Murat Durmus

THE COGNITIVE BIASES Compendium

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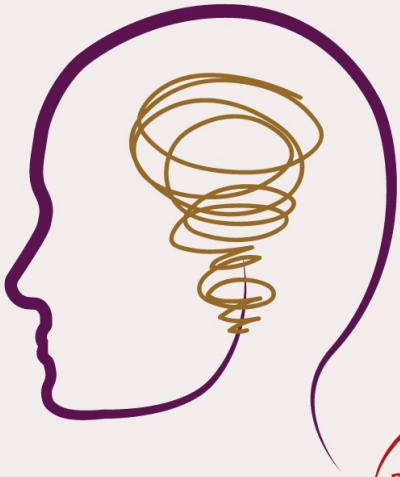
Explore over 150 Cognitive Biases



Bonus Chapter: Algorithmic Bias

The Cognitive Biases Compendium

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Bonus Chapter:

Algorithmic Bias

Murat Durmus

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Note:

Examples of each cognitive bias were written with the support of ChatGPT (OpenAI). The author meticulously reviewed the AI-generated text and adjusted it accordingly.

"Bias here, Bias there;

Watch out, Bias everywhere!"

~

Murat Durmus

For You

You Know Why

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PREFACE

Cognitive biases refer to systematic patterns of deviation from normative and rational judgment. These biases are extensively studied in the fields of psychology and behavioral economics.

While many of these biases have been confirmed through reproducible research, there is an ongoing debate about how to classify and explain them. Some experts, such as Gerd Gigerenzer, criticize labeling cognitive biases as errors of judgment and argue that they can be interpreted as rational deviations from logical reasoning.

Explanations for these biases involve using information-processing rules, known as heuristics, which the brain employs to make decisions or judgments. Biases can manifest in various forms, encompassing cognitive biases driven by mental noise and motivational biases influenced by wishful thinking. Often, both types of biases coexist simultaneously.

Controversy surrounds certain biases, with debates questioning whether they are considered useless or irrational or if they contribute to positive attitudes and behavior. For instance, in social interactions, people ask leading questions to confirm their assumptions about others. However, this confirmation bias has also been regarded as a social skill that aids in building connections.

Although much of the research on biases has been conducted with human subjects, there is evidence of biases observed in nonhumans. For instance, loss aversion has been demonstrated in monkeys, while

hyperbolic discounting has been observed in rats, pigeons, and monkeys.

This book covers 168 cognitive biases, some extensively researched while others loosely understood. Nonetheless, the book aims to provide a comprehensive overview and introduction to cognitive biases. A chapter on "Algorithmic Biases" has been included, recognizing the growing significance of addressing biases in artificial intelligence systems used for decision-making.

Let's learn more about our human biases to make less biased conclusions in the future.

Murat Durmus

TOO MUCH INFORMATION

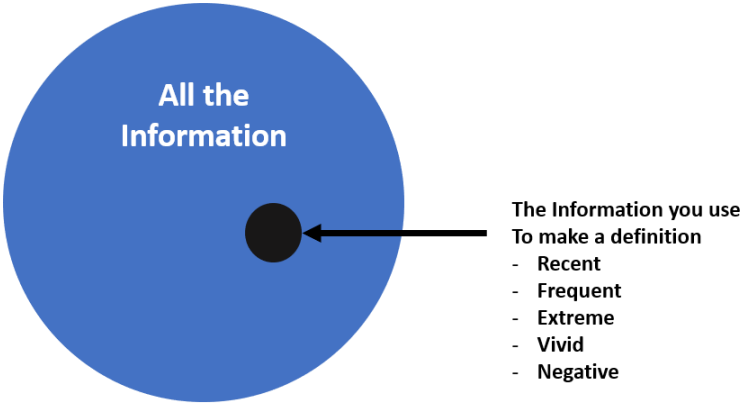
We notice things already primed in memory or repeated often.

Availability Heuristic

Availability bias

The tendency to overestimate the likelihood of events having greater "availability" in memory may be influenced by how recent the memories are or how unusual or emotionally charged they may be.

The availability heuristic, also known as availability bias, is a mental shortcut that relies on immediate examples that come to a person's mind when evaluating a particular topic, concept, method, or decision. It is a cognitive process where individuals judge based on the ease with which relevant examples or instances come to mind.



The availability heuristic is based on the notion that something that can be remembered must be necessary or more important than alternative solutions that cannot be easily recognized. In other words, if the information is readily available in one's memory, it will likely be considered a representative or common occurrence.

As a result, because of the availability heuristic, people tend to bias their judgments heavily toward recent information. This means that new opinions or evaluations are often influenced and skewed by the latest news or events that are more easily accessible in memory.

The availability heuristic can lead to biases in decision-making and judgment, as it may cause individuals to overestimate the likelihood or importance of events or circumstances based solely on their availability in memory. It is essential to be aware of this bias and strive for a more comprehensive and balanced assessment of information and alternatives when making decisions or forming opinions.

Example:

Imagine you are considering taking a flight to visit a friend in another city. As you start planning, you find a news article about a recent airplane crash. The news story's vivid details and emotional impact make it easily accessible in your memory.

Due to the availability heuristic, you might overestimate the likelihood of being involved in a plane crash because the news article's recent and emotionally charged memory dominates your thinking. As a result, you might feel hesitant or fearful about taking the flight, even though statistically, air travel is one of the safest modes of transportation.

In this example, the availability heuristic leads to a biased judgment based on the ease with which the negative example of the plane crash comes to mind. It influences your perception of risk and skews your decision-making process, as you give more weight to the recent and emotionally charged memory rather than considering the overall safety record of air travel.

