suffering." *Journal of Personality and Social Psychology* 100, no. 1 (2011): 120–128. https://doi.org/10.1037/a0020938.
- Van Boven, Leaf, George Loewenstein, and David Dunning. "Mispredicting the Endowment Effect: Underestimation of Owners' Selling Prices by Buyer's Agents." *Journal of Economic Behavior and Organization* 51, no. 3 (2003): 351–365. https://doi.org/10.1016/S0167-2681(02)00150-6.
- Van Boven, Leaf, George Loewenstein, David Dunning, and Loran F. Nordgren. "Changing Places: A Dual Judgment Model of Empathy Gaps in Emotional Perspective Taking." In *Advances in Experimental Social Psychology*, edited by James M. Olson and Mark P. Zanna, 117–171. Amsterdam, Netherlands: Elsevier, 2013. https://doi.org/10.1016/B978-0-12-407188-9.00003-X.
- Van Boven, Leaf, George Lowenstein, Edward Welch, and David Dunning. "The Illusion of Courage in Self-Predictions: Mispredicting One's Own Behavior in Embarrassing Situations." *Journal of Behavioral Decision Making* 25, no. 1 (2012): 1–12. https://doi.org/10.1002/bdm.

22 Only Survivors Tell the Story

Consider this age-old question: Do cats always land on their feet? Believing this conveniently ignores one crucial aspect: Cats that land on their feet tend to live. You don't often think about the cats that are no longer here after the fall. As this lecture will show, this is because of a cognitive bias called survivorship bias. This is the tendency to focus on the people or objects that have moved past some defined selection process and to overlook those that did not make it past that selection process. This second part of the bias typically occurs because of the lack of visibility of the people or objects after the selection process.

Survivorship Bias

Survivorship bias isn't only about living or dying. You can define the term *selection* however you want—for example, "You're on my team, or you're on the other team." When we do that, we can spot the bias in several different areas, including business, medicine, history, construction, the military, and even evolutionary theory. In 2014, noted skeptic Michael Shermer described the three basic aspects of survivorship bias that allow it to run deep throughout our decision-making and thinking. First, when confronted with a selection process, people tend to ignore other outcomes of a situation. For instance, you might complain that your buttered toast lands on the floor the wrong side down all the time when it happens only occasionally.

Second, people are generally overly optimistic about what life has in store because we always observe the survivors of various selection criteria. If we focus only on the survivors of the selection process, everything seems like sunshine and rainbows. If we focused on those that didn't survive the many selection processes that people face every day, we might start to feel that life isn't worth living. Third, most of the time, people aren't good at making judgments that are based on probabilities or likelihoods. We don't like to think about the odds that something bad will happen.

There are plenty of examples of survivorship bias in everyday life. For instance, we are constantly bombarded by news of how the stock market is doing each day. If you want to dig deeper into how the stock market works, you're met with an overwhelming amount of performance metrics so that you can make an informed decision on how to invest your money. The problem in the business world is that these metrics rarely include businesses and funds that fold, or close. The metrics that are used in making fund or stock decisions include only surviving businesses or funds in a particular industry. Once a stock drops out of the stock indices, we don't think about it anymore.

In 1996, finance researcher Edwin Elton and his colleagues were interested in determining how mutual fund mergers—where a fund folds into another, larger fund—led to survivorship bias in market fluctuations. The researchers measured how much each mutual fund merger would lead to survivorship bias. They concluded that funds that get folded into others aren't winners,

and those that don't get subsumed survive the market. The bias comes in when people make decisions on metrics and analytics that do not account for the true market performance of the funds. If investors don't have true performance, they could be gambling their money into future losses instead of future gains.

The bias is embedded in these metrics because companies that acquire other failing companies through mergers are included but the company that failed is not. Thus, it looks like the company that subsumed the failing one did well. The underlying logic is that if you don't accurately account for the experience of those that don't "survive," then you're not getting the full picture of the experience. This could be detrimental to decisions and outcomes. Are the ones that survive better because they survived, or are they worse because they may only be barely surviving? In the case of the stock market, it's hard to tell.

Survivorship Bias in Medicine

Broadly, we're often told about the miracles of modern medicine. However, what's often overlooked is how long it has taken to achieve such wonderful miracles and that many people died before these modern medical advances started to improve or save lives. The wildest example of a treatment many people thought would work that ultimately didn't is the use of radon, a radioactive gas, to shrink cancerous tumors. In the early 1900s, a hot spring in the Czech Republic fueled a spa treatment for the ages. This spring was special because it was naturally irradiated with radon. Patrons of the spa breathed in radon constantly. Some dubious studies around this time suggested that radon would improve tumors. The problem with this conclusion is that radon was breathed in and not directly applied to the place in the body where the cancer was. Researchers know now that radon is a leading cause of lung cancer due to its active radiation, hence the need for mitigation in people's homes. However, anecdotes of people feeling rejuvenated fueled further patronage of the spa. This is where the trouble of survivorship bias comes in. When early treatments are viewed as viable using cherry-picked data, everyone who attempted such treatments and didn't ultimately get better—or, worse, died—is ignored.

Belief in this kind of anecdotal evidence, in general, may have contributed to the large industry of homeopathy, which studies have frequently found to be pseudoscientific. In fact, in 2005, the British medical journal *The Lancet* published a meta-analysis of 110 studies where the researchers used placebos to test against the treatments found in homeopathy and an additional 110 studies using matched clinical trials, which are often used to assess cancer treatments. The researchers concluded that "the clinical effects of homeopathy are placebo effects." Homeopathy is a belief that trace amounts of a substance that causes a disease should be able to cure it, too. However, these substances are generally biochemically inert in your body. That is, they don't interact with your body or even with the biological cause of your illness.

