

Cognitive Biases and Their Influence on Critical Thinking and Scientific Reasoning: A Practical Guide for Students and Teachers

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Abstract

People often deviate from rationality when they face too much information or need to decide quickly. They may use heuristics (rules of thumb) to simplify their thinking which can lead to cognitive biases. Researchers have discovered 200 cognitive biases that result in inaccurate or irrational judgments and decisions, ranging from actor-observer to zero risk bias. This paper explores many of these biases and suggests ways to overcome them and improve decision-making.

Keywords: rational man, cognitive biases, heuristics, anchoring bias, availability bias, representativeness heuristic, confirmation bias, neglect of probability bias, overconfidence bias.

Many of the fundamental principles of economic theory have recently been challenged. Economic theory is primarily based on the premise of the “rational economic man.” Rational man makes decisions based solely on self-interest and wants to maximize utility. However, the rational man theory may be a theory that is dead or rapidly dying. After the Great Recession of 2008, Alan Greenspan, former Chairman of the Federal Reserve, told Congress: “I made a mistake in presuming that the self-interests of organizations, specifically banks and others, were such that they were best capable of protecting their own shareholders” (Ignatius, 2009). Nouriel Roubini, a prominent economist known as Dr. Doom for predicting the housing market collapse in 2006, stated that “The rational man theory of economics has not worked” (Ignatius, 2009). Kahneman (2011: 374) avows: “Theories can survive for a long time after conclusive evidence falsifies them, and the rational-agent model certainly survived the evidence we have seen, and much other evidence as well.”

Kahneman (2011, p. 269) describes how he was handed an essay written by the Swiss economist Bruno Frey that stated: “The agent of economic theory is rational, selfish, and his tastes do not change.” Kahneman was astonished that economists could believe this given that it was apparent to psychologists that “people are neither fully rational nor completely selfish, and that their tastes are anything but stable. Our two disciplines seemed to be studying different species, which the behavioral economist Richard Thaler later dubbed Econs and Humans.”

Many economists now realize that man does not always behave rationally. Although, some, such as Gigerenzer (2018), who describes a “bias bias,” disagree with many of the findings of the behavioral economists. Thaler and Mullainathan (2008) describe how in experiments involving “ultimatum” games, we see evidence that people do not behave as

traditional economic theory predicts they will. People will act “irrationally” and reject offers they feel are unfair:

In an ultimatum game, the experimenter gives one player, the proposer, some money, say ten dollars. The proposer then makes an offer of x , equal to or less than ten dollars, to the other player, the responder. If the responder accepts the offer, he gets x and the proposer gets $10 - x$. If the responder rejects the offer, then both players get nothing. Standard economic theory predicts that proposers will offer a token amount (say twenty-five cents) and responders will accept, because twenty-five cents is better than nothing. But experiments have found that responders typically reject offers of less than 20 percent (two dollars in this example) (Thaler and Mullainathan, 2008, para. 8).

This is why we must also draw on insights from the discipline of psychology. Ariely (2008) uses the latest research to demonstrate that people are predictably irrational; they use heuristics or rules of thumb to make decisions. Heuristics may be seen as “cognitive shortcuts” that humans utilize when there is a great deal of required information to collect in order to make a correct decision but time (or desire to do the extensive research) or money is limited (Caputo, 2013). Using rules of thumb may help a person make quick decisions but might lead to a systematic bias. Smith (2015) lists 67 cognitive biases that interfere with rational decision-making. A cognitive bias is defined as:

[A] systematic error in thinking that affects the decisions and judgments that people make. Sometimes these biases are related to memory. The way you remember an event may be biased for a number of reasons and that in turn can lead to biased thinking and decision-making. In other instances, cognitive biases might be related to problems with attention. Since attention is a limited resource, people have to be selective about what they pay attention to in the world around them (Chery, 2016, para. 2).

There are about 200 known cognitive biases, and the list continues to grow (Flyvbjerg, 2021). According to Benson (2022), cognitive biases help us address four different problems:

Problem 1: Too much information to deal with (information overload) so our brain uses tricks (“cognitive shortcuts”) to select the information we are most likely to use.

Problem 2: Not enough meaning from the bits and pieces of information we are aware of; but we need to make sense out of what we perceive. To solve this problem, we fill in the gaps.

Problem 3: Need to act fast when time and money are limited.

Problem 4: What should we remember? To be efficient, our brains need to remember what we believe are the most important and useful pieces of information; it is impossible to recall everything (Paras. 7-10).

These are the downsides of cognitive biases, according to Benson:

We don't see everything. Some of the information we filter out is actually useful and important.

Our search for meaning can conjure illusions. We sometimes imagine details that were filled in by our assumptions, and construct meaning and stories that aren't really there.

Quick decisions can be seriously flawed. Some of the quick reactions and decisions we jump to are unfair, self-serving, and counter-productive.

Our memory reinforces errors. Some of the stuff we remember for later just makes all of the above systems more biased, and more damaging to our thought processes (Benson, 2022, para. 17).

Similarly, Heick (2019) places the 180+ biases into a graphic consisting of four categories: Too Much Information; Not Enough Meaning; Need to Act Fast; and What Should We Remember? Desjardins (2021) groups 188 cognitive biases in one infographic.

Researchers from various disciplines have been examining cognitive biases in order to understand how to improve decision-making in their areas. Caputo (2013), who was concerned with the negotiation process, asserts that “cognitive misperceptions can highly bias human behavior when making judgments and decisions, and this is true in negotiations.” The military has been studying cognitive biases to improve decision-making in the US army. The military has found that “Because these heuristics generalize situations and allow people to make quick decisions despite time constraints or imperfect information, they often result in predictable errors in judgments (cognitive biases)” (Mission Command, 2015). The Central Intelligence Agency

(CIA) devotes several chapters in its manual to cognitive biases. The following reason is given for studying these biases:

Psychologists have conducted many experiments to identify the simplifying rules of thumb that people use to make judgments on incomplete or ambiguous information, and to show--at least in laboratory situations--how these rules of thumb prejudice judgments and decisions. The following four chapters discuss cognitive biases that are particularly pertinent to intelligence analysis because they affect the evaluation of evidence, perception of cause and effect, estimation of probabilities, and retrospective evaluation of intelligence reports (Heuer Jr., 2008; see Chapters 9-12).

McCann (2014) came up with ten cognitive biases that can result in poor decisions by executives in finance. Cognitive biases have been found to cause patient harm in healthcare facilities (Joint Commission, 2016). Smith (2015) avers that a good marketer must understand cognitive biases for the purpose of converting prospects into customers. Dror, McCormack & Epstein (2015) focused on understanding how cognitive biases work in the legal system. They were mainly concerned with how these biases affect the “impartiality” of expert witnesses. They underscore that:

[A] mere expectation can bias the cognitive and brain mechanisms involved in perception and judgment. It is very important to note that cognitive biases work without awareness, so biased experts may think and be incorrectly convinced that they are objective, and be unjustifiably confident in their conclusion (Dror, McCormack & Epstein, 2015).

It is clear that individuals who want to make rational decisions that are unbiased in all kinds of situations, not only negotiations, military intelligence, or healthcare, should attempt to understand the various cognitive biases that distort clear thinking. The best way to reduce or eliminate cognitive biases is to be aware of them.

Some Cognitive Biases that Adversely Affect Rational Decision Making

Actor-Observer Bias

The actor-observer bias refers to a “tendency to attribute one's own actions to external causes, while attributing other people's behaviors to internal causes” (Chery, 2017). Thus, if someone else cuts in line, it is because he is a jerk. If I cut in line, it is because I am late for a crucial appointment. Zur (1991) found that cognitive biases may affect how we perceive enemies' actions.

Research has repeatedly demonstrated how the enemy's hostile actions are more likely to be attributed to natural characteristics, while positive, conciliatory or peaceful actions are more likely to be attributed to situational factors. In other words, when the enemy is acting peacefully, it is because it is forced to do so by external circumstances and not by its own choice. When it acts aggressively, it is due to personal choice or characteristic behavior (Zur, 1991).

Anchoring Bias

Thaler & Sunstein (2008, pp. 23-24) provide an example of how anchoring works: People who are asked to guess the population of Tallahassee will probably have no idea. Suppose subjects are randomly assigned to two groups. Group A is first told that Los Angeles has 4 million people and then asked to guess the population of Tallahassee. Subjects in Group B are first told that the population of Liberty, NY is 9,900. What will happen is that Group A will make a much higher guess than Group B as to the population of Tallahassee. The reason is that the first number they are given is used as an anchor and then adjusted. Group A will modify the 4

million downward, knowing that Tallahassee is much smaller than Los Angeles. Group B will adjust upward, knowing that Tallahassee is larger than Liberty, NY.

Lawyers use anchoring to establish a number in a lawsuit. The lawyer will ask for \$30 million in damages, knowing very well that there is no way the jury will award this kind of number for, say, a libelous story in the paper about the client. However, she might get her client a few million dollars since the \$30 million will be used as an anchor. Retailers might use phony markdowns (original price \$800) to anchor a price and get customers to overpay for a product.

Thompson (2013) states: “people don't really like making decisions. We have habits, we like thinking automatically. So sometimes we avoid making choices altogether because it stresses us out” Real estate agents understand this and take advantage of buyers by employing the following technique.

Since buying a house is highly consequential and difficult to reverse, rational people should look at a great many options and think them through very carefully. A good agent will show you a few houses that are expensive and not very nice, and then one at almost the same price and far nicer. Many buyers will respond by stopping their search and jumping on this bargain. Our susceptibility to "bargains" is one of the cognitive devices we use to simplify choice situations, and one that companies are conscious of when they position their products (Thompson, 2013, para. 12).

Authority Bias

Authority bias is a cognitive bias that makes people more prone to believe and follow the views of those they see as authority figures. They may even do this when it conflicts with their own moral beliefs. This is why it is crucial to verify that the supposed authority figures are indeed experts, and also seek a second opinion.

Availability Bias

This refers to the overestimation of risks that are readily available in memory. How easily things come to mind is a heuristic that makes people overestimate the importance of certain kinds of information. If something is difficult to remember, one will assume it is less likely to occur. Kahneman (2011) defines availability bias as follows:

There are situations in which people assess the frequency of a class or the probability of an event by the ease with which instances or occurrences can be brought to mind. For example, one may assess the risk of heart attack among middle-aged people by recalling such occurrences among one's acquaintances. Similarly, one may evaluate the probability that a given business venture will fail by imagining various difficulties it could encounter. This judgmental heuristic is called availability. Availability is a useful clue for assessing frequency or probability, because instances of large classes are usually reached better and faster than instances of less frequent classes. However, availability is affected by factors other than frequency and probability (Kahneman, 2011, p. 425).

Availability bias means there is a tendency to overestimate the risks of accidents that are easy to recall. Why are people more worried about being killed with a gun than drowning in a pool? Or, why do we think more people die of homicides than suicides? According to Thaler & Sunstein (2008, pp. 24-26), people "assess the likelihood of risks by asking how readily examples come to mind." Therefore, familiar risks (e.g., those reported in the media) are more frightening to people than those not familiar. Thousands die yearly from injuries resulting from falling in the shower, yet people are more worried about being killed by a terrorist. The danger of being hurt from texting while driving (or even walking) is quite significant. According to Thaler & Sunstein (2008, p. 26): "easily remembered events may inflate people's probability judgments." This is also why people believe that accidents are responsible for as many deaths as disease. It works both ways. Events we cannot bring to mind will have lower probabilities of occurring. Of course, a marketer can make risks familiar by showing them in advertisements.

Two biases that affect availability are recency and salience. Recency refers to the tendency to give more weight to the latest, most recent information or events rather than older information or events. Saliency bias refers to the fact that

Big, dramatic events, such as explosions, gun battles, and natural disasters, stick in our heads and stay there, undermining our ability to think objectively about things like causation, probabilities, and death rates. Since September 2001, motor-vehicle accidents have killed more than four hundred thousand Americans, but how often do you worry or get upset about them? (Cassidy, 2013, para. 2).

The media makes us aware of the threat of terrorist attacks. It is, however, statistically much more likely that an American will die in a car accident than being injured in a terrorist attack. There is one chance in a hundred that a person will die in a car accident over a lifetime, and the chance of being killed in a terrorist attack is 1 in 20 million (<http://www.lifeinsurancequotes.org/additional-resources/deadly-statistics/>).

