

Summary of Don't Believe Everything You Think

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Chapter 1: Weird Beliefs and Pseudoscientific Thinking

Despite widespread scientific and technological progress, many people continue to believe strange and unusual things. Talk show hosts claim to speak with the dead, reputable hospitals employ technicians who practice therapeutic touch, otherwise good scientists believe in dowsing, educational institutions hire practitioners of “facilitated communication”, a large percentage of people believe in paranormal powers, extraterrestrials, and reincarnation, and even the White House consulted astrologers.

Some of the fault for accepting such beliefs lies with the media. Studies show that the media emphasize the extraordinary—often “without disclaimer”—and that this emphasis influences public opinion dramatically. The media often rely upon pseudoscientific and anecdotal reports, taking one person’s account as typical, thereby generalizing the unusual. Sometimes, this can have disastrous results, as exemplified in the cases of women who claimed myriad illnesses caused by breast enhancement surgery. (It was determined that there was no correlation between the surgery and the illnesses long after millions of dollars in damages were paid out). Pseudoscientific reports are often similar to anecdotes: they provide some evidence, but often of questionable quality. Unfounded claims, in themselves, can be harmless; however, sometimes they can lead to disastrous results. For example,

many people have been imprisoned based upon the unfounded results of facilitated recollection (p. 42).

These results could mostly be avoided if people more consistently did not form and confirm preconceived beliefs without searching for or accepting evidence that conflicted with those beliefs (page 41). Because we so willingly accept pseudoscience and anecdotal evidence, “We waste tens of billions of dollars and person hours every year on largely mythical hazards like road rage, on prison cells occupied by people who pose little or no danger to others, on programs designed to protect young people from dangers that few of them ever face, [and] on compensation for victims of metaphorical illnesses” (p. 44).

Chapter 2: A Gremlin on My Shoulder

When considering claims like the above, we should keep several rules in mind. First, “extraordinary claims require extraordinary evidence.” The more unusual a claim is, the more convincing the evidence should be (p. 47). This implies that in the absence of such evidence, we should suspend belief in the claim. Belief should not be founded merely in subjective experience—one person’s claim of truth is not sufficient to establish the truth of that claim, even for that person (p. 50). For this reason, people should remain skeptical of extraordinary claims; after all, what scientist wouldn’t “love to find compelling evidence for the existence of extraterrestrials or ESP?” (p. 51). As Carl Sagan said, if you don’t have “an ounce of skeptical sense in you, then you cannot distinguish useful ideas from the worthless ones” (p. 52).

Being a good skeptic also means having a method for testing whether or not to believe something. This involves examining all claims for valid evidence,

considering “alternative hypotheses” and evaluating “the reasonableness of each hypothesis” (p. 53). Simply put, if a hypothesis (or a belief) cannot be tested, it cannot be proven and therefore is unworthy of belief. If it cannot be disproved, there is no means to determine whether it is true or false (p. 55). Moreover, the simplest explanation for all phenomena ought to be accepted first, and this explanation should not “conflict with other well-established knowledge” (p. 56).

Chapter 3: Thinking like a Scientist

“Science is not the affirmation of a set of beliefs, but a process of inquiry aimed at building a testable body of knowledge constantly open to rejection or confirmation” (p. 72). Understanding this is one of the most important keys to rejecting unfounded beliefs and avoiding mental errors. Science proceeds with the understanding that results of claims must be reproducible. This relies upon “peer review and criticism”, which is the practice of approving scientific ideas, theories, and studies via a committee of people knowledgeable in a given field. Through this means, scientists forward hypotheses that others can test, critique, modify, and retest. This process generally guarantees progress toward greater degrees of confidence in particular beliefs.