In fact, the creation of homeopathic treatments takes the idea of trace amounts to a whole new level through a process of dilution. In dilution, you have a set amount of a substance and continue to add water in larger and larger volumes such that the concentration of the substance decreases. At the end of the dilution process, the new homeopathic treatment is indistinguishable chemically from the dilutant. Many times, water is the treatment in homeopathy. Some practitioners even go as far as to say that water has memory and remembers the substance that was then diluted. You're probably familiar with these products, as they adorn the shelves of major drugstores and pharmacies. It's clear that there is survivorship bias in how these products are perceived to work and, ultimately, how they're marketed.

The science is clear about the dilution practice, according to Edzard Ernst. In 2005, he concluded that such dilutions exceed Avogadro's number, which potentially leaves the substance absent from the final treatment. The effects indicated on labels or through these anecdotes are no different from placebos. This means that researchers gave some people a sugar pill or salt water and looked at how their illness responded compared to others who received the homeopathic treatment. Second, we hear only about the successes. Rarely do people say homeopathic treatments didn't work for them. We're quick to say modern medicine hasn't worked for us but not so much about these other treatments.

Why do people keep using them, thinking they're great? It's likely a combination of survivorship bias in the recommendation and the placebo effect. That's when you think something has been effective because you believed it would be effective. It's the main reason why some people, even in controlled clinical trials, feel better after taking a homeopathic treatment. We believe it will work; thus, we perhaps feel better. Again, we're forgetting about all the people who tried it and never went back because it didn't work and the people who didn't survive.

Survivorship Bias in Other Fields

Any historical story you hear about is the story of the survivors. Thus, much of the history you're familiar with is biased. As the saying goes, history is written by the victors. Western historians often claim that ancient Mesopotamia is one of the first civilizations anywhere in the world, but how many fits and starts did humans have before that one took hold?

What about a more practical aspect of life, such as construction and manufacturing? Survivorship bias can exist there, too. Think of your car. There is a pervasive rumor from certain car salespeople that certain other carmakers built failure points into their cars to force the general public to buy cars more frequently. These sales folks point to how their cars last for hundreds of thousands of miles on the original factory engine with simple annual maintenance. That last part is the most crucial. It's not about the longevity of the car itself but the work that's put into keeping it in good condition. This fallacy ignores the reasons why your car might fail or break, such as failing to do routine maintenance.

Though we may think of old buildings as standing the test of time, we often forget how much repair and maintenance go into keeping them going. Some buildings and machines are in a constant state of repair, and the reasons vary. That old building built in the early 20th century likely needs to be retrofitted with fire sprinklers. Or maybe it's in an earthquake-prone area and needs some roller retrofitting so that it can roll with an earthquake and not shake and crumble. However, people don't see these changes, and the perception becomes something like "they don't make them the way they used to." To some extent, this statement is true. However, it ignores all the changes that these buildings and machines go through. There's a false comparison of old things to new things because we forget about all the old things that failed along the way.

One of the most consequential examples of survivorship bias can be found in military history. When air combat was in its infancy, engineers had to grapple with an important problem: how to design airplanes that could withstand the massive demands of dogfighting and return, along with their pilots, in one piece. First, what did planes look like when they returned home safely? They'd have bullet holes in non-crucial places on the main wings, the main fuselage, and the tail wing. On the wings, the damage would be toward the edges and the connection with the main fuselage. The fuselage would have bullet holes between the cockpit and the rear gunner station. The tail wing would have some damage but not concentrated damage.

The military high command in the US saw this pattern of bullet holes and argued that they should strengthen these areas by adding more armor. However, remember that the planes that returned were the survivors. In 1943, statistician Abraham Wald, working with the US military, disagreed with the generals. Wald argued that planes getting hit in other areas were the ones that weren't coming back. Hitting the engine, the cockpit, or the load-bearing sections of the wings caused the planes to either explode or break apart and fall to the ground. These were the areas that needed more armor because if they were strengthened, more planes that sustained damage in those areas would return home. He was right. Eventually, the higher-ups in the US Navy agreed to follow this plan, and they strengthened the parts not damaged on the returning planes. Thus, more pilots were able to bring their planes back to the aircraft carriers in the middle of the ocean.

We see a similar situation with the seat belts in our cars. Seat belts don't do much on a day-to-day basis. That's because they are only needed to prevent you from getting launched out of your seat in a collision. You could think to yourself that you don't need a seat belt because you don't get into accidents. However, consider the survivorship bias the next time you're tempted to not bother to click that seat belt into place. This applies to motorcycle helmets, too.

Survivorship Bias in Evolution

In evolutionary theory, researchers usually talk about survivors and non-survivors. The common refrain is that evolution is the survival of the fittest. These survivors, passing on small changes over generations, are how we have the species of all living things that exist today. Although this definition is simplistic, it has features that make sense. Evolution is a slow process, working on an organism, its descendants, and so on. However, when you group organisms together in large, diverse groups, called clades, this simple process no longer makes sense. Clades that exist over long periods of time are doing their evolutionary thing, but survivorship bias can creep in when an extinction-level event occurs. This is because these clades seem to diversify quickly after the extinction event but then slow as time goes on.

Take the dinosaurs as an example. Many different species of what paleontologists group into the broad category of dinosaurs were differentiating and evolving over the course of several hundred million years. Then, a giant asteroid struck Earth, leading to the extinction of many of these species. According to one theory, the animals that tended to survive this asteroid were smaller animals, such as small dinosaurs or small mammals. These small animals found more freedom to roam the earth after the asteroid strike. Meanwhile, larger animals struggled with the change in the environment and atmosphere. The small ones, mammals in particular, increased their diversification in a relatively short period of time.