Availability Cascade

Kuran & Sunstein (2007, p. 683) define an availability cascade as “a self-reinforcing process of collective belief formation by which an expressed perception triggers a chain reaction that gives the perception increasing plausibility through its rising availability in public discourse.” Basically, if something is repeated often enough, it will gain much more credibility. As the popular saying goes: “repeat something long enough and it will become true.”

Backfire Effect

One would think that people would change their beliefs and opinions when presented with facts that contradict them. However, the truth is that what often happens when people’s beliefs – especially those firmly held – are challenged by contradictory evidence, these incorrect

beliefs get even more potent. It is a daunting task to change people's views with facts.

Certainty and misinformation are compelling and potent, making it difficult for facts to change people's minds. There is evidence that not only do facts not correct misinformation, but they make it more persistent and potent (Gorman & Gorman, 2017; Kolbert, 2017; Mercier & Sperber, 2017; Wadley, 2012). Colleen Seifert, a researcher at the University of Michigan, states the following concerning misinformation.

Misinformation stays in memory and continues to influence our thinking, even if we correctly recall that it is mistaken. Managing misinformation requires extra cognitive effort from the individual... If the topic is not very important to you, or you have other things on your mind, you are more likely to make use of misinformation. Most importantly, if the information fits with your prior beliefs, and makes a coherent story, you are more likely to use it even though you are aware that it's incorrect (Wadley, 2012).

Bandwagon Effect Bias

This bias refers to the tendency of people to adopt a particular behavior, belief, attitude, or style if a large number of people have also accepted it (Chery, 2015). It is a type of groupthink. The fact that many people believe something does not make it true. The bandwagon effect may have an impact on how people vote. People want to vote for winners and may vote for someone perceived (polls may affect this) as being far ahead in the polls. Advertising may also try to convince us that a product is good simply because millions of people use it. There is some evidence that opinion polls may contribute to the bandwagon effect by influencing undecided voters to go along with the majority (Obermaier, Koch & Baden, 2013).

Barnum Effect

The Barnum effect, also known as the Forer Effect, describes when people believe that general and vague information that could relate to anyone applies uniquely to themselves. Many individuals believe that horoscopes were meant for them. The reality is that they are written in such vague terms that they can apply to almost anyone. Tarot card readers and psychics also take advantage of the Barnum effect and make people think they have special abilities. Marketers also use a similar approach to make people believe that a product was customized to meet their unique needs.

Base Rate Fallacy

The base rate fallacy is a cognitive bias that occurs when people focus too much on the specific, specialized details of a situation (the individuating information which is distinct) and disregard the overall, general frequency or probability of something occurring (the base rate). In a nutshell, the general probability is overlooked in favor of the specific probability. The specific probability might focus on a particular case or a small sample. This can lead to people making inaccurate judgments or decisions. Base rate fallacy is one of six examples of the problem of representativeness or similarity discussed by Tversky and Kahneman (1974).

The following experiment is discussed in Kahneman (2011, pp. 146- 154): Subjects were told the following about Tom W., a graduate student:

Tom W. is of high intelligence, although lacking in true creativity. He has a need for order and clarity and for neat and tidy systems in which every detail finds its appropriate place. His writing is rather dull and mechanical, occasionally enlivened by somewhat corny puns and flashes of imagination of the sci-fi type. He has a strong drive for competence. He seems to have little feel and little sympathy for other people, and does not enjoy interacting with others. Self-centered, he nonetheless has a deep moral sense (p. 147).

The above description led people to ignore prior probabilities regarding the relative size of majors in different disciplines. Subjects asked to rank nine fields of specialization indicated that Tom W. was most likely majoring in computer science and engineering. Essentially, the similarity to a stereotype of a group trumps the actual size of the group (the prior probability).

Flyvbjerg (2021) maintains that base-rate fallacy is one of the more serious biases in project management because project planners tend to see their projects as being special and distinctive. Flyvbjerg points out that every individual is distinctive, but the medical profession has made enormous progress by focusing on what people have in common. A project may appear unique in a particular state but might be familiar if one examines how the plan worked in other states and countries.

When George H. W. Bush ran against Michael Dukakis for president, the infamous Willie Horton advertising campaign was used to distort the reality of furlough programs for prisoners. All 50 states—including California, when Ronald Reagan was governor—had these programs. The advertisement—considered among the top 10 campaigns ever—stated that Dukakis:

[A]llowed first-degree murderers to have weekend passes from prison. One was Willie Horton, who murdered a boy in a robbery, stabbing him 19 times. Despite a life sentence, Horton received 10 weekend passes from prison. Horton fled, kidnapped a young couple, stabbing the man and repeatedly raping his girlfriend. Weekend prison passes—Dukakis on crime (WNYC, 2015, para. 2).

This ad had an enormous adverse impact on criminal justice reform by focusing people's attention on one case and ignoring the base-rate information.

It should be noted that *representativeness/similarity* is a general, shared term that describes various errors individuals make when judging probabilities. Tversky and Kahneman

(1974) identified six situations where representativeness/similarity caused fallacious reasoning: (1) Insensitivity to the prior probability of outcomes; (2) Insensitivity to sample size; (3) Misconceptions of chance; (4) Insensitivity to predictability; (5) The illusion of validity; and (6) Misconceptions of regression (to the mean). One should also add the “Conjunction Fallacy” to this list.

Better-than-Average Bias

According to Kim and Han (2023), the better-than-average bias is a “social comparative bias in which people evaluate their performance or abilities more favorably than they do those of average others.” Thus, people think they are better than others in several areas, including morality, intelligence, and health; they believe they are less likely to get sick than others. This bias is also known as illusory superiority and self-enhancement bias; it can have negative and positive consequences. For example, It can make people feel good about themselves, increase their self-esteem, lower depression, and enhance their well-being. But it can also make them less logical, prone to conflicts with others, and overconfident (see also overconfidence bias).

Bias Blind Spot

People tend to have a bias blind spot, meaning they are likelier to rate themselves as less susceptible to biases (including cognitive biases) than others. We are also more able to detect biases in others than in ourselves. According to one researcher:

People seem to have no idea how biased they are. Whether a good decision-maker or a bad one, everyone thinks that they are less biased than their peers ... This susceptibility to the bias blind spot appears to be pervasive, and is unrelated to people’s intelligence, self-esteem, and actual ability to make unbiased judgments and decisions (Reo, 2015).

Thus, physicians believe that gifts from pharmaceutical companies are likely to unconsciously bias decisions made by other doctors. These gifts, however, will not prejudice their own medical decisions (Reo, 2015).

Certainty Bias

Certainty bias is the cognitive bias that makes us overestimate the accuracy of our beliefs, judgments, and opinions. People resist new information that challenges or contradicts their preexisting ideas, attitudes, thoughts, and beliefs. This is because people stick to their views even when there is a preponderance of evidence indicating that they are wrong. Consider the amount of scientific evidence that the planet is experiencing climate change and that vaccines do not cause autism. Millions of people still cannot accept that they are wrong.

With certainty bias, the focus is on the beliefs and opinions of the individual. With overconfidence bias, a type of certainty bias, the emphasis is on people's convictions regarding their knowledge. People tend to overestimate their expertise and are wrongly overconfident.

Certainty Effect (Zero-Risk Bias)

Studies show that people prefer options that reduce a small risk to zero over a more significant reduction in a much more considerable risk. In other words, we prefer the absolute certainty of a smaller benefit (i.e., complete elimination of risk) to the lesser certainty of receiving a more considerable benefit. Generally, people tend to give higher weights to outcomes they perceive as highly probable or certain and lower weights to outcomes they believe have lower probabilities.

The risk of having an autistic child is much smaller than the risk of a child dying from infectious diseases. Yet many parents try to reduce the risk of autism by not vaccinating their children (actually, there is no evidence linking autism to vaccines) and take on the much higher risk associated with infectious diseases such as measles, rubella, and mumps.

In one study, people preferred reducing a given risk by 5%— from 5% to 0%— rather than halving a considerable risk of 50% to 25%. The latter option reduced the risk more, yet the public preferred zero risk (Decision Lab, 2023). People prefer options where risk can be eliminated entirely over better alternatives. Most people would choose a guaranteed \$1 million over a 95% chance of \$2 million with a 5% chance of 0, even though the expected value of the latter choice is much higher. Money-back guarantees probably are effective because the consumer perceives them as reducing risk to zero (Decision Lab, 2023).

Kahneman (2011, pp. 312-314) discusses the Allais paradox to demonstrate how even the greatest statisticians were susceptible to a certainty effect.

In problems A and B, which would you choose?
A. 61% chance to win \$520,000 OR 63% chance to win \$500,000
B. 98% chance to win \$520,000 OR 100% chance to win \$500,000
(Kahneman, 2011, p. 313).

Most people prefer the left-hand option in problem A and the right-hand option (certainty) in problem B. This pattern of choice makes no logical sense and violates utility theory. Allais demonstrated that “the leading decision theorists in the world had preferences inconsistent with their own view of rationality!” Kahneman explains this using the certainty effect.

People are willing to pay a great deal to eliminate risk entirely. This sometimes results in laws that focus on attempting to remove all risk regardless of the actual benefits. The cost and effort required to reduce the risk to zero may not be worth it, given the limited resources

available to the government. The same can be said of all the tests done by the healthcare system. The costs involved in zero-risk healthcare are enormous, and spending the money on preventive medicine and healthcare for the indigent may make more sense.

One of the most powerful words in advertising is “free.” This may relate to the zero-risk bias. When something is free, there is no risk attached to acquiring it. There should be no difference between purchasing two bottles of champagne at \$40 each for \$80 or paying \$80 for one bottle and getting the second one free; either way, the consumer receives two bottles for \$80. However, the word “free” changes everything.

For example, in one study where people were offered a choice of a fancy Lindt truffle for 15 cents and a Hershey’s kiss for a penny, a large majority (73%) chose the truffle. But when we offered the same chocolates for one penny less each—the truffle for 14 cents and the kiss for nothing—only 31% of participants selected it. The word “free,” we discovered, is an immensely strong lure, one that can even turn us away from a better deal and toward the “free” one (Ariely, 2009, para. 5).

Choice-Supportive Bias

Choice-supportive bias is the tendency for people making a decision to remember their choice as being better than it actually was simply because they made it. We overrate the selected option and underrate the options that were rejected. Post-purchase rationalization is also a type of choice-supportive bias. One who does not want to fall into the trap of choice-supportive bias must constantly check and reevaluate to see whether a decision was correct; one should not defend flawed choices. After all, everyone makes mistakes.

Clustering Illusion Bias

People tend to see patterns in what are essentially random streaks. Gamblers tend to do this and attempt to “beat the system” by taking advantage of these phantom patterns in various

games of chance, such as cards (“hot hand”) or the roulette wheel. People tend to see patterns in price fluctuations of multiple stocks. The Gambler’s Fallacy is another cognitive bias that involves a lack of understanding of random streaks.

Confirmation Bias

Once people form an opinion, they “embrace information that confirms that view while ignoring, or rejecting, information that casts doubt on it ... Thus, we may become prisoners of our assumptions” (Heshmat, 2015). People tend to only listen to information that supports their preconceptions. People may have the ability to see flaws in their opponent’s arguments. However, when it comes to their own opinions, that is when they are blind.

Kahneman speaks of “adversarial collaboration,” which means bringing together two researchers who disagree and having them conduct an experiment jointly (Matzke *et al.*, 2013; Kahneman, 2012). This is a way to reduce the confirmation bias that arises when a researcher consciously or unconsciously designs an experiment in such a way so as to provide support for a particular position (Matzke *et al.*, 2013).

Given the massive amount of research available to scholars, it is not difficult for a researcher to cherry-pick the literature and only reference studies that provide support for a particular opinion (confirmation bias) and exclude others (Goldacre, 2011). Even if individual studies are done correctly, this does not guarantee that a researcher writing a state-of-the-art review paper will write an accurate, undistorted synthesis of the literature. Indeed, Celia Mulrow demonstrated that many review articles were biased (Goldacre, 2011). Motivated reasoning bias is the flip side of confirmation bias (Marcus, 2008, p. 56)

Congruence Bias

Congruence bias is similar to confirmation bias. It is a tendency to test a given hypothesis (usually our own beliefs) rather than consider alternative theories that might produce better results. In effect, someone guilty of congruency bias is trying to prove that s/he is right. This is the reason that alternative hypotheses are not considered. From the quotes below, it is clear that Arthur Conan Doyle, creator of Sherlock Holmes, understood the importance of being aware of the potential existence of several hypotheses rather than starting with one. After the facts are collected, a detective or researcher selects the theory that does the best job of fitting the facts.