This practice conflicts with pseudoscience, and with the public’s interpretation of scientific findings. In pseudoscience, no effort is generally made to reproduce results (p. 81), and ideas are not critiqued by scholars in a field. Instead, hypotheses are accepted that explain highly unusual phenomena, such as UFOs, to explain visual misperceptions. The public commonly accepts pseudoscience and exaggerates claims that real science makes. “For example, after initial research found that listening to Mozart marginally improved students’ scores on one type of

test, and only for a short period of time, the media played up the benefits of classical music. Before long, conscientious moms were playing Mozart symphonies to their unborn babies.”

Instead of being swayed by anecdotes or single studies, scientists (and those with scientific outlooks) remain “skeptical of unsubstantiated claims,” insist that results be testable and reproducible, “try to falsify a claim”, “consider alternative explanations” to highly improbable claims, accept explanations that don’t “conflict with well-established knowledge,” and believe only those claims that are founded in evidence (p. 82).

Chapter 4: The Role of Coincidence and Chance

Our desire to find a cause often leads us to see explanations where only chance exists. In fact, we often ignore the effects of probability in favor of highly improbable causal explanations. For example, many people believe in ESP even though studies indicate that those who profess powers of ESP can predict no better than those who guess at random. Gamblers equally ignore the role of probability when they assume that random events “even out” in the short term (p. 92). And sports enthusiasts swear that the “hot hand” is a real phenomenon even though studies indicate that no such phenomenon exists (p. 94).

Humans are particularly guilty of ignoring probability when attributing significance to coincidence and ritual. People often believe that there are hidden powers or secret meaning behind events that are merely extreme coincidences. Even the noted psychologist Carl Jung proposed a theory of synchronicity that held that “such coincidences are the work of some unknown force trying to impose order on events of the world” (p. 96). In fact, we notice such coincidences and ignore the

myriad times when no such coincidence occurs: a phenomenon known as “selective perception” (p. 97).

Superstition is the most extreme form of finding meaning in coincidence. Those who are superstitious often notice some coincidence, such as a great success or failure on the heels of some action, no matter how unrelated. They then repeat the action believing that its repetition will bring the same results they saw in the previous coincidence of events. Skinner and others claim that superstitious behavior results from the same kind of “operant conditioning” that we see among animals who perform odd actions when they receive food unexpectedly—they form a conditioned “belief” that their bodily behavior brought the reward and seek to duplicate the reward through the behavior.

Chapter 5: Seeing Things that Aren't There

Our perceptions are often guided by our expectations. In fact, “research has found that two factors significantly influence how we perceive the world—we see what we *expect* to see and we see what we *want* to see” (p. 102). This desire to see what we expect results in perceptual and evaluative illusions. For example, many people will report that a light in a room blinked when they were told that it would, even though it did not (p. 103). Even professional football referees have been shown to call more penalties on teams that wear black than other teams (p. 105) because of the connection that some make between “the color black and evil.” Even teams that switched colors from black to blue in the middle of the season were penalized more while wearing black!

This tendency to make broad associations based upon limited evaluations is known as “the halo effect” (p. 104). We commonly assume that attractive people

are happier, for example, and that they are better workers. And we even judge the quality of work based upon past performance, as we see in the example of the famous author Jerzy Kosinski, whose novel was accepted and praised when his name was attached to it and rejected (even by the original publisher) when his name was removed from it and resubmitted.

We also attribute more positive qualities to ourselves (p. 109), (a tendency that is often called the Lake Wobegon Effect). "A great majority of us think we are more intelligent, more fair-minded, and less prejudiced than the average person." This is true of all walks of life from students to taxi drivers. Furthermore, we extend these positive qualities to those with whom we feel affinity, such as our preferred political candidates (p. 106).

But we don't only deceive ourselves in judging personality traits: we can often create visual perceptions that simply don't exist. One "common human perceptual phenomenon, called pareidolia" (p. 109) describes the tendency to see images in "ambiguous stimuli." For example, people can easily see Satan's face in a dark cloud emanating from the World Trade Center before its collapse on 9/11, and thousands of people see the Virgin Mary's image in quotidian things like ice cream stains, darkened spots on burned tortillas, highway signs, and rust spots (p. 107).

