SUMMARY BY ALYSSA BURNETTE INNUMERACY BY JOHN ALLEN PAULOS



Summary of "Innumeracy" by John Allen Paulos

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Learn about the mathematical equivalent of illiteracy.

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Introduction

In undergrad, I had a coffee mug that said, "I'm an English major-- YOU do the math!" The humorous little quip illustrated a common fact: many people are not fans of math, especially those whose brains are geared more toward creative or literary learning. And if that describes you, then-- like me-- you probably spent a good deal of your time in school wondering when you would ever use any of your math homework. It might take you hours of studying at the kitchen table to solve for the answer, but surely you would never need that algebraic equation beyond your high-school math class. And in many cases, that's proven to be true, especially for those of us who grew up to pursue careers that have little involvement with math. (I personally can go an entire work week without ever needing to do a single math problem!)

And, to be honest, I'm very happy about that! That's because math makes me uncomfortable. That deeply rooted discomfort actually goes all the way back to my experience with sixth-grade algebra, when mathematics suddenly became difficult for me. As a child, I was fine with simple addition and subtract. I could even handle division and multiplication with ease. But as soon as you threw letters in with the numbers and asked me to solve for "x," I became hopelessly confused and insecure. As a child, I coped with this by avoiding math as much as possible. I didn't understand it and I was embarrassed by my lack of understanding. I also didn't enjoy math in the same way that I enjoyed language arts, so I wasn't willing to devote the time to conquering my innumeracy. And when you put that history of experiences together, it all adds up to an adult who is deeply uncomfortable with math.

I'm willing to bet that there are many adults who can relate to my experience. In fact, the author knows this to be true; that's why he crafted *Innumeracy*. So, over the course of this summary, we'll explore why some people are more afraid of math than others and how our aversion to numbers impacts our lives.



Innumeracy Isn't a Good Thing

As you saw in the introduction, many people like myself are so comfortable with their lack of mathematical understanding that they feel free to advertise it. Take, for example, the mug I mentioned. "I'm an English major-- YOU do the math!" boldly and humorously proclaims that there are some people who simply can't do math and implies that this is okay. And society certainly reinforces this view. In fact, every single one of my classmates in the English department had the same mug. Many of the teachers did too. All of us disliked math and we weren't ashamed to let people know. Yet, by contrast, you would never see someone proudly advertising the fact that they can't read. (Granted, that might be a little more difficult, but you get the idea!) In fact, illiteracy is a source of deep embarrassment, not something to be joked about. But what makes the difference? Why is one funny and why is one shameful?

The author observes that this is partly due to our societal perception. Because reading is everywhere, we assume that an inability to read is more of a handicap. If you can't read, you can't drive, understand road signs, or follow printed directions. If you can't read, you can't order from a menu, understand the instructions on a prescription, or pursue an education. But if you lack mathematical proficiency, many people feel that you have a host of options which can help you compensate. For example, you can use calculators to help you solve equations. And if you struggle to remember fractions, no worries! Anyone can read "2/3" in a recipe and connect that with the corresponding measuring cup that says "2/3." So, in the end, innumeracy isn't really as much of a problem as illiteracy. ...or is it?

The author argues that innumeracy actually has a powerful impact on a person's daily life because of its effect on our perception of statistics and reallife situations. He asserts that if you don't understand basic statistics, then you might misunderstand the likelihood of many possible occurrences. For example, if you watched a horror movie about shark attacks, you might draw the following conclusion: the people in the movie were swimming in the ocean. Sharks live in the ocean. The people in the movie were attacked by a shark. People often go swimming and sharks live in the ocean. Because these are common things that regularly happen in real life, people who go swimming in the ocean are likely to be attacked by a shark. But of course, that's not necessarily true! In reality, you are more likely to be struck by lightning than you are to be attacked by a shark. Statistically, the chances of being attacked and killed by a shark are 1 in 3.75 million. According to the CDC, your odds of being struck by lightning in any given year are only around 1 in 500,000. As you can see, 500,000 is a much smaller number than 3.75 million! But unless you can understand basic statistics, you wouldn't know that! This ignorance might cause you to live in fear or plan your vacations around the threat of something that is incredibly unlikely.



Coincidences

Have you ever met a prospective partner and been delighted to discover that the two of you share a birthday? As a result of this coincidence, you might assume that you were destined to meet one another. You might even say something like, "It was fate!" and take this coincidence to be evidence of the relationship's potential success. However, the author observes that this is simply another example of innumeracy. People who possess a more in-depth knowledge of mathematics understand that coincidences are, by definition, improbable but not impossible. They might not be likely events but they can and do occur on a more regular basis than we think! And because they do occur so often, the author argues that we should anticipate coincidences instead of being surprised by them.