The following three quotes from Arthur Conan Doyle's Sherlock Holmes stories describe how research should be done:

“It is a capital mistake to theorize before one has data. Insensibly one begins to twist facts to suit theories, instead of theories to suit facts (“A Scandal in Bohemia”).

“One should always look for a possible alternative and provide against it. It is the first rule of criminal investigation” (“Adventure of Black Peter”).

“When you have excluded the impossible, whatever remains, however improbable, must be the truth” (“Sign of the Four”). (Buxbaum, 2013, paras. 2, 10, 6, resp.).

Some researchers are convinced that marijuana is a gateway drug leading to addiction to harder drugs such as heroin. Indeed, there is evidence that a large percentage of addicts did start with marijuana when they were adolescents. However, there is an alternative hypothesis suggested by the National Institute on Drug Abuse:

An alternative to the gateway-drug hypothesis is that people who are more vulnerable to drug-taking are simply more likely to start with readily available substances such as marijuana, tobacco, or alcohol, and their subsequent social interactions with others who use drugs increases their chances of trying other drugs. Further research is needed to explore this question (National Institute on Drug Abuse, 2017, para. 4).

Conjunction Fallacy

According to probability theory, the probability of a conjunction, the joint probability of A and B [$P(A \text{ and } B)$], cannot exceed the likelihood of either of its two individual constituents, $P(A)$ or $P(B)$. In other words, $P(A \text{ and } B) \leq P(A)$ and $P(A \text{ and } B) \leq P(B)$. For example, the probability of being a man with red hair is less than or equal to the likelihood of being a man; the probability of being a man with red hair is less than or equal to the possibility of having red hair.

Despite this, people will make this mistake with the so-called “Linda Problem.” This study is discussed in Kahneman (2011) but was initially published by Tversky and Kahneman (1983).

Linda is 31 years old, single, outspoken, and very bright. She majored in philosophy. As a student, she was deeply concerned with issues of discrimination and social injustice, and also participated in antinuclear demonstrations. Which one of these is more probable?

- (a) Linda is a bank teller.
 - (b) Linda is an insurance salesperson.
 - (c) Linda is a bank teller and is active in the feminist movement
- (Kahneman, 2011, pp. 156-157).

Logically, as noted above, option (c) cannot be more likely than option (a), but Kahneman (2011) found that about 85 percent of respondents claimed that it was. Even advanced graduate students who had taken several statistics courses made this mistake. Tversky & Kahneman posit that the reason most people get this wrong is because they use a heuristic called representativeness. Representativeness (or similarity) refers to the tendency of people to judge the likelihood of an event occurring by finding something similar and then assuming (often incorrectly) that the probabilities of the two events must be similar. Option (c) appears to be more representative and better resembles the behavior of Linda. People do not think of a bank teller as being a political activist.

Conservatism Bias

People tend to favor a prior view even when presented with new information or evidence, i.e., there is a tendency to stick to old information and a reluctance to accept something new. People do not revise their beliefs sufficiently when presented with new evidence because of conservatism bias. Conservatism bias is related to status quo bias. Azzopardi (2010, p. 88) makes this distinction: “The status quo bias is emotional and causes people to hold on to how things are. The conservatism bias is cognitive and causes people to hold on to their previous opinions and idea frames even though facts have changed.” This may help explain why HR professionals are reluctant to consider candidates with different types of backgrounds and qualifications.

Curse of Knowledge Bias

The curse of knowledge bias occurs when we assume that others have the same level of expertise or know-how as we do. We forget what it was like to be new to something and how difficult it was to learn. We also use words and terms others may not know, making our explanations challenging to follow. This can affect our ability to teach, communicate, or convince others. It can also make us arrogant and overconfident. That’s why educators should always empathize with their students and recall their own learning experiences using the most straightforward language rather than technical terms and jargon.

Decoy Effect

Suppose customers are asked to choose between options A and B. Each option has advantages (Option A may offer fewer features but be less expensive than Option B, which offers more features). The decoy effect occurs when a third option (the decoy), Option C, is introduced that is worse than, say, Option B but causes more people to choose the higher-priced

Option B. The decoy is purposely introduced to get customers to select the higher-priced option. This is an example of how this would work and get more people to choose Option B.

Option A – Price of \$250 7 features

Option B – Price of \$400 10 features

Option C (Decoy) – Price of \$500 9 features

Déformation Professionnelle Bias

Déformation professionnelle is a cognitive bias that comes from the tendency to view the world in a narrow way and through the eyes of one's discipline or profession. People suffering from this see the world in a distorted way and not as it really is. The quote from Mark Twain saying that "to a man with a hammer, everything looks like a nail" is reminiscent of this bias. Déformation Professionnelle Bias is similar to what Friedman & Friedman (2010) refer to as disciplinary elitism.

Dualistic Thinking

Some cognitive biases encourage discrimination and prejudice; one of the worst is dualistic thinking which produces an "us vs. them" approach to life. Dualistic thinking, also known as black-and-white, binary, or polarized thinking, is a general tendency to see things as good or bad, right or wrong, and us or them, without room for compromise and seeing shades of gray. This all-or-nothing cognitive approach leads to poor decision-making and creates polarized groups (think of today's Democrats and Republicans). It interferes with one's ability to be an innovator, which requires one to be open-minded.

This type of dualistic thinking is known in the mental health field as "splitting," which is a "defense mechanism in which people unconsciously frame ideas, individuals, or groups in all-or-nothing or either-or terms (e.g., all-powerful vs. 100% powerless)" (Redstone, 2021, para. 2). It is often seen in people who have a borderline personality disorder (Villines, 2022). Splitting is a severe problem when dealing with people with different opinions or interacting with those from other races or religions. It is emotionally dysregulating, fostering behavioral issues like aggression and leading to psychic pain and mental illness. It also makes it difficult for people to have constructive dialogue and works against our shared ideals as a society, like love, peace, justice, and unity (Redstone, 2021, para 6).

Dunning-Kruger Effect

This is the tendency of people who are ignorant or unskilled in an area to overestimate their abilities and believe that they are much more competent than they truly are. People who have absolutely no knowledge of, say, Egyptology will not suffer from the Dunning-Kruger Effect. It is people who have a little bit of knowledge that are likely to have a great deal of confidence in their capabilities.

Kruger & Dunning (1999) documented this effect in a paper titled "Unskilled and Unaware of It: How Difficulties in Recognizing One's Own Incompetence Lead to Inflated Self-Assessments." They asserted that individuals need a reasonable amount of skill and knowledge to accurately estimate the actual amount of skill and knowledge they possess. A little knowledge is indeed dangerous (Poundstone, 2017).

Many scholars believe that the Dunning-Kruger Effect is not a valid concept and may be explained by the effects of regression to the mean (Danvers, 2020; Gignac and Zajenkowski, 2020). Time will tell whether this effect is a statistical artefact or an actual cognitive bias.

Endowment Effect

There is a tendency for people who own an object to value it more than those who do not own it. Thus, people demand more to give up or sell something they own than they would be willing to pay to acquire it. This relates to the status quo bias and loss aversion and is inconsistent with economic theory. Based on several experiments, Kahneman, Knetsch & Thaler (1990, p. 1342) concluded: “The evidence presented in this paper supports what may be called an instant endowment effect: the value that an individual assigns to such objects as mugs, pens, binoculars, and chocolate bars appears to increase substantially as soon as that individual is given the object.”

Escalation of Commitment Bias

This is the tendency for an individual or a group to stick with a failing decision or action rather than accepting that a mistake was made and altering course. There is a reluctance to admit that the original decision was wrong even when there is clear evidence that this is the case. Countries sometimes do this and continue to fight an unwinnable war. The expression “Throwing good money after bad” is reminiscent of this irrational fallacy. It is sometimes called the “sunken cost fallacy.”

Expectation Bias

This refers to the tendency for the researcher's expectations to affect the outcome of a study. It also refers to the fact that people remember things the way they expected them to occur; this is why many memories are false. The need for double-blind studies is to minimize expectation bias. Expectation bias is one of the few cognitive biases that has been researched in the field of auditing (Pike, Curtis & Chui, 2013).

False Consensus Effect

People tend to overestimate how much others share their attitudes, behaviors, beliefs, preferences, and opinions. We tend to think that others think the same way we do.

Framing Bias

Tversky & Kahneman (1981) were among the first to identify this cognitive bias known as framing. People respond differently to choices/preferences depending on how they are presented. In particular, there will be different responses depending on whether the choices are offered as a gain or loss (see loss aversion). Thus, doctors are more likely to prescribe a procedure when it is described as having a 93% survival rate within five years than if it is presented as having a 7% mortality rate within five years (McNeil, Pauker, & Tversky, 1988). Similarly, 9 out of 10 students will rate condoms as effective if they are informed that they have a "95 percent success rate" in stopping HIV transmission; if, however, they are told that it has a "5 percent failure rate," then only 4 out of 10 students rate condoms as being effective (Linville, Fischer, & Fischhoff, 1992). This is why it is more important for a marketer to emphasize what a prospective customer loses by not making a purchase than what they gain by making the

purchase (Flynn, 2013).

The following example, based on the research of Tversky and Kahneman (1981), demonstrates the principle of loss aversion and framing. Participants were told the “US is preparing for the outbreak of an unusual Asian disease, which is expected to kill 600 people.”

They could pick one of two alternative programs to address the problem:

If Program A is adopted, 200 people will be saved.

If Program B is adopted, there is a 1/3 probability that 600 people will be saved, and a 2/3 probability that no people will be saved.

72% of participants chose option 1, while only 28% of participants chose option 2 (Tversky and Kahneman, 1981, p. 453).

A second group of subjects were given the same cover story involving an unusual Asian disease as above but with two alternative scenarios. Note that the only difference is in how the options are framed.

If Program C is adopted, 400 people will die.

If Program D is adopted, there is a 1/3 probability that nobody will die, and a 2/3 probability that 600 people will die (Tversky and Kahneman, 1981, p. 453).

The responses were almost the opposite of the first group of subjects: 22% of participants chose option 1, and 78% chose option 2. The only difference was how the options were framed.

Patel provides the following examples of framing:

We are more likely to enjoy meat labeled 75 percent lean meat as opposed to 25 percent fat. 93 percent of Ph.D. students registered early when the framing was in terms of a penalty fee for late registration, with only 67 percent registering early when the framing was in terms of a discount for earlier registration. More people will support an economic policy if the employment rate is emphasized than when the associated unemployment rate is highlighted (Patel, 2015).

Kahneman (2011, p. 373) explains the different results from opt-out and opt-in systems as a framing effect. This is especially important when getting people to donate organs such as kidneys. Countries that use an opt-out system – where the default is that you are an organ donor and you have to check a box if you do not want to be one – have significantly more organ donors than countries where an opt-in system is used (i.e., the individual must explicitly state that s/he is willing to be an organ donor). The differences in one study showed that the organ donation rate was almost 100% in Austria with an opt-out system versus 12% in Germany with an opt-in system.

Another example given by Kahneman (2011, pp. 372-373) is the following:

Consider two car owners who seek to reduce their costs. Adam switches from a gas-guzzler of 12 mpg to a slightly less voracious guzzler that runs at 14 mpg. The environmentally virtuous Beth switches from a 30 mpg car to one that runs at 40 mpg. Suppose both drivers travel equal distances over a year. Who will save more gas by switching? (Kahneman, 2011: 372).

The answer is counter-intuitive. If they both drive 10,000 miles, Adam saves about 119 gallons (from about 833 gallons to 714 gallons), and Beth saves approximately 83 gallons (from 333 gallons to 250 gallons). The problem has to do with framing. The savings become more evident if the information is in gallons per mile (gpm) rather than mpg. Adam switches from a car that consumes .0833 gpm to one that consumes .0714 gpm — saving .0119 gpm. Beth switches from a car that consumes .0333 gpm to .0250 gpm — saving .0083 gpm.

Fundamental Attribution Error

The fundamental attribution error refers to the tendency of a person observing another person's behavior to attribute it to internal factors or personality and to underestimate the effect

of situational causes (i.e., external influences). In other words, we believe others do what they do because of their internal disposition (personality). Thus, if you see someone fighting with another person, you will probably attribute it to someone with a violent temper. Of course, it is quite possible that he is the victim of a mugging attempt and is trying to defend himself.

Sherman (2014) provides the following example of the fundamental attribution error:

A classic example is the person who doesn't return your call. You could go the usual route and think, "He is an inconsiderate slob and my parents were right years ago when they said I should have dropped him as a friend." But the fundamental attribution error would remind you that there might very well be other reasons why this person hasn't called you back. Maybe he is going through major issues in his life. Maybe he is traveling for work. Maybe he honestly forgot (Sherman, 2014).