In other words, this idea suggests that the asteroid and its aftermath caused the massive explosion of mammals. However, that explanation is a fallacy rooted in survivorship bias. In fact, in 2018, paleontologist Graham Budd

and statistician Richard Mann explained through existing fossil records that mammals were already differentiating and diversifying at a steady pace prior to the asteroid extinction event. Many mammals died in the aftermath of the asteroid's impact. The extinction of the dinosaurs didn't lead to a massive expansion of mammals but rather a temporary reduction from a high baseline and then a continuation of the expansion and diversification that had already been underway before the asteroid. It's true that because the mammals were smaller, they had more opportunities to expand and diversify in the new environment. The larger dinos weren't there to eat them, so they could procreate and continue to evolve, so it looks like there was an explosion of mammals. But survivorship bias has blinded us to the fact that this was also happening before the asteroid strike.

Reducing the Impact of This Bias

There's plenty of survivorship bias in our lives. It's not surprising when you think about it in terms of life and death—we rarely make decisions based on what we can't sense or imagine. Those departed from our world don't get a second thought. How do we reduce the impact of this pervasive bias in our lives?

The best strategy is to consider the successes, or survivors, and the failures, or non-survivors. The past is filled with both. Knowing that will help you with future decisions. What is the difference between survivors and non-survivors? What is the selection process that puts you in one group instead of the other? When you have determined that, what does that mean for your future behaviors? Survivorship bias reduction is primarily built on asking questions to get to the truth behind survival assumptions. Ask yourself: What is the selection process, and how do I end up on the side of the survivors? Note that just because you beat the selection process in some area of life now, this by no means guarantees your future survival or that you'll come out on the winning side of other selection processes. Forgetting this advice could lead you to feel overly optimistic about your decisions. Remembering it, however, reduces your risk.

Reading

- Adams, Cecil. "Do Cats Always Land Unharmed on Their Feet, No Matter How Far They Fall?" *The Straight Dope*, July 19, 1996. https://www.straightdope.com/21342281/do-cats-always-land-unharmed-on-their-feet-no-matter-how-far-they-fall.
- Budd, Graham E., and Richard P. Mann. "History Is Written by the Victors: The Effect of the Push of the Past on the Fossil Record." *Evolution* 72, no. 11 (2018): 2276–2291. https://doi.org/10.1111/evo.13593.
- Elton, Edwin J., Martin J. Gruber, and Christopher R. Blake. "Survivorship Bias and Mutual Fund Performance." *The Review of Financial Studies* 9, no. 4 (1996): 1097–1120. https://doi.org/10.1093/rfs/9.4.1097.
- Ernst, Edzard. "Is Homeopathy a Clinically Valuable Approach?" *Trends in Pharmacological Sciences* 26, no. 11 (2005): 547–548. https://doi.org/10.1016/j.tips.2005.09.003.
- Shang, Aijing, Karin Huwiler-Müntener, Linda Nartney, Stephan Dörig, Jonathan A. C. Sterne, Daniel Pewsner, and Matthias Egger. "Are the Clinical Effects of Homoeopathy Placebo Effects? Comparative Study of Placebo-Controlled Trials of Homoeopathy and Allopathy." *The Lancet* 366 (2005): 726–732. https://doi.org/10.1016/S0140-6736(05)67177-2.
- Shermer, Michael. "How the Survivor Bias Distorts Reality." *Scientific American*, September 1, 2014. https://www.scientificamerican.com/article/how-the-survivor-bias-distorts-reality/.
- Wald, Abraham. "A Method of Estimating Plane Vulnerability Based on Damage of Survivors." Statistical Research Group, Columbia University. Alexandria, VA: Center for Naval Analyses, 1943.

23

Reactance: You Can't Watch This Lecture!

This lecture focuses on perceived freedoms. Have you ever been told not to do something, but did it anyway? Think about *Romeo and Juliet*. Two families are feuding in medieval Italy. It would be sacrilege for anyone to interact with a member of the other family, let alone fall in love with them. Yet Romeo and Juliet, the beloved children of these warring families, do exactly that. Throughout the play, Shakespeare repeatedly weaves in characters who tell these two that their love and their journey is not a good idea. Why do these two characters continue to defy these knowledgeable others?

Reactance Bias

The explanation for the desire to go through with contested plans or behaviors rests in a bias called reactance. It's also a motivational state because it causes us to act. The reactance bias is the tendency to act in ways that are opposite to the rules and regulations that are in place. Thus, this bias appears when you are explicitly told not to do something that you think you should be able and allowed to do. Often, you see it in situations similar to Romeo and Juliet's: A parent tells their teenager that they're not allowed to date that other person. Teenagers experience massive tumult in their adolescence, exploring their expanding freedoms and sense of independence. Thus, what does the teenager do? Sneak out of the house after the parents are asleep.

The name *reactance bias* was coined in the 1960s by psychologist Jack Brehm. He was curious about the motivational aspect of the bias—the arousal that begins to increase when a person is told they are not allowed to do something. To make the idea clearer, give arousal an emotional label. If you imagine your freedoms being taken away, anger is a good emotion to attach to the arousal. Brehm found that his participants were just as likely to be as aroused—angered—whether the freedoms that were taken away were real or perceived. The last word is incredibly important in social psychology and a social bias like reactance.

Real things happen to us in social situations, and we have thoughts and behaviors that can be inferred or observed by others. However, we can also imagine situations that could have happened or might happen in the future. That's where the "perceived" part comes in. Researchers asked participants to think about how they would feel in a hypothetical situation to see if there's a difference between the real and imagined situations. In the case of reactance bias, it's clear that we engage this bias even when the removal of freedoms is hypothetical. Because reactance bias can affect us in both real and hypothetical situations, it's an incredibly powerful motivational tool that spurs us to act. When we act, those behaviors are in service of regaining what we lost because we think the freedom that was lost was ours to begin with.