Attentional Bias

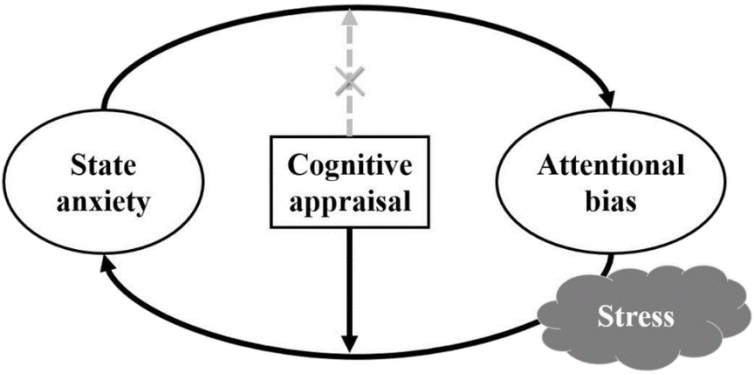
Availability bias

The phenomenon of attentional bias describes how recurring thoughts can influence a person's perception. It refers to the selective factors that affect a person's attention, causing them to prioritize certain information while neglecting or downplaying alternative possibilities. This bias can arise from a person's existing train of thought or preexisting beliefs that shape their perception of the world.

For instance, consider cigarette smokers. Due to the altered reward sensitivity of their brain, smokers often exhibit an attentional bias for smoking-related cues in their environment. This means they are likelier to notice and pay attention to stimuli associated with smoking, such as cigarette packs, lighters, or the smell of smoke. The attentional bias reinforces their thoughts and cravings related to smoking, making it challenging for them to consider alternative possibilities or the negative consequences of smoking.

Attentional biases are not limited to smokers; they have also been associated with clinically relevant symptoms such as anxiety and depression. Individuals with anxiety, for example, may display an attentional bias toward threatening stimuli. This bias causes them to be more attuned to potential dangers, perceiving them more intensely than neutral or positive stimuli. The attentional bias in anxiety can perpetuate anxious thoughts and contribute to the maintenance of anxiety symptoms.

To sum up, attentional bias has a crucial impact on our perception, focusing our attention on specific elements while disregarding others. It may impede our capacity to explore alternative viewpoints and sustain existing ideas, desires, or symptoms linked to conditions like addiction, anxiety, or depression.



Unidirectional moderating effect of cognitive appraisal in the interaction between state anxiety and attentional bias[1]

To sum up, attentional bias has a crucial impact on our perception, as it focuses our attention on specific elements while disregarding others. It may impede our capacity to explore alternative viewpoints and sustain current ideas, desires, or symptoms linked to conditions like addiction, anxiety, or depression.

Example:

Consider an individual who experiences social anxiety. They frequently feel self-conscious and are concerned about how they are perceived in social situations. This ongoing thought process results in an attentional bias, causing them to concentrate more on negative social cues and interpret them as evidence that supports their fears.

In a social gathering, this person might selectively notice instances where others seem disinterested or appear to be judging them. They might overanalyze subtle facial expressions, body language, or perceived signs of rejection. At the same time, they might overlook positive social cues, such as friendly smiles or compliments, because their attention is fixated on potential threats or negative interpretations.

The attentional bias in this example reinforces the person's existing thoughts and fears about social interactions, making it difficult for them to consider alternative possibilities or objectively evaluate the situation. It perpetuates their anxiety symptoms, as their attention remains selectively focused on confirming their preconceived notions rather than considering a more balanced perspective.

Illusory Truth Effect

Truthiness

The illusory truth effect refers to the tendency to believe a statement is accurate simply because it is easier to process or because it has been repeated multiple times, regardless of its actual truth content. It represents instances where perceived truthfulness deviates from reality.

The first condition of the illusory truth effect is based on a logical mechanism. When people encounter new information, they often compare it to what they already know to be true. Suppose a statement aligns with their existing knowledge or beliefs. In that case, it is processed more efficiently and feels more familiar and plausible. In contrast, unfamiliar or contradictory statements require more cognitive effort to process and evaluate.

Repetition plays a crucial role in this effect. When a statement is repeated, it becomes more familiar and easier to process compared to recently encountered statements that haven't been repeated. As a result, people tend to associate repetition with accuracy and perceive the repeated information as more valid, even if its truthfulness is questionable.

The illusory truth effect can also be linked to hindsight bias, which refers to memory distortion after learning the truth. When people are repeatedly exposed to a statement and later discover it false, they may misremember their initial confidence in its truthfulness. This distortion can further reinforce the belief that the statement was

inherently true, leading to a retrospective alignment of confidence with the now-known truth.

Overall, the illusory truth effect highlights how cognitive processes related to familiarity and repetition can influence our perception of truth. It serves as a reminder that the ease of processing or the frequency of exposure does not guarantee the accuracy or validity of a statement. Critical evaluation and verification of information are essential to overcome the potential biases introduced by the illusory truth effect.

Example

A new product called "Miracle Weight Loss Tea" has been introduced. Through repetitive advertising and endorsements, the company claims that drinking tea will lead to significant weight loss without diet or exercise. The commercials, social media posts, and testimonials repeatedly emphasize the product's effectiveness.

As people are exposed to these repeated messages, the illusory truth effect comes into play. Due to the familiarity and ease of processing associated with repeated claims, individuals perceive the statements as more valid and trustworthy. The constant repetition creates a sense of familiarity and convinces many that the product is a miraculous solution for weight loss.

Despite the lack of scientific evidence supporting the claims of the Miracle Weight Loss Tea, the illusory truth effect leads individuals to believe in its efficacy. They may be swayed by the number of times they've heard about the product and assume its repeated promotion indicates its truthfulness.