Gambler's Fallacy (also known as Monte Carlo Fallacy)/Misconception of Chance

Gambler's fallacy is a cognitive bias in which a person mistakenly believes that past outcomes will affect future outcomes even with a random process. For example, if you flip a coin five times and get five heads, one guilty of this bias will expect a tail on the next toss. Of course, since each toss is an independent event, the probability is a constant 50%. People incorrectly believe that random processes are self-correcting and "a deviation in one direction induces a deviation in the opposite direction to restore the equilibrium" (Tversky and Kahneman, 1974, p. 1125). This example is related to this fallacy and is known as the "misconception of chance." The misconception of chance is an example of the *representativeness/similarity* bias discussed by Tversky and Kahneman (1974).

A coin is to be tossed six times. Which sequence is more likely?
Sequence 1: H T H T T H
Sequence 2: H H H T T T

Of course, both are equally likely. However, people will think sequence 1 is more likely than sequence 2 because it appears more random (Tversky & Kahneman, 1974).

This bias was found to influence decision-makers such as refugee asylum judges, loan officers, and baseball umpires. They also made the same mistake in underestimating the probabilities of sequential streaks, such as five baseball strikes in a row or approving asylum for, say, six refugees in a row. Thus, “misperceptions of what constitutes a fair process can perversely lead to unfair decisions” (Chen, Moskowitz & Shue, 2016).

Halo Effect

Halo effect is a cognitive bias that occurs in impression formation in which a person assumes that because someone possesses positive characteristic A, then they will also have positive characteristics B, C, D, E, and F. It also occurs with negative traits. If a person possesses negative characteristic A, then he will also have negative characteristics B, C, D, E, and F.

Kahneman (2011, pp. 206-208) feels that the halo effect together with outcome bias helps explain the popularity of various books dealing with leadership. These books focus on successful firms and then attribute it to leadership style. Actually, in most cases, it is simply luck. Chance often explains the success of particular firms and the failures of others, not the competence of leadership. Indeed, over time, the situation often reverses itself, and successful firms become unsuccessful and vice versa. Kahneman claims that the message of *Built to Last*, a leadership book by Jim Collins and Jerry I. Porras, is that “good managerial practices can be identified and that good practices will be rewarded by good results.” Kahneman (2011, p. 207) asserts: “In the presence of randomness, regular patterns can only be mirages.” According to Fitza (2013),

chance or luck often has a more significant effect on firm performance – it may account for 70% -- than the actual abilities of the CEO.

Hindsight Bias

This is sometimes called the “I knew it all along” effect. It is the tendency to see past events as being more predictable than before they occurred. After an event occurs (e.g., the election of Donald Trump), people believe that they knew he would win before the election took place. Boyd (2015) says that “Hindsight bias can make you overconfident. Because you think you predicted past events, you’re inclined to think you can see future events coming. You bet too much on the outcome being higher, and you make decisions, often poor ones, based on this faulty level of confidence.”

Hyperbolic Discounting

Hyperbolic discounting is a cognitive bias that explains many supposedly irrational behaviors, such as addictions, health choices, and personal financial decisions. McCann (2014) lists it as a critical bias adversely affecting corporate finance decisions. Hyperbolic discounting refers to people's tendency to prefer a reward that arrives sooner rather than wait longer for a larger reward in the future. People discount the value of the award that comes later in the future. A rational person would use a constant discount rate to discount the value of a future reward (this is known as exponential discounting and has been used in economic theory); this means the discount rate should not change across different wait times. In reality, however, people use a time-inconsistent discounting model: The further out in the future the reward, the more we discount it (Kinari, Ohtake & Tsutsui, 2009; Frederick, Loewenstein & O’Donoghue, 2002).

Thus, one may prefer receiving \$5000 now to \$5200 in 3 months. However, if the choice is \$5000 in two years or \$5200 in two years and three months, most people would opt for the \$5200. People do not mind waiting three months if the wait occurs in two years. What this indicates is that the discount rate used by people is not constant or rational: As delay length increases, the time discount rate decreases.

Try this experiment on your friends: Show them a \$100 bill and ask: “Would you rather have this \$100 bill now or wait two weeks and get \$109?” You find that people are not that rational and want things now. Most will take the \$100. Of course, a sensible person should wait two weeks for the \$109—this is equivalent to earning a 9% return ($\$9 / \100) for two weeks of waiting. Does anyone know of a bank that offers 9% interest for two weeks?

Ikea Effect

There is a tendency for people to overvalue and overrate objects they made or assembled by themselves, such as IKEA furniture, regardless of the actual quality of the finished product. However, this effect seems only to exist when the labor resulted in the successful completion of the project. If subjects did not complete the task, the IKEA effect disappeared (Norton, Mochon, & Ariely, 2012).

Illusion of Control

People tend to overestimate how much control they have over external factors such as prices, costs, demand, and the stock market. In some cases, people believe they can control the outcome of something random such as the toss of dice.

Identifiable Victim Effect

People have a tendency to respond more strongly and be willing to offer greater assistance to a single identifiable victim or person at risk than to a large group of anonymous people at risk. This may be why talking about a single case of a disease victim may be more effective in raising money than describing millions of victims. Lee & Feeley (2016) conducted a meta-analysis of this effect.

Illusory Correlation

Illusory correlation is a cognitive bias that makes people believe that two variables or random events are associated when there is no relationship (zero correlation). This can happen because two unrelated events, such as a hitting streak and wearing a particular hat, coincided and made someone believe they were causally related. Likewise, people may assume that the cold weather triggers their migraine or humidity worsens their joint pain.

Information Overload Bias

People make the mistake of believing that more information means better decisions. Actually, too much information often results in poorer decisions since people cannot handle all the information available to them. There is only a limited amount of information the brain can process. Information overload can cause increased stress and what has been referred to as information fatigue. Behavioral economists disagree with neoclassical economists and posit that too many choices lead to poorer decisions (Pollitt & Shaorshadze, 2011).

Ariely (2008, pp. 152-153) demonstrates how having too many options often results in the failure to make any decision. For example, someone trying to purchase a laptop might spend several months trying to buy the *best* laptop and not consider the “consequence of not deciding.” The difference among the laptops might be minimal. Still, the time spent dwelling over trivial differences and the lost opportunities of not having a computer is not taken into account. We often waste far too much time making a trivial decision when we would be better off flipping a coin to make a choice. To learn more about the problem of offering too many options, read Barry Schwartz’s book entitled, *The Paradox of Choice: Why More is Less*, or view his TED lecture at http://www.ted.com/talks/barry_schwartz_on_the_paradox_of_choice.html.

Insensitivity to Prior Probability of Outcomes

Tversky & Kahneman (1974) found that prior probabilities are properly used when no specific evidence is given; when worthless, detailed evidence is provided, prior probabilities are ignored. This is related to the representativeness/similarity bias discussed above. This example from Tversky & Kahneman (1974) illustrates how this bias works. The following description of Dick is provided to the subjects.

Dick is a 30-year-old man. He is married with no children. A man of high ability and high motivation, he promises to be quite successful in his field. He is well liked by his colleagues.

This description was intended to convey no information relevant to the question of whether Dick is an engineer or a lawyer. Consequently, the probability that Dick is an engineer should equal the proportion of engineers in the group, as if no description had been given. The subjects, however, judged the probability of Dick being an engineer to be .5 regardless of whether the stated proportion of engineers in the group was .7 or .3. Evidently, people respond differently when given no evidence and when given worthless evidence (p. 1125).

The base rate fallacy and insensitivity to the prior probability of outcomes share several similarities and may overlap but are not equivalent. Both involve the tendency to minimize or undervalue an event's base rate (the general frequency or prior probability) when making decisions or evaluating. The base rate fallacy, however, is more narrow and relates to situations where people depend too much on individuating information (information unique to a specific case) rather than the base rate.

For instance, if you hear that Tom lacks creativity, enjoys corny puns, has a need for order and clarity, and prefers neat and tidy systems, you might infer that he has a higher chance of being an engineer than a social worker, even though you are aware that there are many more social workers than engineers in the population.

Insensitivity to the prior probability of outcomes is a more general term that includes any situation where people disregard the base rate or the previous likelihood of an outcome when making forecasts or deductions. For example, suppose you are told that a medical diagnostic test for a rare type of cancer has a 92% accuracy rate. In that case, you might be more likely to believe that a positive test result means that the person surely has the disease, irrespective of the low base rate, say three in 100,000.

Insensitivity to Sample Size (Law of Small Numbers)

This cognitive bias, also an example of the *representativeness/similarity* problem, is the tendency of people to underestimate the amount of variation that occurs in small samples. There is considerably more variation in small samples than in large samples, and people do not consider this when estimating probabilities. The problem below, known as the “Hospital

problem,” was used by Tversky & Kahneman (1974) to illustrate the insensitivity to the sample size problem.

A certain town is served by two hospitals. In the larger hospital about 45 babies are born each day, and in the smaller hospital about 15 babies are born each day. As you know, about 50 percent of all babies are boys. However, the exact percentage varies from day to day. Sometimes it may be higher than 50 percent, sometimes lower. For a period of 1 year, each hospital recorded the days on which more than 60 percent of the babies born were boys. Which hospital do you think recorded more such days?

The larger hospital (22.1%)

The smaller hospital (22.1 %)

About the same (55.8%)

Most subjects judged the probability of obtaining more than 60 percent boys to be the same in the small and in the large hospital, presumably because these events are described by the same statistic and are therefore equally representative of the general population. In contrast, sampling theory entails that the expected number of days on which more than 60 percent of the babies are boys is much greater in the small hospital than in the large one, because a large sample is less likely to stray from 50 percent. This fundamental notion of statistics is evidently not part of people's repertoire of intuitions (Tversky & Kahneman, 1974, p. 1125).

It is clear from probability theory that the smaller hospital is much more likely to deviate a great deal from the expected probability of 50%. Thus, a person tossing a coin three times will likely get three tails (12.5% chance). But if the coin is tossed 100 times, it is highly unlikely to deviate much from the 50% probability of getting a tail, i.e., 50 tails. For more on the Hospital Problem, see Noll & Sharma (2014).

Kahneman (2011, pp. 112-113) discusses the problem of selecting samples and indicates that many studies use samples that are too small to confirm their true hypotheses. This means there is insufficient power to reject the claim about a population (i.e., the null hypothesis) even when it is false. There is a way to ensure that a sample is large enough to have sufficient power, but most researchers rely on intuition rather than formulas. As Kahneman (2011: 114) points out: “The strong bias toward believing that small samples closely resemble the population from

which they are drawn is also part of a larger story: we are prone to exaggerate the consistency and coherency of what we see.”

Kahneman (2011, pp. 117-118) cites a study concluding that small schools were more successful than large ones because 6 of the top 50 schools in Pennsylvania were small (an overrepresentation by a factor of four). This resulted in vast amounts of money invested by the Gates Foundation in creating small schools. In actuality, inferior schools also tend to be smaller than the average school. The truth is that small schools are not better than large schools but have more variability. The evidence suggests that large schools may be better overall because they provide more curricular options.

The bottom line is that it is essential to realize that many occurrences, including “hot hands” and winning streaks, are often chance. People should be careful before attributing streaks to some causal effect (e.g., he is a great manager).

Intergroup (In-Group) Bias

Intergroup bias is the tendency to evaluate members of the in-group more favorably than members of the out-group. This bias can be expressed in various ways, including the allocation of resources, evaluation of peers, behaviors such as discrimination, and attitudes such as prejudice. If a person believes that another individual belongs to the same group as herself, she will have more positive ratings of that person and show favoritism.

Interpretation Bias

Interpretation bias is a “cognitive bias in which ambiguous situations are appraised as negative or threatening” (Beard and Peckham, 2020). Therefore, someone from a marginalized group might instantly think that the police officer who gave them a ticket is prejudiced.

Just World Bias

The just-world cognitive bias is a heuristic some people use to make sense of the world. It is the belief that the world is fair and that people generally get what they deserve. This bias can cause individuals to blame victims for their own misfortune or attribute success or failure to a character trait rather than bad luck or external factors. Thus, the condition of homeless people might be attributed to laziness or substance abuse. People might see the high unemployment of minorities as being due to personal characteristics rather than discrimination.

Loss Aversion

The pain of losing something we own outweighs the joy of winning by as much as two to one. Thus, for example, the pain of losing \$100 that you currently have is roughly double the intensity of the joy you would experience finding \$100. This is why a different decision will be made if the same choice is framed as a gain rather than a loss.