Health Messaging

Communication researchers James Dillard and Lijiang Shen investigated health messaging and the resultant attitudes among college students in 2005. They used two behaviors, dental flossing and alcohol drinking, for their messaging research. These are common health messaging topics and behaviors that would be relevant to the students. In this research, the participants were shown either messages related to a private behavior, flossing, or a behavior that's often done in public, drinking alcohol. The health messages advocated increasing flossing and decreasing alcohol consumption.

The researchers framed the messages by relying on fear appeals. Fear appeals are designed to invoke fear of negative consequences. For example, the messaging around flossing included images of gums with gum disease or gingivitis with messages saying that this could be prevented if only you flossed at least once a day. The researchers manipulated the wording of the messages so that the threat to freedom—and hence the potential for reactance—was either high or low. For example, the high threat to freedom contained language such as "any sensible person" and "only a fool." The low-threat messages invoked another social psychology technique that leads us to act with the rest of the group: conformity. These messages contained language such as "and most people would agree that flossing is worthy of serious consideration." There was plenty of hedging, too. Words such as *might*, *perhaps*, and *may* give a person an out to behave as they please because it's merely a suggestion.

Perhaps unsurprisingly, the data suggested that college students who evaluated the "high threat to freedom" health messaging were less inclined to participate in the behavior asked for in the messaging. This was compared to the relatively decent buy-in to the messages that were low reactance threats because they were perceived as suggestions—no threat to freedoms, real or perceived. The final thing the researchers measured had to do with attitudes. What would your attitude toward flossing be if subjected to a high threat to freedom? Attitudes toward the two behaviors, flossing and cutting down on drinking, shifted downward significantly.

In another study, communication researcher Claude Miller and his colleagues explored how the language used in messaging plays a role in whether reactance appears in the target audience. They also wanted to see what happened to the bias when freedom was given back to the person. In the reactance group, they used words such as *should*, *ought*, and *must*—words that compel you to do something. In the control group, where reactance should be minimal, they used words such as *could*, *can*, and *may*. Researchers asked participants to rate how much they felt the messages "threatened their freedom to choose" or whether the messages "tried to make a decision for me." This was a key measure to determine how reactance might occur when reading health messages. They also asked participants to rate how angry the message made them feel.

Another important measure was whether the message contained concrete actions, which were immediately doable by the message target, or abstract actions, in which there were no actionable items in the message. For example, as a concrete message, the researchers gave the participants this: "Basketball requires dribbling, passing, and shooting skills." When introducing an abstract message, the example stated: "Basketball requires an assortment of athletic skills." The difference is in the vagueness of the abstract statement. What athletic skills are they talking about?

First, the researchers found that reactance to the various messages was higher in the reactance group. However, they also found that when freedoms were restored, more positivity toward the message followed. Though reactance is an immediate negative reaction that people show because of real or imagined removal of freedoms by way of controlling language, it can be assuaged rather quickly if a restoration of freedom is made immediately after. What would that restoration of freedom look like? It would be like Romeo and Juliet being allowed to have a relationship because their parents shrug and say, "Never mind about what we said before. Go ahead and date. We don't care."

Second, the researchers in the messaging study found that health messages are most useful and positively received when concrete language is used. This has a sobering effect on and mitigates reactance because at least the message is clear. This is likely due to the way the message is often framed. A positive health promotion message that is focused on what you would gain from a health behavior might work in an abstract way: "Flossing can improve your gum and body health, so you should floss." Thus, you might think, "Okay,

flossing can improve my health—can you tell me how?" At that point, more concrete information is necessary. However, if a message is framed in a negative, preventative sort of way, this abstract approach doesn't seem to work: "Floss or die, your choice!" In this case, concrete messages work better: "Flossing removes the plaque and tartar in the hard-to-reach places in your mouth, so you ought to prevent gum disease by getting rid of this junk!"

Compliance

One principle in social influence—getting people to do what we want them to do—is called compliance. Compliance comes in many forms, from what the government asks or compels you to do to simple social interactions between individuals. One strategy in compliance syncs well with reactance bias. It's colloquially referred to as reverse psychology. Essentially, reverse psychology is the technique to get someone to do or say something by saying that you don't want them to do or say it.

Remember the question "What if Romeo and Juliet's parents didn't care that they wanted to be lovers? Would the couple stay together?" This tactic might be a way to get compliance from their children and maintain the status quo of hatred toward the other family. That's an example of the removal of the freedom barrier from the work done by Miller and colleagues. Once the barrier is removed, reactance tends to dissipate. If reactance was fueling the desire, maybe that desire dissipates, too. Interestingly, this is why love affairs that cause the breakup of other existing relationships often don't last long—the barriers that led to the affair are no longer present.

Importantly, compliance techniques work best when the target—in this case, someone displaying reactance bias—is unaware that they are the target. For example, if you loudly proclaim that you're against some behavior and then have an immediate change of heart, your target will suspect that something's up. Make sure your use of reverse psychology is subtle. However, the use of reverse psychology can backfire if used on children and teens. John Gottman, a researcher in parenting, argues that it isn't a good strategy in the long term because it can lead to greater reactance from the child and can sow distrust between parent and child. The child might perceive that you're trying to manipulate them.

What if you tend to behave this way? First, there's a way you can determine how reactive you are. The Hong Psychological Reactance Scale is a questionnaire that is useful for determining how much reactance bias you might have in broad, general situations. Respondents answer on a 5-point agreement scale. The measure includes statements such as "I become frustrated when I am unable to make free and independent decisions." These statements concern any situations that might conceivably contain restrictions to perceived freedoms. It's sometimes useful to know how much of a trait you have. Once you have that knowledge, the real work of reducing this bias in your life begins.