Mere-Exposure Effect

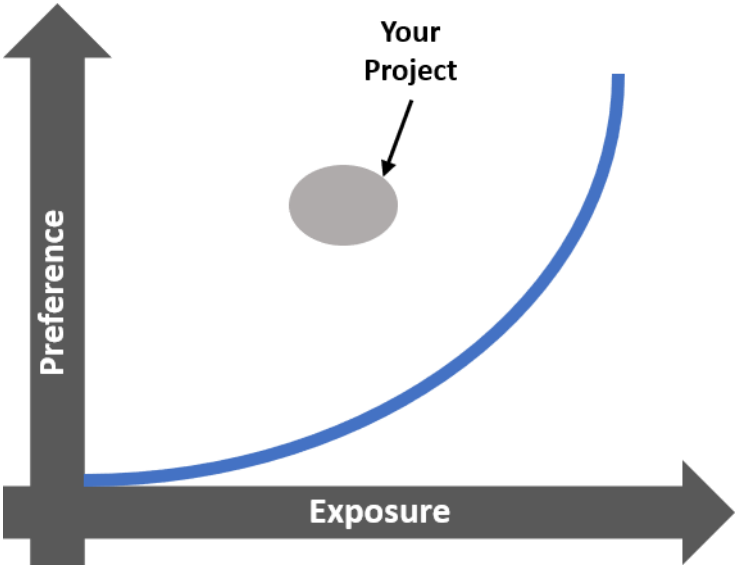
Familiarity principle

The mere-exposure effect, also known as the familiarity principle, refers to the tendency to express undue liking for things merely because of familiarity. It is a psychological phenomenon where individuals develop a preference for objects, people, or stimuli simply because they have been exposed to them repeatedly.

Extensive research in various domains of psychology has examined this phenomenon. Studies have shown that individuals tend to favor stimuli, such as words, Chinese characters, paintings, pictures of faces, geometric figures, and even sounds, that they have encountered multiple times. The more exposure they have to these stimuli, the more positively they evaluate and appreciate them.

The mere-exposure effect plays a significant role in interpersonal attraction. Research has found that the more we encounter someone, the more we tend to like and find them attractive. This can impact how we interact with others and build relationships since we often develop positive feelings toward those we know.

It is important to note that the mere-exposure effect operates subconsciously, meaning that individuals may not be aware of its influence on their preferences and judgments. The effect highlights the role of familiarity in shaping our perceptions and preferences, even when objective qualities or characteristics are not considered.



Understanding the mere-exposure effect can help us recognize and critically evaluate our preferences, ensuring that we do not overly favor or judge things solely based on familiarity. It reminds us to approach new experiences with an open mind and consider other factors beyond mere exposure when forming opinions or making decisions.

Example

Let's say there is a new song that a famous artist has just released. When people first hear the song, they might not firmly believe it. However, as the song gains more airplay on the radio and becomes more widely heard, individuals are exposed to it repeatedly.

Over time, due to the mere-exposure effect, people may start to develop a liking for the song. They might catch themselves humming along to the tune or finding it catchy, even if they didn't initially react

strongly to it. Repeated exposure to the song creates a sense of familiarity, contributing to increased preference for the song.

In this example, the mere-exposure effect demonstrates how people's liking for the song can be influenced by their light exposure to it. It showcases that our preferences and attitudes can be shaped by being repeatedly exposed to something, regardless of the song's objective quality or original appeal.

The influence of familiarity is not restricted to music alone; it also applies to other areas, such as advertising, product marketing, and social interactions. The more we are exposed to something, the more inclined we become toward it, showcasing the significant impact of familiarity on our perceptions and preferences.

Context Effect

Memory

That cognition and memory depend on context, such that out-of-context memories are more difficult to retrieve than in-context memories (e.g., recall time and accuracy for a work-related memory will be lower at home, and vice versa).

Context effects are considered part of the top-down design. The theoretical approach of constructive cognition supports the concept. Context effects such as word recognition, learning ability, memory, and object recognition can affect our daily lives. They can have a significant impact on marketing and consumer decisions. For example, research has shown that the comfort level of the floor shoppers are standing on can influence their assessment of the product's quality. Shoppers are likelier to give higher ratings to a product if standing on a comfortable floor and lower ratings if the floor is uncomfortable. This demonstrates how the context in which a judgment is made can influence the perception and evaluation of a product.

Because of such effects, context effects are currently studied predominantly in marketing. Marketers aim to understand how various contextual factors, such as physical environment, background music, or social cues, can shape consumer behavior and decision-making. By leveraging context effects, marketers can create more effective advertising campaigns, design store layouts that enhance customer experience, and optimize product presentations to align with the desired consumer context.

Recognizing context effects highlights the importance of considering the situational factors surrounding cognitive processes and memory retrieval. It emphasizes that our ability to remember and recall information can be influenced by the specific context we encountered and encoded it. By understanding and leveraging context effects, we can enhance learning, memory, and decision-making in various domains of life.

"THE CAT" is a classic example of context effect. We have little trouble reading "H" and "A" in their appropriate contexts, even though they take on the same form in each word.[2]

Example

Let's say you have a coworker named Sarah who always wears a distinctive red hat. Over time, you become accustomed to seeing Sarah with the red hat daily in the office. One day, Sarah comes to work without wearing her red hat. Later in the day, you are asked to recall a recent conversation with Sarah. However, due to the absence of her usual red hat, you might find it more difficult to retrieve the conversation's memory than if she had been wearing the hat.

In this example, the context of seeing Sarah with the red hat has become associated with your interactions and memories of her. When the familiar context is absent, such as when she is not wearing the hat, it creates a mismatch in the context cues, making it harder for you to recall the specific memory associated with that context.