Interestingly, researchers believe it takes at least five positive, nice remarks to offset one unpleasant comment in marital interactions. Loss aversion is also an issue in consumer shopping. People reacted more strongly to a 10% increase in the price of eggs than a 10% decrease in the price (Heshmat, 2018).

Loss aversion can also explain why people are more likely to use their income to

purchase insurance to protect themselves from a painful loss rather than use the funds to invest in the stock market and possibly earn considerably higher returns (with a chance to lose money). Sticking to the status quo rather than seeking change, even when the change could be advantageous, is also related to loss aversion.

Memory Bias

Memory biases are cognitive biases that involve the tendency to remember past events in a way that matches one's current feelings, thoughts, or beliefs. They can occur with either positive or negative stimuli. For example, someone who feels like a victim might only remember when others from a different group harmed them and ignore the times they were helped or supported by them.

Mere Exposure Effect

This refers to the tendency to prefer and like things merely because we are more familiar with them. This suggests that repeated exposure to some philosophy or idea will help make them more acceptable to others.

Misconception of Chance

See Gambler's Fallacy.

Moral licensing

Moral licensing is a cognitive bias that allows people to act unethically or immorally without feeling like they are contradicting their moral values or compromising their self-image

of being an ethical individual. It makes people feel morally justified in engaging in a bad behavior (e.g., cheating on taxes) after doing something good before (e.g., donating to charity). After all, the good deed done in the past makes them feel morally superior and entitled to behave unethically because they have proven that they are good from the previous act.

Men who publicly identify as feminists and contribute to women's rights causes often face allegations of sexual harassment or sexual abuse. Indeed, this is what happened to celebrities such as Harvey Weinstein and others. They were later exposed as sexual predators. Most likely, they used moral licensing to justify this. This is why it is not unusual for people who explicitly rejected sexist hiring practices on paper to still prefer a male candidate for a job. Companies with diversity and inclusion programs may believe this is enough to demonstrate their morality. This may lead them to justify their discriminatory actions towards their minority employees. Moreover, employees who reluctantly participate in seminars or talks on diversity and inclusion may feel they have done their good deed and then bully or mistreat coworkers from minority groups (Collier, 2021).

Marketers use this bias to increase sales. For example, airlines might donate some of their profits to charities so people will ignore how poorly they treat their employees. In the same way, consumers who make a green purchase may feel morally entitled to indulge in a luxury purchase later, using their eco-friendly choice as an excuse for their lavish, self-indulgent spending (Simbrunner and Schlegelmilch, 2017).

Motivated Blindness

Motivated blindness provides a psychological reason that many people engage in unethical behavior. It refers to individuals' psychological tendency to overlook unethical

behaviors when it is in their interest to remain ignorant. Once people have a vested interest in something, they can no longer be objective. This is why conflicts of interest are such a problem; it is almost impossible to behave ethically when a conflict of interest exists. Bazerman & Tenbrunsel (2011a) demonstrate how motivated blindness caused many ethical failures, including the Great Recession of 2008.

It's well documented that people see what they want to see and easily miss contradictory information when it's in their interest to remain ignorant—a psychological phenomenon known as motivated blindness. This bias applies dramatically with respect to unethical behavior (para. 14).

As noted above, “People tend to have a bias blind spot, meaning that they are more likely to rate themselves as being less susceptible to biases (this includes cognitive biases) than others.” Bazerman & Tenbrunsel (2011b, p. 37) observe, “Most of us dramatically underestimate the degree to which our behavior is affected by incentives and other situational factors.” On the other hand, we overestimate how others will be influenced by incentives (e.g., paying people to donate blood).

Motivated Reasoning

As noted above, motivated reasoning is related to confirmation bias. Marcus (2008: 56) defines motivated reasoning as “our tendency to accept what we wish to believe (what we are motivated to believe) with much less scrutiny than what we don't want to believe.” Marcus makes the following distinction between motivated reasoning and confirmation bias: “Whereas confirmation bias is an automatic tendency to notice data that fit with our beliefs, motivated reasoning is the complementary tendency to scrutinize ideas more carefully if we don't like them than if we do.” People's reluctance to scrutinize and analyze contrary ideas makes it difficult to change their beliefs. This may contribute to status quo bias.

Negativity Bias

Negativity bias is a cognitive bias that causes us to pay more attention to negative information and things than positive ones and dwell on them. It means we are more likely to notice and recall negative experiences, respond more strongly to bad news than good news, and focus more on insults than praise. Individuals are much more likely to relive painful memories than blissful ones. Negativity makes us recall traumatic experiences better than happy ones and thus makes us less joyful and stressed. People focus more on an event's downsides (e.g., potential losses) than the upsides when deciding what to do. Loss aversion is a symptom of the dominance of negativity (Kahneman, 2011, pp. 300-309). Moore (2019) maintains that this bias can affect the impressions we form of colleagues in the workplace. One bad experience with one member of a minority group is more likely to be recalled than numerous positive experiences with the same group.

Neglect of Probability Bias

The neglect of probability is the tendency to completely ignore probabilities when making decisions under uncertainty. People often focus on the adverse outcome rather than on the likelihood that it will occur. The car ride to the airport is much more dangerous than flying in a plane, yet people are more apprehensive about flying. The danger of being killed in a terrorist attack is extremely low. Yet, people are not afraid to text while driving, which is highly likely to result in an accident but are fearful of being victims of terrorism.

The following example illustrates the neglect of probability when it comes to lotteries.

Two games of chance: In the first, you can win \$10 million, and in the second, \$10,000. Which do you play? ... The probability of winning is one in 100 million in the first game, and one in 10,000 in the second game. So which do you choose? (Meaning Ring, 2016, para. 1).

The correct answer is the second lottery since it has an expected monetary value ten times greater than the first lottery. Most people, however, would choose the first lottery. This bias may also explain why people tend to be more afraid of flying than driving, even though the likelihood of dying in a plane crash is considerably lower than in a car accident.

Omission bias

Omission bias is the tendency to judge commissions – active, harmful actions that hurt others – as worse and more immoral than otherwise equivalent omissions (e.g., allowing others to die). We think it is worse to directly and actively harm others than cause harm passively by not doing something, even when the same number of people are hurt. The famous “Runaway Trolley” case is reminiscent of this bias. Approximately 90% of subjects are willing to pull a lever that diverts the runaway trolley and kills one person but saves the lives of five people. On the other hand, very few people would be willing to throw a fat man off a bridge to stop the runaway trolley and thereby save five people (known as ‘would you kill the fat man?’). In both cases, the math is the same: one person dies in an effort to save five (Bakewell, 2013).

Optimism Bias

This refers to the tendency to be overly optimistic about favorable outcomes. People do not believe that bad things will happen to them. Evatt (2010, para. 2) asserts: “Most people expect they have a better-than-average chance of living long, healthy lives; being successfully employed and happily married; and avoiding a variety of unwanted experiences such as being robbed and assaulted, injured in an automobile accident, or experiencing health problems.”

Similarly, most newlyweds underestimate the chance of getting divorced; most smokers feel that, unlike other smokers, they are less likely to develop smoking-related diseases such as cancer.

Outcome Bias

Outcome bias is a cognitive bias that refers to the tendency to judge the quality of a decision by focusing on the eventual outcome rather than examining the factors that existed when the decision was made. For example, a doctor might make a correct decision and go ahead with, say, doing a C-section. If the baby dies, people (and juries) are more likely to believe that the doctor made a poor decision. People have this inclination to overemphasize outcomes rather than the factors and issues present when the decision was made. A general might do something foolhardy. However, if he wins the battle, people will think he is a brilliant strategist.

Outcome bias should not be confused with hindsight bias. With hindsight bias, there has been memory distortion, and the past has not been accurately recalled. The person actually believes that s/he predicted that an event would occur, even though this was not the case. With outcome bias, on the other hand, the past is not misremembered; it is ignored or devalued. This is due to the tendency to minimize the uncertainties that existed when the decision was made and to focus mainly on the outcome.

Overconfidence Bias

Overconfidence bias is a type of certainty bias. However, with certainty bias, the focus is on our beliefs; with overconfidence bias, the focus is on our knowledge and talents. People tend to overestimate their abilities and are overconfident. This is an even more significant problem with experts. This overconfidence often results in people taking more substantial risks than they should. Kolbert (2017) highlights, "People believe that they know way more than they actually

do.” Sloman & Fernbach (2017) also speak of the “knowledge illusion”; we do not understand how little we actually know. With certain kinds of questions, answers that people feel that their response is 99% certain to be correct” turn out to be incorrect 40% of the time (Kasanoff, 2017).

Several books have been written about expert predictions which usually turn out to be wrong. Experts do only slightly better than random chance. Kahneman (2011, pp. 218-219) cites research conducted by Tetlock (2005) that demonstrates how poorly experts who make a living “commenting or offering advice on political and economic trends” actually perform. They do not do better than monkeys throwing darts on a board displaying the various possible outcomes (Kahneman 2011, p. 219).

This is what can be said about expert predictions:

When they’re wrong, they’re rarely held accountable, and they rarely admit it, either. They insist that they were just off on timing, or blindsided by an improbable event, or almost right, or wrong for the right reasons. They have the same repertoire of self-justifications that everyone has, and are no more inclined than anyone else to revise their beliefs about the way the world works, or ought to work, just because they made a mistake.

Extensive research in a wide range of fields shows that many people not only fail to become outstandingly good at what they do, no matter how many years they spend doing it, they frequently don’t even get any better than they were when they started. In field after field, when it came to centrally important skills—stockbrokers recommending stocks, parole officers predicting recidivism, college admissions officials judging applicants—people with lots of experience were no better at their jobs than those with very little experience (Eveleth, 2012, paras. 5, 7).

Kahneman (2011, pp. 222-233) believes that algorithms often do a better job at predictions than experts. He describes several situations where one should rely on a simple checklist consisting of, say, six relevant characteristics rather than relying on an expert. Kahneman discusses a simple algorithm developed by Dr. Virginia Apgar in 1953 to determine whether a newborn infant was in distress. Her method is superior to the expert judgment of

obstetricians since it focuses on several cues. Kahneman does point out the hostility towards using algorithms. Incidentally, Apgar's algorithm, still in use, has saved thousands of lives. Kahneman (2011, p. 226) cites the work of Dawes and claims that a simple formula that uses predictors (i.e., independent variables) with equal weights is often superior to multiple regression models that use complex statistics to assign different weights to each of the predictor variables. Multiple regression models are often affected by "accidents of sampling." Of course, some common sense is needed to select the independent variables most likely to predict the dependent variable accurately. Dawes claims that the simple algorithm of "frequency of lovemaking minus frequency of quarrels" does an excellent job of predicting marital stability (Kahneman, 2011, p. 226). The bottom line is that we should not be overly impressed with the judgment of experts.

It does, however, sometimes pay to be overconfident. There is evidence that others overrate individuals who are overconfident and sure of their abilities; underconfident individuals are underrated by others as being worse than they happen to be (Lamba & Nityananda, 2014). This may explain why politicians have no problem being so sure of themselves and overpromising (Hutson, 2014).

The importance of overconfidence is being used to explain why there is a gender gap in the corporate world. Men are more egotistical than women, making them appear more capable (Hutson, 2014). Kahneman (2011) believes that one has to be very careful with people who are overconfident and assertive. Before accepting that they know what they are talking about, one has to have some way of measuring this empirically. He concludes that "overconfident professionals sincerely believe they have expertise, act as experts and look like experts. You will have to struggle to remind yourself that they may be in the grip of an illusion."

Peak–End Rule

The peak-end rule is a cognitive bias that deals with how people judge experiences, both pleasant (e.g., vacations) and unpleasant (e.g., sticking a hand in ice-cold water). People tend to perceive experiences mainly by how it was at the peak and when it ended. The peak is the most intense part of the experience and might be positive or negative. Interestingly, people do not average the entire experience to arrive at an overall rating.

Whitbourne (2012) provides the following examples to demonstrate the peak-end rule.

[P]articipants exposed to 30 seconds of 14-degree ice water (very cold!) rated the experience as more painful than participants exposed to 90 seconds of exposure to 60 seconds of 14-degree ice water plus 30 additional seconds of 15 degree ice water. In other words, participants found the 90 seconds of ice water exposure less painful than those exposed to 60 seconds of nearly equally cold water because the 90 seconds ended with exposure to a “warmer” stimulus. We will rate an experience as less painful, than, if it ends on a slightly less painful way. The “peak end” in this case was a one degree difference in water temperature.