First, you might want to take a look at what you perceive as freedoms in your life. Is it a freedom, or is it a privilege or an allowance? It's perfectly valid to conflate these things in your mind. However, note that just because you might think something is a freedom doesn't necessarily mean it is. Second, this is one of those biases that operates mostly in the dark recesses of your subconscious. Most of the time, you won't recognize your reactance until either someone specifically calls it out or you catch on to some reverse psychology attempt.

Reducing the Impact of the Bias

What are some strategies to mitigate reactance? First, remember that many freedoms are social contracts and constructs. That means humans created them to maintain order and harmony from a certain perspective. As members of society, we all agree, in some unstated contractual way, to act within these limits. Sometimes, we do things that others don't like and realize that our actions violate this contract.

For example, when cigarettes were found to cause cancer, the social contract regarding smoking cigarettes began to shift to restrict their consumption. As time went on, secondhand smoke was deemed incredibly harmful, and further restrictions were engineered. However, if you were a smoker during these shifts in the social contract, you may have felt as though you were being attacked and punished for your behavior. This may have led to protest behavior, such as smoking outside but right in front of the door. You can lessen your own reactance by understanding that our social contract with others and the limitations we as a society put in place are constantly changing. The social pressure from an orderly contract is incredibly powerful. Understanding the place this comes from can give you a good start to reducing reactance's hold on your immediate, biased reaction.

Another strategy that reduces reactance bias is reflecting on which "freedoms" are freedoms and what makes sense to prolong your life and the lives of those around you. Ask yourself whether the limitation is worth resisting. For example, in 1984, when the first seat belt use law went into effect in New York, many drivers were in an uproar about this new imposition. There was plenty of reactance bias. The state of New York couldn't exactly use reverse psychology here because that would probably have made a bad situation worse. Ultimately, the population of the state, and eventually the country, understood that seat belts were the better option—even mandating that seat belts have a chest strap in all cars.

Remember, sometimes, reactance bias can lead you to resist things that aren't worth the effort of resisting. While it may not be wise to give in to everything, you should consider the effort that reactance sometimes requires. Reactance is a bias that can also reflect resistance to change. If you consider that reactance to restrictions on freedom can be characterized as an unwillingness to change the current state of things, you start to see that reactance is an immediate emotional and biased reaction that can impact how we engage with change.

Reading

- Brehm, Jack W. *A Theory of Psychological Reactance*. Cambridge, MA: Academic Press, 1966.
- Dillard, James Price, and Lijiang Shen. "On the Nature of Reactance and Its Role in Persuasive Health Communication." *Communication Monographs* 72, no. 2 (2005): 144–168. https://doi.org/10.1080/03637750500111815.
- Gottman, John, and Joan DeClaire. *The Heart of Parenting: Raising an Emotionally Intelligent Child*. New York: Simon and Schuster, 1997.
- Hong, Sung-Mook, and Salvatora Faedda. "Refinement of the Hong Psychological Reactance Scale." *Educational and Psychological Measurement* 56, no. 1 (1996): 173–182. https://doi.org/10.1177/0013164496056001014.
- Miller, Claude H., Lindsay T. Lane, Leslie M. Deatrick, Alice M. Young, and Kimberly A. Potts. "Psychological Reactance and Promotional Health Messages: The Effects of Controlling Language, Lexical Concreteness, and the Restoration of Freedom." *Human Communication Research* 33, no. 2 (2007): 219–240. https://doi.org/10.1111/j.1468-2958.2007.00297.x.

24

Status Quo: The More Things Change ...

This lecture is all about superstitions. If you knock on wood for luck or avoid walking under open ladders, then you have superstitions. Superstitions are best described as illusory correlations, or things you think are connected but actually have nothing to do with each other. You engage in these behaviors because you have a belief that the behavior or even rituals of multiple behaviors in a prescribed order will have some impact on future outcomes, near or far. They're tied to good fortune and a desire to avoid bad luck.

The Illusion of Control

Why do we cling to superstitious beliefs and rituals? It's because of a pernicious bias that feeds not only superstitions but also many other biases and behaviors: the status quo bias. This is the tendency to prefer the current state of affairs in your life and in the world around you. Superstitious behaviors and beliefs are representative of a false belief that we have about nature: that we can control it ourselves. In psychology, this false belief is called the illusion of control.

Psychologist Ellen Langer explored this illusion in 1975. Over several experiments, she manipulated a series of situations so that participants felt one of two ways: as though they had control or had little to no control. The experiments were based on the lottery. Langer measured how confident participants felt in each situation. More importantly, she found that when participants felt confident, they believed that their chances of success were inappropriately high—significantly higher than what the objective chances would indicate mathematically. She defined the illusion of control as the false belief that we can influence things over which we have absolutely no control. She suggested that confidence in such outcomes is unwarranted and overestimated.

The illusion of control is a good description of how many of our cognitive and social biases continue to affect our behavior, even when we think we have a handle on them. It also allows them to work, unimpeded by deliberate, logical counterthoughts. We think, erroneously, that we can control things without direct manipulation. For example, confirmation bias has plenty of influence over our illusion of control. Is the rabbit's foot lucky, or do you only remember when you had it with you and you were successful? Perhaps it's present when we try to remember things of importance but ultimately fall victim to source monitoring errors, leading to issues such as cryptomnesia. Or maybe we're grappling with the bias of false memories—remembering something that you swear you experienced even though it was unintentionally implanted by others without your direct knowledge.