This demonstrates how cognition and memory can be influenced by context and how out-of-context memories can be more challenging to retrieve. Our ability to remember and recall information often

depends on the context in which the information was encoded. When the context cues are altered or absent, it can impact our ability to retrieve those memories accurately.

Cue-Dependent Forgetting

Memory

Cue-dependent forgetting, also known as retrieval failure, occurs when the ability to retrieve information from memory is hindered due to the absence of appropriate retrieval cues. This phenomenon encompasses semantic, state, or context-dependent cues.

To illustrate this, let's consider the example of searching for files on a computer. In a computer's memory, a search is performed based on specific words or phrases. Relevant files containing those keywords are then displayed. However, human memory operates differently. Instead of directly accessing information by searching for specific cues, our memory retrieval relies on the association between memories. Some memories cannot be readily recalled by simply thinking about them; instead, we need to activate related associations or cues to access them.

In cue-dependent forgetting, the absence or inadequate activation of retrieval cues can hinder our ability to recall specific information. Retrieval cues can be external or internal factors present or encoded alongside the target information. These cues serve as triggers that facilitate memory retrieval by reactivating the associated memories.

Understanding the role of retrieval cues and the concept of cue-dependent forgetting can provide insights into how memory works and how we can enhance our memory retrieval processes. By employing effective retrieval cues or engaging in techniques such as context reinstatement, we can enhance our ability to access and retrieve information stored in our memory.

Example

Have you ever been in a situation where you remember someone's face and conversation with them but can't recall their name? It's a shared experience that requires memory support or cues to retrieve the missing information.

However, as you start to think about other details of the party, such as the location, the music playing in the background, or the people you were with, suddenly, the name pops into your mind. The contextual cues associated with the party environment serve as retrieval cues that facilitate the recall of the person's name.

In this example, the absence of an effective retrieval cue initially hindered your ability to remember the person's name. However, once you accessed related contextual cues from the party, those cues triggered the associated memory. They allowed you to retrieve the information you were seeking.

This illustrates how cue-dependent forgetting can occur when specific retrieval cues are lacking or not adequately activated, leading to difficulties recalling information from memory. The presence of appropriate cues significantly improves our ability to retrieve and remember information that might otherwise remain inaccessible.

Mood Congruence

Memory

The improved recall of information is congruent with one's current mood. Mood congruence refers to the phenomenon where there is a correspondence between a person's emotional state and the information they are more likely to remember or recall. Individuals in a particular mood tend to have better memory for information that is consistent or congruent with their current mood. If someone feels happy, they are more likely to recall positive memories or events that align with their positive mood. Similarly, if someone feels sad or anxious, they may have enhanced recall of negative or problematic information.

On the other hand, mood incongruence occurs when a person's emotional state or reactions are inconsistent with the situation or context. In such cases, the individual's emotional experience may seem out of place or contradictory to the circumstances. For instance, in mental health, individuals experiencing a depressive episode with bipolar disorder may have mood-congruent symptoms such as feelings of personal inadequacy, guilt, or worthlessness that align with their depressive mood. Conversely, mood-incongruent symptoms would involve experiences inconsistent with the person's mood, such as exhibiting elevated mood or grandiose delusions during a depressive episode.

Mood congruence and incongruence significantly shape how emotions and memories interact. The unity between mood and memory retrieval suggests that our emotional state can influence

what information is more accessible or salient in our memory, potentially affecting our overall perception and interpretation of events.

Example

Imagine that Sarah is feeling sad and downcast. She had a rough day at work, and everything seemed wrong. Later in the evening, Sarah's friend calls her and asks if she remembers a joyful event they had shared a few months ago—a fun day at the beach. Despite trying hard to recall the memory, Sarah struggles to remember it. However, as she continues talking with her friend, they start discussing a recent movie they watched: a heartwarming comedy. Suddenly, Sarah's face lights up, and she exclaims, "Oh, I remember now! That day at the beach was amazing! We laughed so much and had a great time!"

In this example, Sarah's mood congruence becomes evident. Initially, when she felt sad, it was difficult for her to recall the joyful memory of the beach day. However, when her friend introduced a topic (a recent comedy movie) that evoked a positive mood, Sarah's ability to remember the happy event improved. Her current mood and the congruent emotional content of the conversation acted as cues that facilitated the retrieval of the associated memory.

Frequency Illusion

Availability bias

The frequency illusion, also known as the Baader-Meinhof phenomenon, is an intriguing cognitive bias that involves the perception of something being noticed repeatedly, leading to the belief that it occurs more frequently than it does. This phenomenon can be attributed to selection bias, where our attention is drawn to a specific event, word, or concept, making us more likely to reencounter it.

The term "Baader-Meinhof phenomenon" originated from a peculiar incident involving the Baader-Meinhof Group. It all began when Terry Mullen noticed the term "Baader-Meinhof Group" for the first time and, shortly after, encountered references to it in other sources. Intrigued by this apparent coincidence, Terry Mullen wrote a letter to a newspaper column in 1994, sharing his experience. Following the publication of his letter, numerous readers responded with their accounts of similar occurrences where they encountered a new term or concept and then started noticing it frequently. As a result, the term "Baader-Meinhof phenomenon" was coined to describe this intriguing illusion of frequency.

The Baader-Meinhof phenomenon reminds us that our perception can be influenced by the focus of our attention and the increased salience of specific stimuli. While it may seem as though the occurrence of a specific event or term has suddenly skyrocketed, it is essential to recognize that our subjective experience does not always align with objective reality. The frequency illusion highlights the

fascinating interplay between our attention, memory, and perception, offering insight into how our minds interpret and process information in everyday life.