Given this tendency toward voluntary perceptual illusion, it is not surprising that hallucinations are common. In fact, "about 10 percent to 25 percent of normal people have experienced at least one vivid hallucination in their lives" (p. 110). These hallucinations seem real, but are actually simply the brain's internal workings. In fact, "there are circuits in the brain that are involved with religious and other supernatural experiences, which may be activated by outside stimulation or

seizures” (p. 110). These hallucinations can be caused by a permanent condition known as Charles Bonnet syndrome. This amazing and debilitating malady results in people seeing “miniature policemen” or “dragons, shining angels, little circus animals, and elves” (p. 114). One man even experienced the top half of his visual field as normal, and the bottom half as being hallucinated.

Not all hallucinations emanate from faulty neurology: some come from a social phenomenon called “mass hysteria.” Mass hysteria happens when an individual reports some terrifying experience and others who learn of it report the same. For example, when a woman reported that a man entered her house at night and gassed her, 29 people reported the same thing happening, while the police turned up no evidence to corroborate the stories (p. 112). Instances like these cross cultures, from sightings of Bigfoot type creatures to reports of public slashings.

“Given our misperceptions, we can’t always trust that our senses are giving us an accurate read of reality, which is a main reason why we can’t rely on anecdotal evidence when evaluating the truth of a claim” (p. 117). We should, in fact, accept explanations that do not require using our imagination or ones that coincide with our strong desire to confirm our pre-existing beliefs.

Chapter 6: Seeing Associations that Aren’t There

“Studies demonstrate that if we think two variables are related, we’ll often see a connection, irrespective of the evidence. This is what is known as illusory correlation—we see associations that don’t actually exist” (p. 125). While individuals are guilty of finding these associations in everyday life, entire industries of trained professionals are as well. For example, technical analysts make a living

predicting stock movements based upon perceived patterns in charts which in fact do not exist. In fact, "charting has been shown to be useless" (p. 122). Psychology is equally guilty: using tests such as the Rorschach and the Draw-a-Person tests, psychologists, psychiatrists, and therapists draw conclusions of patients' conditions despite the fact that the tests have never correlated with any known conditions. Studies indicate that "Therapists are seeing associations between responses and illnesses or personality traits because they expect to see them, not because they exist" (p. 125). Perhaps the best example of finding non-existent associations comes from graphology. A full "85 percent of the largest corporations in Europe" have used graphology in personnel evaluations despite the fact that "research has demonstrated that graphology is completely useless" (p. 126).

These erroneous tendencies might be overcome by taking into account "negative information." For example, studies that sought to show a correlation between sugar consumption and hyperactivity in children found that five out of six children demonstrated hyperactive behavior after eating sugar. This high percentage led researchers to conclude that sugar consumption caused hyperactivity. In fact, further research indicated that five out of six children who do not eat sugar showed hyperactive behavior (p. 127).

This tendency to avoid the lessons of negative information can lead to further errors, such as concluding a cause from a correlation. For example, one study found a correlation between student self esteem and success. Educators immediately assumed that positive self esteem caused success and designed programs to enhance esteem in the hopes of enhancing achievement (p. 129). However, it is

equally likely that high achievement leads to high self esteem, making the former conclusion worthless.

A third error in perceiving non-existent associations arises from selection bias (p. 130). This happens when researchers base conclusions on inadequate statistical populations or when they compare unlike statistical data. For example, some researchers concluded that spending more money on education was a bad idea because students in Mississippi (where spending was low) outperformed students in California (where spending was high) on SAT tests. In fact, only a small, select percent of the Mississippi high school population took the SAT, while a large percent of the California students did so (p. 131). Comparing the top 4% of students from each state would have yielded different conclusions.