This theory is further supported by the research of David Spiegelhalter, a statistician at the University of Cambridge. In 2016, Spiegelhalter launched a project in which he "collected" coincidences. Over the course of his study, he analyzed 4,470 coincidences to identify the similarities and statistical likelihoods of each. From there, he compiled a list of the six most common types of coincidences and how likely they are to occur. Here's what he found:

- Sharing a birthday with someone (11 percent)
- Connections involving books, TV, radio, or the news (10 percent)
- Vacation-related coincidences (6.1 percent)

• Meeting people while in transit—while walking around, in airports, or on public transportation (6 percent)

• Coincidences related to marriage or in-laws (5.3 percent)

In an interview with the magazine Psychology Today, Spiegelhalter explained that he "believes that coincidences are best understood as

interesting examples of the laws of probability at work. For example, the probability of two people having the same birthday is 1/365, which means that if you tell 365 people when your birthday is, you are very likely to find at least one person who shares the same birthday. Vacation-related coincidences tend to involve unexpectedly running into someone you know. Since you probably know a great many people and you are part of a specific socio-economic group that is likely to take vacations in the same places, the probability of running into someone you know is also fairly high."

So, if you're not very comfortable with math, you might assume that each of these coincidences are uncanny and delightful surprises. But as you can see from these examples, they're actually very common! In this respect, it is evident that innumeracy can alter our perception of events and of the world around us.



Why Astrology is a Pseudoscience

Recently, my friend has become obsessed with something called "angel numbers." Every time she happens to pick her phone up and see matching numbers, she posts about it on Instagram, convinced that it means something. For example, this happens every time her phone clock lands on a number like "10:10," "11:11," "12:12," or "2:22." She refers to these as "angel numbers." A quick glance at a website called "Angel Numbers.com" explains that "angel numbers are a sequence of numbers that hold a special message from your guardian angels. Each angel number's meaning can be deciphered by looking at the numbers within the sequence, and the order in which they are arranged. Seeing these number sequences is not just a random event; it is a method in which the divine often communicates with you.

The spirit world is thought to operate through symbols, number synchronicity, and seeming coincidence. Divine beings do not typically communicate directly with humans but leave clues in our path indicating that the universe has a message for us! These special messages of divine guidance are our Guardian Angels or Angelic helper beings trying to give you an important sign or wake up call. When you are vibrating with the frequency of the Angels you will be more open to receiving and noticing the universal information that is present to you." Now, chances are, you've come to the end of this paragraph and concluded that this is utter nonsense. No one "vibrates with the frequency of the Angels" and it means absolutely nothing when your phone clock hits "10:10." But my friend--- and many other people--- genuinely believe it!

Why? Because, on the surface, it sounds like it makes sense. If you suffer from innumeracy, you might be easily taken in by concepts that sound serious and mathematical. And I have to admit that, as someone who is also uncomfortable with math, "number synchronicity" really sounds like it means something! You may have noticed the fact that this pseudoscience also draws on the power of coincidence. By its use of the phrase "seeming coincidence," it insinuates that everything happens for a reason. In so doing, it taps in to our common misperception of coincidence and invites us to believe that coincidences really occur because of the hand of fate. Of course, as you've already seen through the author's explanation, this is every bit as nonsensical as one might assume. It's also a great example of how pseudoscience preys on innumeracy.

Angel numbers are only one example of astrology, a popular pseudoscience which encompasses everything from your "star sign" to your "angel numbers." And although many more people believe in horoscopes than in angel numbers, the sad truth is that they are both equally wrong. Your star sign is said to reflect the position of the sun at the time you were born. This position-- and its subsequent gravitational pull-- is meant to explain your personality, your character, your values, and your mood swings. By understanding your star sign, people believe that you can cultivate a deeper knowledge of yourself. This in turn is meant to enhance your life and your relationships.

But sadly, astrology is a ruse just like any other run-of-the-mill trick that con artists use to deceive people. There is no mathematical or statistical evidence to support it. In fact, the position of the sun at the time of your birth has absolutely no effect on your present personality traits! And despite the perception that the gravitational pull of the planets must guide you toward certain stars or character traits, this is absolutely untrue! But because it sounds like it's grounded in real, mathematical principles, people commonly fall for it. Even if we don't understand math, we understand that numbers are true and infallible. A person might lie or make a mistake or be influenced by extenuating circumstances. But the same cannot be said of numbers.Your mood might change if you have a bad day, but 2 + 2 will always be 4, even if the numbers were having a bad day! As a result, you can plainly see that innumeracy can be a severe handicap that causes you to believe blatant untruths.



Final Summary

Innumeracy is the mathematical equivalent of illiteracy. But although people are embarrassed of being unable to read, many people happily flaunt their innumeracy. That's because our society perpetuates the perception that a lack of numerical competence is not a handicap. But as the author's examples illustrate, innumeracy can affect us in more ways than one might assume! Our inability to understand basic mathematical principles can cause us to fall prey to pseudoscience, misunderstand statistics, and alter our life choices as a result of misperceptions. That's why the author believes that everyone should have the mathematical competence to make sound life choices.





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