Example

Suppose you recently purchased a new car, a model you had never seen on the roads before. Excited about your new purchase, you start driving it around town. Suddenly, you begin to notice that the same car model seems to be everywhere. You see it parked on the street, passing by on the highway, and even in the parking lots. This car has suddenly become incredibly popular, even though you haven't noticed it before.

In reality, the frequency of this particular car model hasn't changed overnight. It's just that your attention has been directed towards it due to your recent purchase. Your mind has become more attuned to noticing this specific car. As a result, you start perceiving it as more common than it is. This heightened awareness creates the illusion that the car is appearing with improbable frequency.

The Baader-Meinhof phenomenon occurs when our attention is selectively focused on a particular item, topic, or concept, leading us to notice it more frequently than before. It's a fascinating cognitive bias that showcases how our current interests, experiences, or recent exposures can influence our perception.

Empathy Gap

Empathy bias

The tendency to underestimate the influence or strength of feelings in either oneself or others. Empathy gaps can be interpersonal (toward others) or intrapersonal (toward oneself, e.g., predicting one's future preferences). Much social psychological research has focused on intergroup empathy gaps, their underlying psychological and neural mechanisms, and their effects on downstream behavior (e.g., prejudice against outgroup members)."

Empathy gaps refer to the phenomenon where individuals underestimate the impact or intensity of emotions in themselves and others. It can occur in interpersonal situations, where people fail to recognize and understand the emotions experienced by someone else. It can also occur intrapersonally, where individuals struggle to predict their future preferences or emotional states accurately.

Extensive research in social psychology has examined intergroup empathy gaps, explicitly focusing on the psychological and neural mechanisms that underlie this phenomenon. These studies explore how empathy gaps contribute to biased perceptions, stereotypes, and prejudices against individuals from different social groups or outgroups. By understanding the mechanisms and consequences of empathy gaps, researchers aim to shed light on the factors that influence social behavior and promote more inclusive and empathetic attitudes.

Example

Let's consider a scenario where two friends, Sarah and John, are discussing a difficult situation Sarah is going through. Sarah tells John about her recent breakup and expresses her sadness, loneliness, and heartache. However, John struggles to comprehend the depth of Sarah's emotions fully and underestimates her pain's intensity. He might respond with comments like, "Just move on," or "It's not a big deal; you'll get over it."

In this example, John's response demonstrates an empathy gap. He fails to grasp the extent of Sarah's emotional turmoil fully and unintentionally downplays the significance of her feelings. John's underestimation of Sarah's emotions stems from an inability to empathize with her experiences accurately.

This example highlights how empathy gaps can hinder effective communication and support between individuals. It underscores the importance of recognizing and bridging these gaps to foster understanding, compassion, and genuine empathy in our interactions.

Omission Bias

(No assignment)

The moral bias of commissions versus omissions refers to the tendency to judge harmful actions (commissions) as worse or less moral than equally dangerous inactions (omissions). This bias can stem from various cognitive processes, such as psychological inertia, the perception of transaction costs, and the inclination to perceive harmful actions as more morally objectionable than equivalent harmful inactions.

The debate surrounding this bias revolves around whether it is a cognitive or rational decision-making process. Some argue that refraining from action is often seen as less morally culpable due to the absence of direct involvement or the perception of fewer negative consequences. However, others contend this bias may arise from irrational evaluations of harmful actions versus inactions.

One classic ethical dilemma that highlights this bias is the trolley problem, where individuals are asked to choose between actively causing harm to save many lives or passively allowing harm to occur by doing nothing. In such scenarios, the differing moral judgments and subjective evaluations shed light on the bias towards commissions and omissions.

Moreover, the bias of commissions versus omissions has been associated with other cognitive phenomena, including the endowment effect and the status quo bias. These concepts further contribute to understanding how our moral judgments and decision-

making processes can be influenced by the distinction between taking action and refraining from it.

Example

Imagine a situation where you witness a person drowning in a lake. There are two individuals nearby who are capable of rescuing the drowning person. One individual, let's call him John, actively chooses not to intervene and watches as the person struggles in the water. The other individual, Sarah, takes immediate action, jumps into the lake, and successfully saves the person from drowning.

In this scenario, the bias of commissions versus omissions comes into play. Despite the outcome being the same (the person is saved), there is a tendency to perceive John's inaction as morally worse or less admirable than Sarah's action. John's choice not to intervene may be viewed as a conscious decision to let harm occur, while Sarah's action is considered heroic and morally commendable.

This example demonstrates how the bias of commissions versus omissions can influence our moral judgments. It highlights the tendency to assign greater moral weight to harmful actions (commissions) compared to equally dangerous inactions (omissions), even when the outcome or consequence is the same.

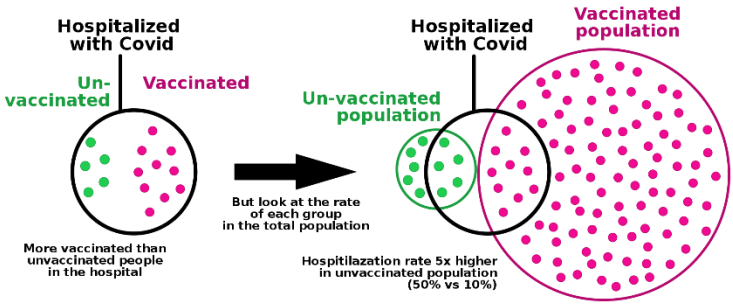
Base Rate Fallacy

Extension neglect

The base rate fallacy, also known as base rate neglect or bias, refers to ignoring general information and focusing primarily on specific case information, even when the general information is more critical. This cognitive bias occurs when individuals fail to adequately consider the base rate, which provides general information about the prevalence or likelihood of an event or condition in a population.