Chapter 7: Predicting the Unpredictable

For thousands of years, people have sought to predict the future, presumably because predicting the future “gives us a better sense of control” (p. 154). Strategies to do so include everything from reading animal entrails to advanced computer simulations of the weather. And yet, studies of prediction indicate that in nearly all the areas that we care about—from our personal lives to the stock market—prediction remains impossible.

Despite the evidence that prediction is impossible, we continue using “psychics and astrologers,” trying to predict the stock market, making long term economic forecasts, predicting the weather, and prophesying what the social and technological future will look like. “There are over ten thousand professional astrologers in the United States today” (p. 137), hundreds of thousands of investment analysts, numerous stock portfolio managers and market gurus,

numerous professional economic forecasters, and an entire industry of weather forecasters. None of these people have any success in making predictions that surpasses random guesses.

Psychics and astrologers succeed for two reasons: human credulity and the ambiguity of their predictions. Many people—even large corporations and police departments—*believe* that foretelling the future is possible. This may be because forecasters emphasize the coincidences of their correct predictions and ignore their failures. Or, it may be that the prophecies are sufficiently ambiguous to be convincing, as was the case when 68% of people surveyed thought that a vague prophesy by Nostradamus accurately predicted 9/11, while a nearly equal number thought that the same prophecy accurately described other important historical events, such as WWII (p. 134-135).

Investment managers, fund managers, and stock market “gurus” remain equally convincing to the public, despite clearly inadequate results. Studies indicate that stock analysts succeed at the rate that sheer randomness would predict. Expert Burton Malkiel, who studies market predictions, claims that “the few examples of consistently superior performance occurred no more frequently than can be expected by chance” (p. 142). William Sherden, in his book The Fortune Sellers concludes the same: investment managers succeed at rates that could be matched by random prediction.

The same is true of economic forecasters, as we see from studies that conclude that “economists can’t even predict the major turning points in our economy” (p. 148). Indeed, “forty-six of forty-eight forecasts did not predict our economy’s turning points” (p. 148). Economic forecasters miss even the largest

events, including recessions and huge growth periods. Perhaps in an effort to overcome their failures, forecasters have developed highly complex computer simulation and modeling software. Unfortunately, these models, despite their complexity, cannot outperform simplified models (p, 149). Quite simply, “the problem with macro [economic] forecasting is that no one can do it” (p. 149).

Humans, of course, are equally vested in social prediction, which fails as badly as economic forecasting does (p. 153). Examples abound: technological developments that unexpectedly improved life, consumer products that seemed headed for glory and ended in disaster, and doomsday predictions that appeared accurate from all the signs, but which now would be laughed at.

The answer may well be to give up trying to predict the future state of highly complex systems like the economy, global politics, and the weather because “the sooner we realize that many things in our environment are essentially unpredictable, the sooner we’ll be able to make more informed decisions on what to believe and how to use our resources” (p. 154).

Chapter 8: Seeking to Confirm

Examples of humans’ “natural tendency to confirm” abound: Admiral Kimmel and Pearl Harbor, judgments about presidential debates, believers in ESP, and President Bush’s interpretation of evidence before the war in Iraq (p. 155).

Numerous studies indicate that these high profile news events are not extreme examples of poor judgment and disastrous results: they typify the human tendency to accept “at face value” that information that concurs with our belief and reject that which disagrees (p. 156).

In fact, people will go to great lengths to justify continued belief in the face of contradictory evidence. This is because most of our beliefs do not come from “empirical evidence or logical reasoning.” Instead, we are influenced greatly by a number of emotional issues, such as family influences, “peer pressure, education, and life experience” (p. 157). The result is that people fool themselves consistently by seeking confirmation and discounting contrary evidence: students think tests are fair when they perform well and that they are not fair when they do not; teachers think that “students’ successes are due to their teaching skills” while lack of motivation explains their failures; gamblers attribute their wins to skill and their losses to poor luck (p. 158).