People will prefer and even choose exposing themselves to more pain (objectively determined) if the situation ends with them feeling less pain... If you are having a tooth drilled, you'd find it was less painful if the dentist ends the procedure with some lightening of the drill's intensity, even if the procedure is longer than it would otherwise be.

We approach not only our experiences of pleasure and pain in this way, but also our acquisition of objects that we're given as gifts... participants given free DVDs were more pleased with the gifts if they received the more popular ones after the less popular ones, then if they received the exact same DVDs in the opposite order. When it comes to pleasure, it's all about the ending (Whitbourne, 2012, paras. 7-9).

Pessimism Bias

This refers to the tendency of some individuals to be overly pessimistic and exaggerate the likelihood that negative events will occur. People with this type of outlook believe that negative things will keep happening to them and they will not succeed at all kinds of tasks. Individuals who suffer from depression are very likely to have a pessimism bias (Alloy &

Ahrens, 1987). It is the opposite of optimism bias.

Planning Fallacy

This bias is related to overconfidence and an illusion of control (McCann, 2014). People tend to underestimate the time and cost it will take to complete a project or task. What often happens when completing a job is that something unforeseen happens. McCann (2014) lists this bias, together with the illusion of control and overconfidence, as special problems in corporate finance. Kahneman (2011: 249-251) cites a survey conducted in 2002 of American homeowners who remodeled their kitchens. They thought the cost of the job would be around \$18,658 and ended up spending an average of \$38,769.

This happens frequently when the government estimates the cost of a new weapons system or buildings. Kahneman (2011, p. 251) provides a simple solution known as “reference class forecasting.” The forecaster should try to gather information about time or cost from outsiders involved in similar ventures and use this information to come up with a baseline prediction. The forecaster should then decide whether they are too optimistic regarding time and cost and see if the baseline prediction needs to be adjusted.

Projection Bias

Projection bias refers to the tendency of people to misperceive how their future tastes and preferences will differ from current tastes and preferences. People tend to exaggerate to themselves the degree to which their future preferences, values, and tastes will be the same as their current preferences, values, and tastes (Loewenstein, O’Donoghue, & Rabin, 2003). Projection bias leads to all kinds of poor choices, including becoming addicted to, say, cigarettes,

buying too many impulse items when shopping while hungry, and ordering too much food in a restaurant when ordering at the beginning of the meal while hungry. People deciding on where to vacation during the summer who make their plans during the winter when it is freezing will tend to go to places that are too hot because of projection bias. They will assume that they need a hot place. Of course, once the winter is over, preferences change.

Reactance

Human beings value their freedom and ability to make any choice. Suppose someone tries to restrict their choice, and people feel that they are being forced into a particular behavior. In that case, they will resent the diminution in freedom and act in a manner that restores their autonomy. In other words, they often do the opposite of what the authority figure tells them to do.

Reactive Devaluation

Reactive devaluation is a cognitive bias that results when people reject or downgrade ideas merely because they originated from an opponent, competitor, or other antagonist. One way to overcome this is by not revealing the source of the idea or pretending that it came from someone the other party likes.

Regression Toward the Mean (also known as regression to the mean) Bias

Regression toward the mean bias was first documented by Sir Francis Galton (1886), who examined the relationship between parents' height and their children's height. He found that, in general, parents who are taller than average tend to have children who are taller than average; and parents who are shorter than average tend to have children who are shorter than average.

However, in instances where the parents' average height was greater than the average for the population (e.g., suppose the father is 6'8" and the mother is 5'11"), the children tended to be shorter than the parents. Similarly, when the parents' average height was shorter than the average for the population (e.g., suppose the father is 5'1" and the mother is 4'10"), the children tended to be taller than the parents.

Regression to the mean is a widespread statistical phenomenon and has many implications. Thus, if you play a slot machine and have a "hot hand" and win several times in a row (this is due to chance), you might conclude that you have a winning streak and keep playing. However, regression toward the mean indicates that if you keep playing, your luck will run out, and you will start losing. The same is true in sports. An athlete with a phenomenal year who hits 60 home runs will probably not do as well the following year. Smith (2016) discusses the so-called "Sports Illustrated Cover Jinx." There is no curse associated with being on the cover of Sports Illustrated. The reason players tend to have a poor year after being on the cover of Sports Illustrated is not a curse but due to the regression to the mean. Smith (2016) demonstrates that the five baseball players with the highest batting averages in 2014 (the average for the five was .328) did worse in 2015 (the average dropped to .294).

Regression to the mean will not happen if two perfectly correlated variables are measured (there is no random effect). If two variables do not have a strong correlation, regression to the mean will occur. Kahneman (2011, p.181) provides the following examples. Given that the correlation between SAT scores and college GPA is .60, and the correlation between income and education level is .40, there will be a more substantial regression-to-the-mean effect. The weaker the correlation, the more significant the role of randomness. The batting average of baseball players during one season correlates with the batting average of a subsequent season, but the

correlation is not perfect. Also, if a measurement is far from the population mean, there will be a stronger regression-to-the-mean effect since the amount of room to regress is much larger than if the measurement is close to the population mean.

Regression towards the mean can result in serious mistakes by researchers and decision-makers. They may believe something is due to an experimental factor when it is simply due to chance. Suppose you take a sample of 200 ADHD children who score very highly on aggressiveness and feed them borscht thrice daily. If you examine the aggressiveness scores 60 days later, the scores should be lower because of regression towards the mean, not drinking borscht. This is true of any measurements. If you examine the scores of subjects that are either much higher or much lower than average and then take a second set of measurements from the same people, the second set of scores should be closer to the population average.

Morton & Torgerson (2003) feel that all healthcare professionals should be aware of regression to the mean if they want to make correct decisions.

Clinicians use diagnostic tests to target and monitor treatment. Regression to the mean can confound this strategy. The preliminary test has a high probability of giving an abnormal result through chance, and initial treatment may be unnecessary. Because of this chance effect, there is a high probability that subsequent measurements will spontaneously regress toward the mean value. This misleads clinicians and patients into thinking that treatment has been effective when the treatment was either not required or ineffective...

Public health interventions are often aimed at sudden increases in disease and thus vulnerable to the effects of regression to the mean (Morton & Torgerson, 2003, para. 5).

Kahneman (2011, pp. 175-176) describes the mistakes made in teaching flight instructors. The belief that praising trainee pilots for an excellent landing often resulted in a subsequent poor landing is contrary to theories that claim that good performance should be rewarded so that

subjects become conditioned to do well. The correct explanation was regression towards the mean.

Kahneman (2011, pp. 181-182) underscores that a statement such as “Highly intelligent women tend to marry men who are less intelligent than they are” will result in many interesting theories involving causality. For example, some people will feel this is because intelligent women do not want to compete with their husbands. In actuality, regression to the mean provides a more straightforward explanation. Tversky and Kahneman (1974) describe “misconceptions of regression” as one of the six cases of the *representativeness/similarity* bias in judgment.

Representativeness Heuristic

This cognitive bias is a mental shortcut that we use when estimating probabilities. As noted above in the discussion of base rate fallacy, *representativeness/similarity* heuristic is a general, shared term that describes various errors individuals make when judging probabilities. Tversky and Kahneman (1974) identified six situations where representativeness/similarity caused fallacious reasoning: (1) Insensitivity to the prior probability of outcomes; (2) Insensitivity to sample size; (3) Misconceptions of chance; (4) Insensitivity to predictability; (5) The illusion of validity; and (6) Misconceptions of regression (to the mean). One should also add the “Conjunction Fallacy” to this list.

We make decisions regarding the likelihood of a particular event based on calculating how similar it is to an existing belief, stereotype, or mental prototype. The problem with this heuristic is that it may result in disregarding important information and thus making a poor decision. For example, one researcher found that decisions made by jurors could be affected by the wearing of eyeglasses which increases intelligence ratings of defendants and decreases guilty

verdicts. The authors also found several interaction effects between the defendant's race and the wearing of eyeglasses (Brown, Henriquez, and Groscup, 2008). Facial tattoos probably can also influence how we perceive someone.

Selective Perception Bias

People tend to allow their expectations or beliefs to influence how they perceive the world. Thus, information that contradicts existing beliefs will tend to be overlooked and/or forgotten; information in agreement with their expectations will be noticed and retained (selective retention).

Self-Serving Bias

There is no question that people want to see themselves in a positive light.” (Heine et al., 1999; Wang et al., 2015). Self-serving bias, a type of attributional bias, enables people to see themselves in a positive light. It is a type of cognitive bias that involves attributing one's successes to internal, personal characteristics (internal attributions) and blaming one's failures on outside forces beyond one's control (external attributions). In other words, we take personal credit when we succeed (e.g., getting an A+ in a course), but if something does not work out (e.g., getting a D in a class), we tend to deny responsibility and blame outside factors such as a poor teacher or an unfair test. One thing self-serving bias accomplishes is improving one's self-esteem and strengthening the ego. However, it makes it difficult for a person to desire to improve if s/he believes all failures are due to outside forces.

Semmelweis Reflex

The Semmelweis Reflex refers to the tendency to reject new ideas because they contradict established beliefs and paradigms. This was named after Dr. Ignaz Semmelweis, who could not convince doctors to wash their hands before delivering babies (see story at <http://www.exp-platform.com/Pages/SemmelweisReflex.aspx>).

Spotlight Effect

The spotlight effect is a cognitive bias that describes the tendency that makes individuals overestimate the degree to which they are observed and noticed by others. If people believe they are in the spotlight and being noticed more than they actually are, they become more self-conscious and worried about their behavior and appearance. Awareness of this bias can help one be more accurate in evaluating social situations.

Status Quo Bias

Status quo bias is a cognitive bias that occurs when people favor the familiar and prefer that things remain the same rather than opting for change. People seem to prefer inaction to making decisions. It also manifests itself when inertia results in people continuing with a previously-made decision rather than trying something new. People are more upset about the negative consequences of making a new decision than the consequences of not making any decision (Kahneman & Tversky, 1982). Choosing by default (default may be a historical precedent or a choice made noticeable), an automated choice heuristic, is related to status quo bias.

Stereotyping Bias

Stereotyping is a mental shortcut used by people when making decisions about strangers. When stereotyping, we have certain expectations about the qualities and attributes members of a group (e.g., women, blacks, Jews, homosexuals, Hispanics, Asians, Moslems, etc.) possess. It is much easier for the brain to remember a generalization than specifics because they require less effort. Thus, a generalization like “all _____ are violent” is much easier to recall than dealing with scores of individuals (Benson, 2022). One might make certain assumptions about a person who identifies as a liberal Democrat or conservative Republican. However, many stereotypes are incorrect and based on fallacious beliefs about certain groups. In any case, there is a great deal of variability among individuals that comprise a group.

Survivor Bias

This refers to the tendency to focus on the people or objects that survived or succeeded. We tend to ignore the non-survivors and might completely overlook them because they have become invisible. Unfortunately, in many cases, the non-survivors or failures can provide us with much information. However, because they are not around, we may be unaware of the considerable amount of missing data.

Shermer (2014) provides the following interesting example of survivor bias citing Gary Smith, author of the book *Standard Deviations*:

Smith illustrates the effect with a playing card hand of three of clubs, eight of clubs, eight of diamonds, queen of hearts and ace of spades. The odds of that particular configuration are about three million to one, but Smith says, “After I look at the cards, the probability of having these five cards is 1, not 1 in 3 million.” (Smith, 2014, para. 2).

Survivor bias is also known as sampling or selecting on the dependent variable. This is where the researcher selects cases where some measure or phenomenon of interest has been observed while excluding the cases where the variable or phenomenon of interest has not been observed. The selected cases are then used to prove the measure or phenomenon of interest. For example, suppose a researcher looks only at successful firms as measured by annual returns. She concludes that these firms were headed by leaders who had humility and that CEO humbleness makes a company great. This finding may or may not be valid. The flaw in the researcher's reasoning is that she also did not examine unsuccessful firms. It is quite possible that humble CEOs also head unsuccessful firms.

In Search of Excellence by Tom Peters and Robert H. Waterman (1982) is one of the most popular business books. The authors studied 43 of America's best-run in an effort to determine what made them successful and came up with eight basic principles of management. In other words, they sampled based on the dependent variable of "excellent firms in 1982." The question is, what happened to those firms? Eckel (2013) says that "two-thirds of them underperformed the S&P 500 over a decade. Some faltered badly, and some even went out of business." Kodak, K Mart, and Wang Labs are three examples of firms on Peter and Waterman's (1982) list that went bankrupt. Amdahl, also on the list, was successful until the early 1990s and then started losing money and was eventually taken over. Baum and Smith (2015) also found that the stock performance of these companies did not stand the test of time.