Perhaps we fall prey to the lack of emotional information in those memories. This leaves us with the emotional peaks and the end of the experience, as with the peak-end rule. Maybe it is potentially a worse memory error with a malicious bent, such as the misinformation effect. Here, postevent information is intentionally misleading us to change the way we remember events. The illusion of control tells us we are the masters of our cognitions, memories, and emotions.

The illusion of control can even pop up in social situations, influencing our social cognitive biases. Think how survivorship bias causes us to ignore the casualties of past events because we think our memories are unbiased records of the past. Perhaps fundamental attribution errors or stereotypes perpetuate in our minds because we think we can maintain control of other people simply by how we describe them. Perhaps the strongest illusion of control we have when interacting with others is the empathy gap. Many of us think we can understand the perspectives of others, but at the end of the day, it's all an illusion.

Don't feel bad if you can't or won't take the effort to change—that in and of itself is the status quo bias at work. Changing may cause enormous amounts of anxious thoughts and feelings, which are unpleasant. Some people have a greater need for control in their lives than others, so the illusion of control varies on an individual basis. For example, a person with a high need for control will also have a stronger illusion of control. Because the need likely stems farther out into actual and imagined space, the illusion has to be much larger.

The Status Quo Bias

Recall that the status quo bias is the tendency to prefer the current state of affairs to any kind of change, both internally (within each of us) and externally (out in the world). Here's how it works: Wherever you are—cognitively, emotionally, behaviorally—is your set point. Any deviation from that current state represents a loss. Even if your psychological state improves, this bias still considers it a loss because it is a different state from your set point. Humans do not like change and do not like to change. We see this broadly in all aspects of our lives. We are anxious about how long and how much is needed to create change at both personal and societal levels. It's honestly stressful to think about, and many times, this leads to more anxiety or depression.

The status quo bias was coined by economists William Samuelson and Richard Zeckhauser in 1988. They explored one key aspect of the bias: We don't want to overextend our psychological commitment. We have to think about how much mental energy—effort—is required to go through the change we're confronted with. In one of the researchers' experiments, participants made a financial decision regarding investments. The researchers asked participants to imagine themselves as avid readers of financial information who nonetheless never had funds to invest in markets. Then, the participants were randomly assigned to one of two groups that were given additional information about an inheritance from a distant great-uncle. For the measurement, participants were given a choice to invest in a moderate-risk company, a high-risk company, treasury bonds, or municipal bonds.

In the control group, participants were told that the inheritance was a large sum of money from their uncle's estate. In the status quo bias group, the inheritance was an existing portfolio that was already invested in the stock market. The status quo investment was in the moderate-risk company. The researchers in this case were interested in whether people choose to retain the current investment or change it to one of the other choices. This meant that participants in the status quo bias group were already put in an investment position rather than being able to do whatever they wanted from the start, like the participants in the control group. Does the participant stick with what is already the case or decide to change it?

The researchers found that when participants were given a status quo option and offered alternatives, they tended to stick with the status quo option. When the researchers asked follow-up questions and offered expanded options for investments, going from two alternatives to three and then four, even more participants in the status quo bias group decided to keep their initial investment as their alternatives increased. You may have heard this referred to as being paralyzed by indecision. This is what essentially happened in this case. However, here, there was something preexisting that the participant could stick with when the paralysis set in.

In this example, participants who were given the inheritance with an investment already in place decided to keep that investment more often than not. We don't know whether these participants were paralyzed by choice, as that wasn't measured. However, the resulting decision to stick with the status quo—especially when the decision is related to investments, a form of gambling—shows us that when faced with alternatives that come with uncertainty, it is simply easier to avoid making a new decision or a decision to change. Relatedly, the status quo bias also causes us to want to avoid regret and losses. These things lead to bad feelings, and we don't want to have bad feelings. You can imagine, though it wasn't measured, that participants in the study may have felt that this scenario of investing could potentially lead to the loss of their great-uncle's hard work.

The Bias in Contract Law

Another part of life where the status quo bias appears is in the legal system—specifically when we make contracts with others. In 1998, law professor Russell Korobkin examined how contract law perpetuates the status quo bias. The idea is simple: When you make a contract, you have at least two parties agreeing that one of the parties will do work in exchange for something of value given by the other party. Contingencies for all sorts of possible issues are built into these contracts. However, no contract can capture all possible things that could happen over the life of the contract. There are some basic rules that should be put in contracts. When there are these default rules—background rules that try to govern all private contracts—you end up with a situation rife with the status quo bias. Why? Because it's so easy to fall back to the default. The default exists to maintain the status quo.

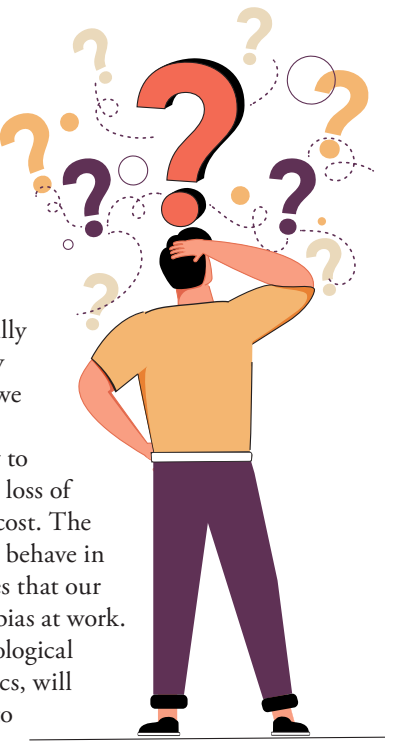
The participants in Korobkin's study were law students. Each participant was given one of three slightly different scenarios to assess. The participant acted as a lawyer for a freight service in a contract negotiation with a mail-order gift company to whom they'd be offering shipping services. Each of these scenarios featured a different default term that the contract relied on. The participants were informed of the range of economic benefits as well as possible risks that could result from pursuing various custom contract provisions that were different from the default rules governing the two contracting parties in similar situations.