Moreover, our cognitive propensity for confirmation is so strong that “we confirm even if we don’t have a prior belief or explanation”—simply forming a hypothesis on our own is sufficient incentive to inspire us to defend it. For example, studies show that expert polygraph examiners will confirm guilt if told that someone is suspected of being guilty (p. 161). This tendency spills over to important matters such as jury findings: juries will hand down harsher penalties when asked to consider worse crimes first and lesser penalties when asked to consider lesser crimes first (p. 161). This need to be right is so deeply ingrained in human nature that people prefer “yes” answers to “no” answers even if the answers provide the same information (p. 165).

The best way to overcome the natural tendency toward confirmation bias is to consciously develop disconfirmation strategies. This is not an easy task, as we see from the fact that 70% of those who are told to seek disconfirmation ignore the advice and continue to seek confirmation. Indeed, 80% of trained “mathematical

psychologists" cannot solve simple problems requiring disconfirmation, relying instead on confirming strategies to solve problems that can only be solved through disconfirmation (p. 164). Simply put, "to determine if a hypothesis is likely to be true, we should try to prove it false" (p. 163).

Chapter 9: How We Simplify

Because nearly all rational decisions require enormous amounts of information, humans resort to mental shortcuts called heuristics to make decisions. These mental shortcuts are often helpful in rendering adequate answers; however, because they are shortcuts, they can also lead us astray. For example, people often associate personality types with professions or think that causes resemble effects.

There are several reasons for these widespread mistakes. First, even professionals "ignore base rates". (This means that when determining the possibility of an event, we don't take into consideration the probability of that event within a global population). Second, we commonly disregard "regression to the mean", which means the tendency for stochastic systems to return to their average over time rather than continue in some temporary extreme. Third, we ignore sample size, which means that we don't consider that small numbers of cases of probabilistic outcomes result more often in wide variations from the norm. Fourth, we often fall prey to the conjunction fallacy: the mistaken belief that the likelihood of two events is greater than the likelihood of one. This implies that as we add detail to our predictions, the probability of their correctness decreases. Fifth, we tend to stereotype: to attribute characteristics to individuals based upon supposed characteristics of a group. In fact, in-group variation is normally distributed for nearly all large groups. Sixth, we often use "the availability heuristic" to reach

conclusions: “when using this heuristic, the estimated frequency or probability of an event is judged by the ease with which similar events can be brought to mind” (p. 176). The media are often complicit in emphasizing the unusual, making available images and stories that are atypical but which people come to think of as common. Finally, our estimates are influenced by “anchoring and adjustment” (p. 180), which describes our tendency to make estimates closer to some arbitrary point simply because someone suggests that point to start, no matter how irrelevant it is.

Chapter 10: Framing and Other Decision Snags

Decisions are often influenced by things that are unrelated to the decision itself, such as the language in which the issue is presented. For example, people will choose an option posed in positive language and reject one in negative language even though the outcomes are identical. This may be rooted in our strong aversion for loss (“loss aversion” p. 186), which sociologists judge by our willingness to accept small gains and the sometimes extreme sacrifices we make to avoid losing. This, in turn, is related to a “phenomenon known as the endowment effect” which describes our tendency to overvalue that which we already possess (p. 186). We also tend to keep mental accounts (p. 187) of money, which leads us to spend money quickly that we come by easily and underestimate the cost of credit (p. 189).

Some of our most serious mental mistakes involve overconfidence and intuition (which is probably related to overconfidence). “Research has consistently demonstrated that we’re overconfident in the judgments we make” (p. 193). This is true of common people as well as of “doctors, lawyers, security analysts, and engineers” (p. 193) and graduate students. In fact, there is “little or no relation

between our confidence and accuracy" (p. 194). This has unfortunately been proven to be true even of physicians who "diagnose brain damage... cancer or pneumonia" (p. 194). This tendency toward overconfidence can probably only be combated by considering alternatives, which few people do.