When base rate information is presented alongside specific case information, people tend to give more weight to the specific details and overlook the broader context provided by the base rate. In other words, individuals prioritize the specific instance or anecdotal evidence over the general statistical information. As a result, they may make biased judgments or decisions that are not aligned with the actual likelihood or probability of the event or condition.

The base rate fallacy highlights the importance of considering both general information and specific case details when making judgments or decisions. Ignoring base rates can lead to flawed reasoning, inaccurate risk assessments, and biased judgments. It is essential to recognize the relevance of base rate information and appropriately integrate it with specific case information to make more accurate and informed decisions.



A hospital receiving more vaccinated covid patients than unvaccinated ones might suggest that the vaccine is ineffective, but such an imbalance is to be expected within a highly vaccinated population[3]

Example

Suppose a study reveals that only 10% of the population in a specific city is affected by a particular medical condition, which we will refer to as Condition X. Later on, you come across a person named John who shares that he has been having symptoms that are linked to Condition X.

In this scenario, the base rate information tells us that only 10% of people in the city have Condition X. However, due to the base rate fallacy, you might solely focus on John's case and overlook the low prevalence of the condition in the population. As a result, you may be more inclined to believe that John is indeed suffering from Condition X, even though the probability of him having it is relatively low.

You might make a biased judgment or decision by neglecting the base rate and overemphasizing the specific case of John. It is crucial to consider both the specific case and the general information about the prevalence (base rate) of a condition or event to arrive at a more accurate assessment.

Bizarre, funny, visually striking, or anthropomorphic things stick out more than non-bizarre/unfunny things.

Bizarreness Effect

Memory

The bizarreness effect refers to the phenomenon where bizarre or unusual material is better remembered than common or ordinary material. While there is an ongoing debate and varying research findings about the existence and impact of the bizarreness effect on memory, some studies suggest its presence while others question its influence.

In a 1986 paper by McDaniel and Einstein, they argue that the improvement in memory for bizarre information is not solely due to its bizarreness but rather its distinctiveness. According to their perspective, when information is bizarre, it stands out. It becomes more distinct, which facilitates better encoding and subsequent recall. This distinctiveness captures the human brain's attention, which is naturally inclined to pay more attention to novel or unfamiliar information as an adaptive mechanism.

However, it is essential to note that not all research findings support the notion of the bizarreness effect on memory. Some studies suggest that bizarreness may impair memory performance or worsen recall outcomes. The scientific understanding of the bizarreness effect is complex. It continues to be explored by researchers in cognitive psychology and memory.

Overall, the relationship between bizarreness and memory is multifaceted, with distinctiveness potentially facilitating memory encoding. Further investigation is needed to fully understand the

underlying mechanisms and conditions that influence the impact of bizarreness on memory performance.

Example

Imagine you are attending a magic show. The magician performs a series of tricks, but one, in particular, stands out. He places a live goldfish in his mouth, then pulls out a fully grown rabbit from his ear. This bizarre and unexpected act captures your attention and leaves a lasting impression.

Later that day, you are discussing the magic show with a friend. Despite witnessing several other tricks during the performance, the memory of the magician pulling a rabbit out of his ear remains vivid in your mind. The bizarreness of the event has made it stand out and be better remembered compared to the more common tricks performed by the magician.

In this example, the bizarreness of the rabbit trick creates a unique and memorable experience that enhances your memory of it. Even if the other tricks were well-executed, they might fade into the background due to their lack of novelty and unexpectedness. The bizarreness effect demonstrates how extraordinary or peculiar events tend to imprint stronger on our memory than mundane or ordinary occurrences.

Humor Effect

Memory

The humor effect suggests that humorous items are more easily remembered than non-humorous items. This phenomenon has been observed in various contexts and can be attributed to several factors. One possible explanation is the specificity of humor. Jokes, witty remarks, and amusing anecdotes often contain unexpected or incongruous elements that deviate from our expectations. This element of surprise engages our attention and makes the information more memorable.

Another factor contributing to the humor effect is the longer cognitive processing time required to understand humor. Humorous content often involves wordplay, irony, or double meanings, which require additional mental effort to decipher and appreciate. The engagement of cognitive processes in understanding humor leads to deeper processing and encoding of the information, making it more likely to be retained in memory.

Additionally, humor elicits emotional responses such as amusement, joy, or laughter. The emotional arousal triggered by humor can enhance memory consolidation, leading to better retention of humorous information. The positive emotional experience associated with humor may also create a more precise and enjoyable memory trace, increasing the likelihood of recall.

Overall, the humor effect highlights the mnemonic power of humor, suggesting that humorous items have an advantage in memory

retention compared to non-humorous items. The specificity of humor, the cognitive processing, and the emotional arousal elicited by humor all contribute to this phenomenon.

Example

Picture yourself at a conference where one of the speakers kicks off their presentation with a funny story related to the topic. It's full of clever wordplay and surprising twists that make the audience burst into laughter. As the conference continues, various speakers present their material, some of which are informative and not meant to be humorous.

After the conference ends, you reflect on the day's events and realize that the humorous presentation stands out vividly in your memory. You can recall the details of the amusing story, the punchline, and even some of the laughter shared among the audience. In contrast, the non-humorous presentations feel blurrier in your memory, making key points and details harder to recall.

During the conference, the humor effect was demonstrated. This means that people tend to remember humorous content better than non-humorous content. This can be attributed to the specific nature of humor, the cognitive processing required to understand jokes, and the emotional response triggered by laughter, all of which contribute to improved memory retention of humorous items.