Consistently, even when the default rules were different and impacted the financial interests of the shipping company differently, it didn't significantly alter the frequency with which students recommended pursuing custom rules versus how often they recommended sticking with the default rule. In other words, there was at least some incentive for the students to favor the default rule simply because it was the default rule, regardless of its benefit to the shipping client. These results have similarities with the previous example of the study involving investing decisions after an inheritance: If there is an existing status quo, people will tend to make decisions using that starting point.

The results also showed that participants used these default contract terms to create their legal arguments. It seemed that these students used the idiom "why reinvent the wheel" when crafting these new contracts if given information about previous contract details. This point has broader implications for the status quo bias. Since we can't know every contingency, the idea of default rules allows us to rest significantly on the status quo. Doing so reduces the negative feelings we might have if we encounter an unexpected event after a contract is signed.

The Bias in Blame Avoidance

A third way the status quo bias leads us to prefer the current state of affairs is that we don't want to be blamed for negative outcomes—or, even worse, have to pay for the change. What's the best psychological trick to prevent that? Stick with what's currently working.



Psychologists Daniel Kahneman and Amos Tversky studied this feature of status quo bias in 1991. In the previous decade, they had created a comprehensive theory surrounding choices called cumulative prospect theory. The theory claimed that people are generally against losing what is already theirs. Many biases generally fall back on the idea that we need to prevent risk and losses in our lives and decisions. How does this theory apply to the status quo bias? It simply means that a loss of any kind—especially our own lives—is a cost. The cost of changing our minds or deciding to behave in a different way is a loss. The theory implies that our aversion to losing things is the status quo bias at work. Put broadly, we end up in a state of psychological inertia that, according to the laws of physics, will require some outside force acting upon it to get us out of that inertia.

The status quo bias can be a rational choice. A rational choice in cognitive psychology is simply making a judgment, decision, or behavior that serves our goals. Sometimes, the bias stops you from changing because it is in your best interest not to change. You do not have to change your ways. Nobody will force you to do so if you do not want to. You may have to deal with future consequences, both positive and negative, but change is not required.

Now that you understand how many biases work—their causes, their influence in many facets of life, their outcomes—where do you want to go from here? You can ultimately choose to stick with the status quo, or you can make a cognitive change. It could even be a small step here or there, a daily acknowledgment of when you spot a bias.

Reading

- Allan, Lorraine G., and Herbert M. Jenkins. "The Judgment of Contingency and the Nature of the Response Alternatives." *Canadian Journal of Psychology / Revue Canadienne de Psychologie* 34, no. 1 (1980): 1–11. https://doi.org/10.1037/h0081013.
- Kahneman, Daniel, Jack L. Knetsch, and Richard H. Thaler. "Anomalies: The Endowment Effect, Loss Aversion, and Status Quo Bias." *Journal of Economic Perspectives* 5, no. 1 (1991): 193–206. https://doi.org/10.1257/jep.5.1.193.
- Korobkin, Russell B. "The Status Quo Bias and Contract Default Rules." *Cornell Law Review* 83 (1998): 608–687.
- Langer, Ellen J. "The Illusion of Control." *Journal of Personality and Social Psychology* 32, no. 2 (1975): 311–328. https://doi.org/10.1037/0022-3514.32.2.311.
- Samuelson, William, and Richard Zeckhauser. "Status Quo Bias in Decision Making." *Journal of Risk and Uncertainty* 1, no. 1 (1988): 7–59. https://doi.org/10.1.1.632.3193.
- Tversky, Amos, and Daniel Kahneman. "Loss Aversion in Riskless Choice." *The Quarterly Journal of Economics* 106, no. 4 (1991): 1039–1061.

Quiz

1. **Biases are best defined as:**
   - **a** human quirks
   - **b** systematic errors
   - **c** shortcuts
   - **d** random errors

2. **Earthquake weather is likely due to this type of confirmation bias:**
   - **a** confirming behavior
   - **b** the file drawer effect
   - **c** the irrational primacy effect
   - **d** illusory correlation

3. **According to the research discussed in the course, the fusiform face area activates when we see:**
   - **a** faces
   - **b** clouds
   - **c** inkblots
   - **d** anything we've seen a lot of

4. **What's the main reason the IKEA effect occurs?**
   - **a** We put in the effort to create something, so we like it better.
   - **b** We love big furniture stores from Sweden.
   - **c** We put in the effort to create something, so we like it worse.
   - **d** We enjoy putting together furniture.

5. **When we are around many people who share the same attitudes, our initial attitude:**

   a. gets less extreme
   b. gets more extreme
   c. stays the same as it was
   d. none of the above

6. **According to the course, what is the single best bias that allows us to remember things we are learning?**

   a. the spacing effect
   b. the generation effect
   c. the testing effect
   d. the cause and effect

7. **When was Clever Hans able to count?**

   a. He was only able to count when the question asker knew the answer and stood in front of Hans.
   b. He was only able to count when the question asker knew the answer and stood off to the side.
   c. He was only able to count when he wore blinders.
   d. Clever Hans was always able to count.

8. **According to the lecture on anchoring and framing, it's usually better to make the:**

   a. negotiation simple
   b. last offer
   c. first offer
   d. counteroffer

9. The fundamental attribution error is defined as the tendency to attribute _____ causes to other people's behaviors and attribute _____ causes to our own behaviors.