Von Restorff Effect

This bias is named after the German psychologist Hedwig von Restorff (1906–1962). She found that radically different and distinctive things are more likely to stand out in one's brain than ordinary items. This is the logic of highlighting terms that we want to remember.

Heuer, Jr. (2010, Chapter 10) suggests other ways to make information stand out:

Specifically, information that is vivid, concrete, and personal has a greater impact on our thinking than pallid, abstract information that may actually have substantially greater value as evidence. For example:

*Information that people perceive directly, that they hear with their own ears or see with their own eyes, is likely to have greater impact than information received secondhand that may have greater evidential value.

*Case histories and anecdotes will have greater impact than more informative but abstract aggregate or statistical data (Heuer, Jr., 2010, Chapter 10).

Zeigarnik Effect

There is a tendency for people to find it easier to remember a task that is incomplete and has not been finished than one which has been completed. This probably has to do with the way short-term memory works. This effect is named after Russian psychologist Bulma Zeigarnaik who first wrote about it (Zeigarnik, 1927).

Zero-Risk Bias

See Certainty Effect.

Conclusion

Taylor (2013) highlights that cognitive biases may harm businesses because they often result in poor decisions. He notes that there are several ways to reduce these biases. First, he posits that one must be aware of the different types of biases. By studying cognitive biases and understanding them, one can reduce their impact. Second, he asserts that collaboration is probably the most powerful tool for minimizing cognitive biases. This is why it is crucial to have diverse groups (groupthink is also a bias) that can work together to make a decision. He highlights some recommendations made by Daniel Kahneman, who recommends that the following questions should be asked so as to minimize cognitive bias:

Is there any reason to suspect the people making the recommendation of biases based on self-interest, overconfidence, or attachment to past experiences? Realistically speaking, it is almost impossible for people to not have these three influence their decisions.

Was there groupthink or were there dissenting opinions within the decision-making team? This question can be mitigated before the decision-making process begins by collecting a team of people who will proactively offer opposing viewpoints and challenge the conventional wisdom of the group (Taylor, 2013, para. 13).

Soll, Milkman & Payne (2015) provide suggestions on how to outsmart some cognitive biases. They discuss three tools that can be used to prevent what they call “misweighting,” i.e., placing too much weight on the wrong information: blinding, checklists, and algorithms. Blinding is one way to eliminate the effects of such factors as stereotyping. One orchestra had job candidates audition behind a screen to prevent gender bias. This resulted in a considerable increase (from 5% to 40%) in female players. The use of checklists helps place the focus on what is truly relevant and helps reduce cognitive biases that may result in poor choices. This has helped venture capitalists and HR people make better selections. Algorithms are far from perfect

since people create them, but they are still considerably better than relying solely on human judgment (Soll, Milkman & Payne, 2015).

How many decisions a day does the average person make? This is a challenging question to answer. The number often cited online is 35,000 (Hoomans, 2015). Of course, most of these decisions are as trivial as when to get out of bed. Many decisions, however, are quite serious, and a poor choice can cause immense harm. Indeed, wars are often the result of cognitive biases when it comes to understanding the enemy (Zur, 1991). Indeed, politicians, business people, military leaders, negotiators, and investors must improve their decision-making abilities. This means doing everything possible to minimize cognitive biases. One cannot be a critical thinker without understanding cognitive biases and knowing how to deal with them.

References

- Alloy, L. B. & Ahrens, A. H. (1987). Depression and pessimism for the future: Biased use of statistically relevant information in predictions for self versus others. *Journal of Personality and Social Psychology*, 52(2), 366-378.
- Ariely, D. (2009). The end of rational economics. *Harvard Business Review*, July. Retrieved from <https://hbr.org/2009/07/the-end-of-rational-economics>
- Ariely, D. (2008). *Predictably irrational*. HarperCollins Publishers.
- Azzopardi, P. V. (2010). *Behavioural technical analysis: An introduction to behavioural finance and its role in technical analysis*. Harriman House.
- Bakewell, S. (2013). Clang went the trolley: 'Would you kill the fat man?' and 'the trolley problem.' *New York Times Book Review*. Retrieved from <http://www.nytimes.com/2013/11/24/books/review/would-you-kill-the-fat-man-and-the-trolley-problem.html>
- Baum, G. & Smith, G. (2015) Great companies: Looking for success secrets in all the wrong places. *Journal of Investing*, Fall, 61-72. Available at: <http://economics-files.pomona.edu/GarySmith/SuccessSecrets.pdf>
- Bazerman, M. H. & Tenbrunsel, A. E. (2011a). Ethical breakdowns. *Harvard Business Review*, April. Retrieved from <https://hbr.org/2011/04/ethical-breakdowns>
- Bazerman, M. H. & Tenbrunsel, A. E. (2011b). *Blind spots: Why we fail to do what's right and what to do about it*. Princeton University Press.
- Beard, C., & Peckham, A. D. (2020). Interpretation bias modification. In J. S. Abramowitz & S. M. Blakey (Eds.), *Clinical handbook of fear and anxiety: Maintenance processes and treatment mechanisms* (pp. 359–377). American Psychological Association. <https://doi.org/10.1037/0000150-020>
- Benson, B. (2022). Cognitive bias cheat sheet. *Better Humans*. Retrieved from <https://betterhumans.pub/cognitive-bias-cheat-sheet-55a472476b18>
- Boyd, D. (2015, August 30). Innovators beware the hindsight bias. *Psychology Today*. Retrieved from <https://www.psychologytoday.com/blog/inside-the-box/201508/innovators-beware-the-hindsight-bias>
- Brown, M. J., Henriquez, E., & Groscup, J. (2008). The effects of eyeglasses and race on juror decisions involving a violent crime. *American Journal of Forensic Psychology*, 26(2), 25–43.
- Buxbaum, R. E. (2013). The scientific method isn't the method of scientists. *Rebresearch.com*. Blog. Retrieved from <http://www.rebresearch.com/blog/the-scientific-method-isnt-the-method-of-scientists/>
- Caputo, A. (2013). A literature review of cognitive biases in negotiation processes. *International Journal of Conflict Management*, 24(4), 374-398.
- Cassidy J. (2013, September 11). The saliency bias and 9/11: Is America recovering? *New Yorker*. Retrieved from <http://www.newyorker.com/news/john-cassidy/the-saliency-bias-and-911-is-america-recovering>
- Chen, D., Moskowitz, T. J. & Shue, K. (2016). Decision-making under the gambler's fallacy: Evidence from asylum judges, loan officers, and baseball umpires. *Quarterly Journal of Economics*, 131(3), March, 1-60. DOI: 10.1093/qje/qjw017
- Chery, K. (2015, November 9). What is the bandwagon effect? *Verywell.com*. Retrieved from <https://www.verywell.com/what-is-the-bandwagon-effect-2795895>

- Chery, K. (2016). What is a cognitive bias: Definition and examples. *Verywell.com*. Retrieved from <https://www.verywell.com/what-is-a-cognitive-bias-2794963>
- Chery, K. (2017). What is the actor-observer bias? *Verywell.com*. Retrieved from <https://www.verywell.com/what-is-the-actor-observer-bias-2794813>
- Collier, C. (2021, January 27). This is how moral licensing hurts diversity and inclusion in the company. Retrieved from <https://drcherrycoaching.com/this-is-how-moral-licensing-hurts-diversity-and-inclusion-in-the-company/>
- Danvers, A. (2020, December 30). Dunning-Kruger isn't real. *Psychology Today*. Retrieved from <https://www.psychologytoday.com/us/blog/how-do-you-know/202012/dunning-kruger-isnt-real>
- Desjardins, J. (2021, August 26). Every single cognitive bias in one infographic. *Visual Capitalist*. Retrieved from <https://www.visualcapitalist.com/every-single-cognitive-bias/>
- Dror, I., E. McCormack, B. M. & Epstein, J. (2015). Cognitive bias and its impact on expert witnesses and the court. *Judges' Journal*, 54(4), Retrieved from http://www.americanbar.org/publications/judges_journal/2015/fall/cognitive_bias_and_its_impact_on_expert_witnesses_and_the_court.html#6
- Decision Lab (2023). Why do we seek certainty in risky situations? *DecisionLab.com*. Retrieved from <https://thedecisionlab.com/biases/zero-risk-bias>
- Eckel, B. (2013, November). Fake science. *Reinventing Business*. Retrieved from <http://www.reinventing-business.com/2013/10/fake-science.html>
- Evatt, C. (2010). Brain biases. Retrieved from <http://brainshortcuts.blogspot.com/2010/11/optimism-bias.html>
- Eveleth, R. (2012, July 31). Why experts are almost always wrong. *Smithsonian.com*. Retrieved from <http://www.smithsonianmag.com/smart-news/why-experts-are-almost-always-wrong-9997024/>
- Fitza, M. A. (2013). The use of variance decomposition in the investigation of CEO effects: How large must the CEO effect be to rule out chance? *Strategic Management Journal*, 35(12), December, 1839-1852.
- Flynn, S. (2013, May 8). Behavioural economics: part three – understanding purchasing pains. *PowerRetail*. Retrieved from: <http://www.powerretail.com.au/marketing/behavioural-economics-part-three-understanding-purchasing-pains/>
- Flyvbjerg, B. (2021). Top ten behavioral biases in project management: An overview. *Project Management Journal*, 52(6), 531– 546. <https://doi.org/10.1177/87569728211049046>
- Frederick, S., Loewenstein, G. & O'Donoghue, T. (2002). Time discounting and time preference: A critical review. *Journal of Economic Literature*, 40, June, 351-401.
- Friedman, H. H. & Friedman, L. W. (2009, May 3). Bigotry in academe: Disciplinary elitism. *SSRN.com*. Retrieved from [SSRN: https://ssrn.com/abstract=1398505](https://ssrn.com/abstract=1398505) or <http://dx.doi.org/10.2139/ssrn.1398505>
- Galton, F. (1886). Regression towards mediocrity in hereditary stature. *Journal of the Anthropological Institute*, 15, 246-263.
- Gigerenzer, G. (2018). The bias bias in behavioral economics. *Review of Behavioral Economics*, 5(3-4), 303–336. <https://doi.org/10.1561/105.00000092>
- Gignac, G. E. & Jankowski, M. (2020). The Dunning-Kruger effect is (mostly) a statistical artefact: Valid approaches to testing the hypothesis with individual differences data. *Intelligence*, 80, May-June, 10149. <https://doi.org/10.1016/j.intell.2020.101449>

- Goldacre, B. (2011). The dangers of cherry-picking evidence. *Guardian*. Retrieved from <https://www.theguardian.com/commentisfree/2011/sep/23/bad-science-ben-goldacre>
- Gorman, S. E. & Gorman, J. M. (2017). *Denying to the grave: Why we ignore the facts that will save us*. Oxford University Press.
- Heike, T. (2019, July 3). The cognitive bias codex. *Teach Thought*. Retrieved from <https://www.teachthought.com/critical-thinking/cognitive-biases/>
- Heine S. J., Lehman D. R., Markus H. R., Katayama S. (1999). Is there a universal need for positive self-regard? *Psychological Review*, 106, 766–794.
- Heshmat, S. (2015, April 23). What is confirmation bias? *Psychology Today*. Retrieved from <https://www.psychologytoday.com/blog/science-choice/201504/what-is-confirmation-bias>
- Heshmat, S. (2018, March 8). What is loss aversion? *Psychology Today*. Retrieved from <https://www.psychologytoday.com/us/blog/science-choice/201803/what-is-loss-aversion>
- Heuer, Jr., R. J. (2008). Psychology of intelligence analysis. *CIA's Center for the Study of Intelligence*. Available at <https://www.cia.gov/library/center-for-the-study-of-intelligence/csi-publications/books-and-monographs/psychology-of-intelligence-analysis/art3.html>
- Hoomans, J. (2015, March 20). 35,000 decisions: The great choices of strategic leaders. *Leading Edge Journal*. Retrieved from <http://go.roberts.edu/leadingedge/the-great-choices-of-strategic-leaders>
- Hutson, M. (2014). It pays to be overconfident, even when you have no idea what you're doing. *New York Magazine*. Retrieved from <http://nymag.com/scienceofus/2014/05/pays-to-be-overconfident.html>
- Ignatius, D (February 8, 2009). The death of rational man. *Washington Post*. Retrieved from http://articles.washingtonpost.com/2009-02-08/opinions/36876289_1_nouriel-roubini-behavioral-economics-irrational-psychological-factors
- Joint Commission (2016). Cognitive biases in health care. *Quick Safety*, Issue 28, October. Retrieved from https://www.jointcommission.org/assets/1/23/Quick_Safety_Issue_28_Oct_2016.pdf
- Kahneman, D. (2012). The human side of decision making: Thinking things through with Daniel Kahneman. *Journal of Investment Consulting*, 13(1), 5-14.
- Kahneman, D. (2011). *Thinking fast and slow*. Farrar, Straus and Giroux.
- Kahneman, D., & Tversky, A. (1982). The psychology of preference. *Scientific American*, 246, 160-173.
- Kahneman, D., & Tversky, A. (1984). Choices, values, and frames. *American Psychologist*, 39(4), 341-350. doi:10.1037/0003-066x.39.4.341
- Kahneman, D., Knetsch, J. L. & Thaler, R. H. (1990). Experimental tests of the endowment effect and the Coase theorem. *Journal of Political Economy*, 98(6), December, 1325-48.
- Kasanoff, B. (2017, March 29). 175 reasons why you don't think clearly. *Forbes*. Retrieved from <https://www.forbes.com/sites/brucekasanoff/2017/03/29/sorry-you-cant-make-a-logical-data-driven-decision-without-intuition/#1e6bbf847f60>
- Kim, M.Y., Han, K. (2023). For me or for others? The better-than-average effect and negative feelings toward average others during the COVID-19 pandemic. *Current Psychology*, 42, 13173–13181. <https://doi.org/10.1007/s12144-021-02548-z>
- Kinari, Y., Ohtake, F. & Tsutsui, Y. (2009). Time discounting: Declining impatience and interval effect. *Journal of Risk and Uncertainty*, 39(1), 87-112. doi:10.1007/s11166-009-9073-1