Von Restorff Effect

Memory

The Von Restorff effect, also known as the 'isolation effect,' suggests that when presented with a list of homogeneous stimuli, an item that stands out or differs from the others is more likely to be remembered. This effect was discovered by German psychiatrist and pediatrician Hedwig von Restorff (1906-1962) in her 1933 study. She found that participants demonstrated better memory retention for the distinct and isolated items within a list of categorically similar items.

The study employed the isolation paradigm, which presents a list of items where one item differs from the rest in a specific dimension. This unique feature, leading to the Von Restorff effect, can be achieved by altering the meaning or physical characteristics of the stimulus, such as its size, shape, color, and spacing, or by underlining it.

The Von Restorff effect highlights the impact of novelty and distinctiveness on memory encoding and retrieval. Drawing attention to unique or isolated stimuli enhances their chances of being remembered amidst a sea of similar information.

Example

Picture yourself at a conference where speakers present research findings on psychology-related topics such as cognitive processes, memory, perception, and social behavior throughout the day.

Among the presentations, one speaker stands out by wearing a vibrant, colorful outfit that is distinctly different from the professional attire of the other speakers. This speaker's talk focuses on the role of humor in memory retention. They deliver their presentation in a light-hearted and humorous manner, incorporating jokes and amusing anecdotes throughout.

As the conference concludes, and you reflect on the day's events, you find that the presentation by the speaker in the colorful outfit stands out in your memory. The distinctive appearance and engaging and humorous delivery make it more memorable than the other talks that followed a more traditional format.

In this example, the speaker's unique attire and humorous approach serve as the isolated and distinct stimuli, triggering the Von Restorff effect. The novelty and deviation from the norm capture your attention, making the presentation more memorable among the homogeneous set of conference talks.

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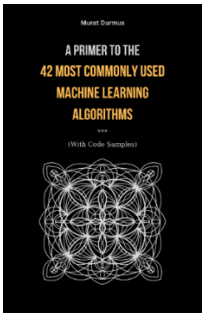

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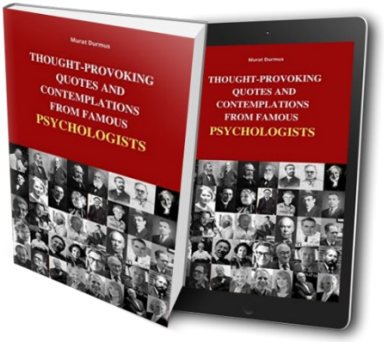

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REFERENCES

[1] Liu J, Shen K, Li H. How state anxiety and attentional bias interact with each other: The moderating effect of cognitive appraisal. 2019;81(3):694-706. doi:https://doi.org/10.3758/s13414-018-01650-y

[2] Context effect. (2023, February 19). In Wikipedia. https://en.wikipedia.org/wiki/Context_effect

[3] Base rate fallacy. (2023, July 4). In Wikipedia. https://en.wikipedia.org/wiki/Base_rate_fallacy

[4] Picture superiority effect. (2023, June 7). In Wikipedia. https://en.wikipedia.org/wiki/Picture_superiority_effect

[5] Weber–Fechner law. (2023, June 1). In Wikipedia. https://en.wikipedia.org/wiki/Weber%E2%80%93Fechner_law

[6] Confirmation bias. (2023, June 25). In Wikipedia. https://en.wikipedia.org/wiki/Confirmation_bias

[7] Galai D, Sade O. The "Ostrich Effect" and the Relationship between the Liquidity and the Yields of Financial Assets. Published online January 1, 2003. doi: https://doi.org/10.2139/ssrn.431180

[8] Clustering illusion. (2023, April 14). In Wikipedia. https://en.wikipedia.org/wiki/Clustering_illusion

[9] Gambler's fallacy. (2023, June 30). In Wikipedia. https://en.wikipedia.org/wiki/Gambler%27s_fallacy

[10] Dunning–Kruger effect. (2023, June 23). In *Wikipedia*. https://en.wikipedia.org/wiki/Dunning%E2%80%93Kruger_effect

[11] Sunk cost. (2023, June 14). In Wikipedia. https://en.wikipedia.org/wiki/Sunk_cost#Fallacy_effect

[12] IKEA effect. (2023, February 23). In Wikipedia. https://en.wikipedia.org/wiki/IKEA_effect

[13] Occam's razor. (2023, June 26). In Wikipedia. https://en.wikipedia.org/wiki/Occam%27s_razor

[14] Misinformation effect. (2023, May 28). In Wikipedia. https://en.wikipedia.org/wiki/Misinformation_effect

[15] "Serial-position effect" Wikipedia, Wikimedia Foundation, 20 February 2022, https://en.wikipedia.org/wiki/Serial-position_effect

[16] Regulation (EU) 2016/679 of the European Parliament and of the Council of 27 April 2016 on the protection of natural persons with regard to the processing of personal data and on the free movement of such data, and