- **a** dispositional; situational
- **b** situational; dispositional
- **c** eerie; mundane
- **d** mundane; eerie

10. Why is eyewitness testimony considered weak evidence by cognitive psychologists?

- **a** Memory is suggestible, so information received after an event can influence the recall of a memory.
- **b** The presence of a weapon can be an attention grabber at the exclusion of other details.
- **c** Memory is not a record of events but rather a reconstruction.
- **d** all of the above

11. According to the lecture on the availability heuristic, what emotion is the leading reason for why this heuristic may change our decisions and behaviors when something tragic or alarming happens?

- **a** surprise
- **b** sadness
- **c** fear
- **d** disgust

12. Hindsight bias is defined as the tendency for people to interpret _____ events as being more predictable than they are in reality.

- **a** future
- **b** past
- **c** pleasant
- **d** tragic

13. **The gambler's fallacy and the hot-hand fallacy occur due to people's misunderstanding of _____ sample sizes.**

    a small
    b large
    c representative
    d homogenous

14. **Barnum statements work on different people because they are purposely _____.**

    a mean
    b dark
    c cheery
    d vague

15. **A stereotype is a _____ of one member of a group to the whole group.**

    a description
    b derogation
    c generalization
    d statement

16. **The Dunning-Kruger effect is defined as the tendency of people to _____ their ability to perform a task or solve a mental problem.**

    a underestimate
    b overestimate
    c misstate
    d choose

17. The _____ in the Deese-Roediger-McDermott method in a test of recognition memory leads to false memories.

- **a** critical lure
- **b** critical fish
- **c** bait
- **d** tackle

18. Belief bias occurs because people misunderstand:

- **a** validity
- **b** content
- **c** logical necessity
- **d** arguments

19. According to the lecture on the peak-end rule, what is one suggestion that the research supports to reduce the bias in a person's life?

- **a** Journal each day.
- **b** Ignore one's emotions.
- **c** Watch TV.
- **d** Have other people take photos.

20. According to the research on social desirability bias, what is one way to find out if people are answering survey questions in a desirable way?

- **a** Ask them if they were honest after they submit the survey.
- **b** Insert questions that ask whether they vote in every election.
- **c** Give them a lie detector test.
- **d** Never ask personal questions.

21. If Tim is mad, then he is in a _____ emotional state; if Judy is sorrowful, then she is in a _____ emotional state.

- **a** high; low
- **b** low; high
- **c** hot; cold
- **d** cold; hot

22. Survivorship bias is defined as the tendency to focus on the people or objects that have moved past a(n) _____ while ignoring those that have not moved past it.

- **a** obstacle
- **b** roadblock
- **c** problem
- **d** selection process

23. The play *Romeo and Juliet* is a classic example of which bias?

- **a** reactance
- **b** survivorship bias
- **c** hindsight bias
- **d** confirmation bias

24. The tendency to want, and an overall preference for, the current state of affairs is called the:

- **a** reactance bias
- **b** Dunning-Kruger effect
- **c** curse of knowledge
- **d** status quo bias

Image Credits

6: The Teaching Company Collection; **7**: The Teaching Company Collection; **12**: Getty Images; **13**: The Teaching Company Collection; **15**: The Teaching Company Collection; **19**: National Aeronautics and Space Administration; **20**: National Institutes of Health; **21**: Courtesy of Dr. Isabel Gauthier; **22**: The Teaching Company Collection; **23**: The Teaching Company Collection; **24**: Getty Images; **25**: Getty Images; **26**: UNCTAD/Flickr/CC BY-SA 2.0; **30**: Getty Images; **31**: The Teaching Company Collection; **32**: Getty Images; **39**: Getty Images; **42**: Getty Images; **46**: Getty Images; **47**: The Teaching Company Collection; **48**: The Teaching Company Collection; **51**: Getty Images; **56**: Getty Images; **59**: Getty Images; **64**: Getty Images; **69**: The Teaching Company Collection; **73**: The Teaching Company Collection; **77**: Getty Images; **82**: The Teaching Company Collection; **82**: The Teaching Company Collection; **84**: Getty Images; **85**: Getty Images; **92**: The Teaching Company Collection; **94**: The Teaching Company Collection; **98**: The Teaching Company Collection; **105**: Getty Images; **114**: xurde/Flickr/CC BY-SA 2.0; **118**: Getty Images; **122**: Getty Images; **123**: Getty Images; **130**: The Teaching Company Collection; **133**: Getty Images; **135**: Getty Images; **141**: Getty Images; **144**: Getty Images; **148**: Getty Images; **151**: The Teaching Company Collection; **152**: The Teaching Company Collection; **154**: The Teaching Company Collection; **158**: barbara_dj/Fiverr.com; **159**: Courtesy of Abraham Rutchick; **160**: The Teaching Company Collection; **166**: Getty Images; **169**: Getty Images; **176**: Getty Images; **179**: Getty Images; **185**: Getty Images; **192**: Getty Images; **193**: Getty Images; **196**: Getty Images; **197**: Getty Images; **200**: Getty Images; **204**: Getty Images; **205**: Getty Images

Title pages: Getty Images

ANSWER KEY

1. b; **2**. d; **3**. d; **4**. a; **5**. b; **6**. c; **7**. a; **8**. c; **9**. a; **10**. d; **11**. c; **12**. b; **13**. a; **14**. d; **15**. c; **16**. b; **17**. a; **18**. c; **19**. a; **20**. b; **21**. c; **22**. d; **23**. a; **24**. d

Notes

Notes

Notes

Notes

Notes

Notes

THE GREAT COURSES®

4840 Westfields Boulevard, Suite 400

Chantilly, VA 20151-2299

USA

1-800-832-2412

www.thegreatcourses.com