- Kolbert, E. (2017, February 27). Why facts don't change our minds. *New Yorker*. Retrieved from <http://www.newyorker.com/magazine/2017/02/27/why-facts-dont-change-our-minds>
- Kruger, J. & Dunning, D. (1999). 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 (6), 1121–34. doi: 10.1037/0022-3514.77.6.1121
- Kuran, T. & Sunstein, C. (2007). Availability cascades and risk regulation. University of Chicago Public Law & Legal Theory Working Paper, No. 181. Retrieved from http://chicagounbound.uchicago.edu/cgi/viewcontent.cgi?article=1036&context=public_law_and_legal_theory
- Lamba S. & Nityananda, V (2014). Self-deceived individuals are better at deceiving others. *PLoS ONE*, August, 9(8): e104562. doi:10.1371/journal.pone.0104562
- Lee, S. & Feeley, T. H. (2016). The identifiable victim effect: A meta-analytic review. *Social Influence*, 11(3), 199-215. <http://dx.doi.org/10.1080/15534510.2016.1216891>
- Linville, P. W., Fischer, G. W., & Fischhoff, B. (1992). AIDS risk perceptions and decision biases, in J. B. Pryor and G. D. Reeder (Eds.), *The social psychology of HIV infection*. Hillsdale, NJ: Erlbaum.
- Loewenstein, G., O'Donoghue, T., & Rabin, M. (2003). Projection bias in predicting future utility. *Quarterly Journal of Economics*, 118 (4), 1209–1248.
- Marcus, G. (2008). *Kluge: The haphazard evolution of the human mind*. New York: Houghton Mifflin Company.
- Matzke, D., Nieuwenhuis, S., van Rijn, H., Slagter, H. A, van der Molen, M. W. & Wagenmakers, E. J. (2013). Two birds with one stone: A preregistered adversarial collaboration on horizontal eye movements in free recall. Retrieved from http://dora.erbe-matzke.com/papers/DMatzke_EyeMovements.pdf
- McCann, D. (2014, May 22). 10 cognitive biases that can trip up finance. *CFO*. Retrieved from <http://ww2.cfo.com/forecasting/2014/05/10-cognitive-biases-can-trip-finance/>
- McNeil, B. J., Pauker, S. G., & Tversky, A. (1988). On the framing of medical decisions, in D. E. Bell, H. Raiffa, and A. Tversky (Eds.), *Decision making: Descriptive, normative, and prescriptive interactions*. Cambridge, England: Cambridge University Press.
- Meaning Ring (2016, March 28). Why you'll soon be playing mega trillions. Retrieved from <http://meaningring.com/2016/03/28/neglect-of-probability-by-rolf-dobelli/>
- Mercier, H. & Sperber, D. (2017). *The enigma of reason*. Harvard University Press.
- Mission Command (2015, January 9). Cognitive biases and decision makings: A literature review and discussion of implications for the US army. White Paper. *Mission Command Center of Excellence*. Retrieved from http://usacac.army.mil/sites/default/files/publications/HDCDTF_WhitePaper_Cognitive%20Biases%20and%20Decision%20Making_Final_2015_01_09_0.pdf
- Moore, C. (2019, December 30). What is negativity bias and how can it be overcome? *Positive Psychology*. Retrieved from <https://positivepsychology.com/3-steps-negativity-bias/>
- Morton, V. & Torgerson, D. J. (2003, May 17). Effect of regression to the mean on decision making in health care. *BMJ*, 326(7398), 1083-1084. doi: 10.1136/bmj.326.7398.1083 Retrieved from <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC1125994/>
- National Institute on Drug Abuse (2017, January). Is marijuana a gateway drug? Retrieved from <https://www.drugabuse.gov/publications/research-reports/marijuana/marijuana-gateway-drug>

- Noll, J. & Sharma, S. (2014). Qualitative meta-analysis on the hospital task: Implications for research *Journal of Statistics Education*, 22(2). Available at www.amstat.org/publications/jse/v22n2/noll.pdf
- Norton, M. I., Mochon, D. & Ariely, D. (2012). The IKEA effect: When labor leads to love. *Journal of Consumer Psychology*, 22(3), July, 453–460.
- Obermaier, M., Koch, T. & Baden, C. (2015). Everybody follows the crowd? Effects of opinion polls and past election results on electoral preferences. *Journal of Media Psychology*, DOI: <http://dx.doi.org/10.1027/1864-1105/a000160>
- Patel, N. (2015, May 18). 5 psychological hacks that will make your pricing page irresistible. *Marketing Land*. Retrieved from <http://marketingland.com/5-psychological-hacks-will-make-pricing-page-irresistible-121535>
- Peters, T. & Waterman, R. H. (1982). *In search of excellence*. New York: Harper & Row.
- Pike, B., Curtis, M. B. & Chui, L. (2013). How does an initial expectation bias influence auditors' application and performance of analytical procedures? *Accounting Review*, July, 88(4), 1413-1431.
- Pollitt, M. G. & Shaorshadze, I. (2011). The role of behavioural economics in energy and climate policy. Cambridge Working Papers in Economics (CWPE) No. 1165. University of Cambridge. Retrieved from <http://www.econ.cam.ac.uk/dae/repec/cam/pdf/cwpe1165.p>
- Poundstone, W. (2017, January 21). The Dunning-Kruger president. *Psychology Today*. Retrieved from <https://www.psychologytoday.com/blog/head-in-the-cloud/201701/the-dunning-kruger-president>
- Redstone, I. (2021, January 11). Splitting: The psychology behind binary thinking and how it limits a diversity of opinions. *Forbes*. Retrieved from <https://www.forbes.com/sites/ilanaredstone/2021/01/11/splitting-the-psychology-behind-binary-thinking-and-how-it-limits-a-diversity-of-opinions/>
- Reo, S. (2015, June 8). Researchers find everyone has a bias blind spot. *Carnegie Mellon University News*. Retrieved from <https://www.cmu.edu/news/stories/archives/2015/june/bias-blind-spot.html>
- Sherman, M. (2014, June 20). Why we don't give each other a break. *Psychology Today*. Retrieved from <https://www.psychologytoday.com/blog/real-men-dont-write-blogs/201406/why-we-dont-give-each-other-break>
- Shermer, M. (2014, September 1). How the survivor bias distorts reality. *Scientific American*. Retrieved from <https://www.scientificamerican.com/article/how-the-survivor-bias-distorts-reality/> doi:10.1038/scientificamerican0914-94
- Simbrunner, P. & Schlegelmilch, B.B. (2017). Moral licensing: A culture-moderated meta-analysis. *Management Review Quarterly*. 67, 201–225. <https://doi.org/10.1007/s11301-017-0128-0>
- Sloman, S. & Fernbach, P. (2017). *The knowledge illusion: Why we never think alone*. New York: Riverhead Books.
- Smith, G. (2016, October 12). The Sports Illustrated cover jinx: Is success a curse? *Psychology Today*. Retrieved from <https://www.psychologytoday.com/blog/what-the-luck/201610/the-sports-illustrated-cover-jinx>
- Smith, G. (2014). *Standard deviations: Flawed assumptions, tortured data, and other ways to lie with statistics*. New York: Overlook Press.

- Smith, J. (2015). 67 ways to increase conversion with cognitive biases. *Neuromarketing*. Retrieved from <http://www.neurosciencemarketing.com/blog/articles/cognitive-biases-cro.htm#>
- Soll, J. B., Milkman, K. L. & Payne, J. W. (2015). Outsmart your own biases. *Harvard Business Review*, May, Retrieved from <https://hbr.org/2015/05/outsmart-your-own-biases>
- Taylor, J. (2013, May 20). Cognitive biases are bad for business. *Psychology Today*. Retrieved from <https://www.psychologytoday.com/blog/the-power-prime/201305/cognitive-biases-are-bad-business>
- Tetlock, P. (2005). *Expert political judgment: How good is it? How can we know?* Princeton, New Jersey: Princeton University Press.
- Thaler, R. H. and Mullainathan, S. (2008). How behavioral economics differs from traditional economics. *The Concise Library of Economics*. Retrieved from <http://www.econlib.org/library/Enc/BehavioralEconomics.html>
- Thaler, R. H. & Sunstein, C. R. (2008). *Nudge*. New Haven, CT: Yale University Press.
- Thompson, D. (2013, January 16). The irrational consumer: Why economics is dead wrong about how we make choices. *Atlantic.com*. Retrieved from <http://www.theatlantic.com/business/archive/2013/01/the-irrational-consumer-why-economics-is-dead-wrong-about-how-we-make-choices/267255/>
- Tversky, A. & Kahneman, D. (1974). Judgment under Uncertainty: Heuristics and biases. *Science*, 185, No. 4157, 1124- 1131.
- Tversky, A. & Kahneman, D. (1981). The framing of decisions and the psychology of choice. *Science*, 211, 453–458.
- Tversky, A. & Kahneman, D. (1983). Extension versus intuitive reasoning: The conjunction fallacy in probability judgment. *Psychological Review*, 90 (4), October, 293–315. doi:10.1037/0033-295X.90.4.293.
- Villines, Z. (2022, October 20). What is splitting in borderline personality disorder (BPD)? *Medical News Today*. Retrieved from <https://www.medicalnewstoday.com/articles/bpd-splitting>
- von Restorff, H. (1933). Über die wirkung von bereichsbildungen im spurenfeld. *Psychologische Forschung*, 18, 299-342. doi:10.1007/BF02409636
- Wadley, J. (2012, September 20). New study analyzes why people are resistant to correcting misinformation, offers solutions. *Michigan News*. Retrieved from <http://ns.umich.edu/new/releases/20768-new-study-analyzes-why-people-are-resistant-to-correcting-misinformation-offers-solutions>
- Wang, X., Zheng, L., Cheng, X., Li, L., Sun, L., Wang, Q. & Guo, X. (2015). Actor-recipient role affects neural responses to self in emotional situations. *Frontiers in Behavioral Neuroscience*, 9:83, Published online Published online 2015 Apr 15. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4397920/doi:10.3389/fnbeh.2015.00083>
- Whitbourne, S. K. (2012, September 8). Happiness: It's all about the ending. *Psychology Today*. Retrieved from <https://www.psychologytoday.com/blog/fulfillment-any-age/201209/happiness-it-s-all-about-the-ending>
- WNYC (2015, May 18). The campaign ad that reshaped criminal justice. *WNYC Studios*. Retrieved from <https://www.wnycstudios.org/podcasts/takeaway/segments/crime-reshaped-criminal-justice>
- Zeigarnik, B. (1927). Über das behalten von erledigten und unterledigten handlungen. *Psychologische Forschung*, 9, 1-85.

Zur, O. (1991). The love of hating: The psychology of enmity. *History of European Ideas*, 13(4), 345-369.