repealing Directive 95/46/EC (General Data Protection Regulation) (Text with EEA relevance)
https://eur-lex.europa.eu/eli/reg/2016/679/oj
[17] Proposal for a REGULATION OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL LAYING DOWN HARMONISED RULES ON ARTIFICIAL INTELLIGENCE (ARTIFICIAL INTELLIGENCE ACT) AND AMENDING CERTAIN UNION LEGISLATIVE ACTS
https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:52021PC0206
[18] Day, Matt (31 August 2016). "How LinkedIn's search engine may reflect a gender bias". *The Seattle Times*. Retrieved 25 November 2017.
[19] Crawford, Kate; Schultz, Jason (2014). "Big Data and Due Process: Toward a Framework to Redress Predictive Privacy Harms". *Boston College Law Review*. **55** (1): 93–128. Retrieved 18 November 2017.
[20] Noble, Safiya (2012). "Missed Connections: What Search Engines Say about Women" (PDF). *Bitch*. **12** (4): 37–41.
[21] Guynn, Jessica (16 March 2017). "Google starts flagging offensive content in search results". *USA TODAY*. USA Today. Retrieved 19 November 2017.
[22] Simonite, Tom. "Study Suggests Google's Ad-Targeting System May Discriminate". *MIT Technology Review*. Massachusetts Institute of Technology. Retrieved 17 November 2017.
[23] Alexander, Rudolph; Gyamerah, Jacquelyn (September 1997). "Differential Punishing of African Americans and Whites Who Possess Drugs: A Just Policy or a Continuation of the Past?". *Journal of Black Studies*. **28** (1): 97–111. doi:10.1177/002193479702800106. ISSN 0021-9347. S2CID 152043501.
[24] Guynn, Jessica (1 July 2015). "Google Photos labeled black people 'gorillas'". *USA TODAY*. USA Today. USA Today. Retrieved 18 November 2017.
[25]"Alexa does not understand your accent". Washington Post.
[26] Sweeney, Latanya (28 January 2013). "Discrimination in Online Ad Delivery". arXiv:1301.6822 [cs.IR].
[27] Braun, Lundy (2015). "Race, ethnicity and lung function: A brief history". *Canadian Journal of Respiratory Therapy*. **51** (4): 99–101. ISSN 1205-9838. PMC 4631137. PMID 26566381.
[28] Johnson, Carolyn Y. (24 October 2019). "Racial bias in a medical algorithm favors white patients over sicker black patients". *Washington Post*. Retrieved 2019-10-28.
[29] Bartlett, Robert; Morse, Adair; Stanton, Richard; Wallace, Nancy (June 2019). "Consumer-Lending Discrimination in the FinTech Era". *NBER Working Paper No. 25943*. doi:10.3386/w25943. S2CID 242410791.

[30] Sandvig, Christian; Hamilton, Kevin; Karahalios, Karrie; Langbort, Cedric (22 May 2014). "Auditing Algorithms: Research Methods for Detecting Discrimination on Internet Platforms" (PDF). *64th Annual Meeting of the International Communication Association*. Retrieved 18 November 2017.
[31] Brin, Sergey; Page, Lawrence. "The Anatomy of a Search Engine". *www7.scu.edu.au*. Archived from the original on 2 July 2019. Retrieved 18 November 2017.
[32] Epstein, Robert; Robertson, Ronald E. (18 August 2015). "The search engine manipulation effect (SEME) and its possible impact on the outcomes of elections". *Proceedings of the National Academy of Sciences*. **112** (33): E4512–E4521. Bibcode:2015PNAS..112E4512E. doi:10.1073/pnas.1419828112. PMC 4547273. PMID 26243876.
[33] Bond, Robert M.; Fariss, Christopher J.; Jones, Jason J.; Kramer, Adam D. I.; Marlow, Cameron; Settle, Jaime E.; Fowler, James H. (13 September 2012). "A 61-million-person experiment in social influence and political mobilization". *Nature*. **489** (7415): 295–8. Bibcode:2012Natur.489..295B. doi:10.1038/nature11421. ISSN 0028-0836. PMC 3834737. PMID 22972300.
[34] Zittrain, Jonathan (2014). "Engineering an Election" (PDF). *Harvard Law Review Forum*. **127**: 335–341. Retrieved 19 November 2017.
[35] Jeff Larson, Julia Angwin (2016-05-23). "How We Analyzed the COMPAS Recidivism Algorithm". *ProPublica*. Archived from the original on 29 April 2019. Retrieved 2020-06-19.
[36] Skeem J, Lowenkamp C, Risk, Race, & Recidivism: Predictive Bias and Disparate Impact, (June 14, 2016). Available at SSRN: https://ssrn.com/abstract=2687339 or https://doi.org/10.2139/ssrn.2687339
[37] Angwin, Julia; Grassegger, Hannes (28 June 2017). "Facebook's Secret Censorship Rules Protect White Men From Hate Speech But Not Black Children — ProPublica". *ProPublica*. Retrieved 20 November 2017.
[38] Angwin, Julia; Grassegger, Hannes (28 June 2017). "Facebook's Secret Censorship Rules Protect White Men From Hate Speech But Not Black Children — ProPublica". *ProPublica*. Retrieved 20 November 2017.
[39]Angwin, Julia; Varner, Madeleine; Tobin, Ariana (14 September 2017). "Facebook Enabled Advertisers to Reach 'Jew Haters' — ProPublica". *ProPublica*. Retrieved 20 November 2017.
[40] Sap, Maarten. "The Risk of Racial Bias in Hate Speech Detection" (PDF). Archived (PDF) from the original on 2019-08-14.

[41] Ghaffary, Shirin. "The algorithms that detect hate speech online are biased against black people". *Vox*. Retrieved 19 February 2020.

[42] Graham, Stephen D.N. (July 2016). "Software-sorted geographies" (PDF). *Progress in Human Geography* (Submitted manuscript). **29** (5): 562–580. doi:10.1191/0309132505ph568oa. S2CID 19119278.

[43] Furl, N (December 2002). "Face recognition algorithms and the other-race effect: computational mechanisms for a developmental contact hypothesis". *Cognitive Science*. **26** (6): 797–815. doi:10.1207/s15516709cog2606_4.

[44] Introna, Lucas; Wood, David (2004). "Picturing algorithmic surveillance: the politics of facial recognition systems". *Surveillance & Society*. **2**: 177–198. Retrieved 19 November 2017.

[45] Buolamwini, Joy; Gebru, Timnit (2018). "Gender Shades: Intersectional Accuracy Disparities in Commercial Gender Classification" (PDF). *Proceedings of Machine Learning Research*. **81**: 1 – via MLR Press.