This overconfidence is perhaps most apparent in our intuitive judgments. We make predictions based upon interviews and personal experience even though using statistics is much more effective in making decisions and predictions. Studies of college admissions and prison parole processes have revealed, for example, that simple statistical measures are far better than personal judgments in making predictions about student and parolee success, even when those judgments are made by highly experienced people. Indeed, in all matters of human behavior, simple statistical guidelines are far better than individual assessments (p. 200).

Chapter 11: Faulty Memories

Most people have the impression that human memory works like computer memory: everything is recorded somewhere and recollection is simply a matter of "finding" the memory (p. 202). In fact, memory is not nearly that precise. Instead, memory is more like a reconstruction: a mixture of what happened, of what is happening, and expectations about what should happen under given conditions. These expectations can be influenced by our personal expectations, current experiences, and prompts from others (such as suggestions and leading questions). The most shocking cases of false memories come from cases of "recovered memory" in which people "remember" details of past abuse under the influence of hypnosis and psychological questioning. These often happen when psychologists become convinced that a patient represses a bad memory because the emotional

trauma was intense (p. 205). Despite the fact that researchers have proven that false memories can be easily induced (even of horrific crimes), many continue believing in the veracity of recovered memories. Some people are still in prison because of false memories inspired by psychological questioning that leads to desired answers.

But even those who aren't subject to leading questions under trying psychological circumstances can create "entirely false memories" through simple questioning and requests to remember (p. 208). Memories can further be manipulated by simple words, such as in the case of people who "remembered" more violent details about a car accident when asked about cars that "crashed" than those who were asked about the same cars that "bumped" (p. 209).

Despite our confidence in what we see, our eyes can often deceive us. Numerous studies of eyewitness testimony reveal repeated discrepancies between what people claim to have seen and what they actually saw. Part of the problem arises from the fact that our minds naturally form generalized pictures of faces in an impressionistic rather than a precise fashion (p. 213). Consequently, even people who are extremely confident that they saw a certain person do a specific act at a precise time are often badly mistaken. The problem with this misapprehension is that courts and juries take eyewitness testimony very seriously, as we see from the study that showed that a single eyewitness testimony increased the rate of conviction from 18% to 72% in a case in which all other information was identical (p. 212). Obviously, the opportunities for faulty memories to arise are numerous, yet we seldom are willing to accept that our memories err.

Chapter 12: The Influence of Others

Decades ago, psychologist Stanley Milgram demonstrated the power of authority figures in his experiments that showed that people would obey authority even when it meant inflicting pain on others. Numerous subsequent studies have borne out his results, indicating that “our beliefs and actions can be significantly influenced by authority figures” (p. 218). But we can also be influenced by peers or strangers: research indicates that people “can make incorrect judgments for even obvious tasks, just because others make the same judgment” (p. 220). In particular, if we find ourselves making a decision in a group that displays unanimity, we have a strong tendency to follow the group’s opinion, no matter how obviously wrong it is. This kind of thinking has earned its own title: groupthink.

But people’s thinking is influenced not only when they are actually in groups. For example, people commonly shirk responsibility if they think that there is someone else who might do the required job, such as when numerous people do not call the police when a crime is being committed because they think that others will (p. 222). Likewise, they will not put forth their best effort when they know who will judge them and will increase their efforts and attention to detail when they do not know who will judge their work.

Recommended Additional Reading

Groupthink: Psychological Studies of Policy Decisions and Fiascoes

How We Know What Isn't So

The Psychology of Judgment and Decision Making

Mind Myths: Exploring Popular Assumptions about the Mind and Brain

Phantoms in the Brain

The Myth of Repressed Memory

Fortune Sellers: The Big Business of Buying and Selling Predictions

Believing in Magic: The Psychology of Superstition

Irrationality: Why We Don't Think Straight

Mistakes Were Made (but not by me)

The Drunkard's Walk

How Doctors Think