

# SUMMARY

## THE IMPROBABILITY PRINCIPLE

DAVID J. HAND



# **Summary of “The Improbability Principle” by David J. Hand**

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The science behind miracles.

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# Introduction

If you've ever watched any of the Marvel superhero movies, you might have heard about something called "the butterfly effect." Although the butterfly effect wasn't invented by the creators of Marvel (it's actually part of a larger scientific principle called "chaos theory") it suits the Marvel universe well because it demonstrates that one seemingly insignificant decision can have a ripple effect that changes the outcome of your entire future-- and potentially affects the lives of others. For example, let's say that you meet a charming stranger in the lobby while you're waiting for your dentist appointment. You guys flirt a bit and maybe even exchange contact info. The next decision in front of you-- whether or not you choose to go on a date with that person-- can impact the course of your future.

Maybe that was the person you were going to marry. Maybe you would have felt that on the first date and the two of you would live happily ever after. Your future happiness, your decisions, the births of any children you might have all depend on you choosing the path that creates that version of your life story. But let's say that was the person you were meant to marry... and you didn't go out with them. Your life then takes a different direction-- one in which you miss out on all that future happiness and those children-- as a result of that one small decision. This just goes to show that our decisions-- even those which we think might be dependent on chance-- are actually the result of easily explainable scientific principles.

And the same is true of miracles. That's why the author wants to explain that what we might consider "miraculous" or under the domain of the supernatural is actually an easily explainable phenomenon if we simply have the right information.

# Ordinary Miracles

We tend to use this phrase to characterize events which happen all the time but which strike as incredible in nature-- things like the birth of a child or nature in bloom or blossoming new relationships. But the author remarks that knowledge of what he calls the improbability principle renders the term “ordinary miracles” universally accurate. This means that the bigger and more astounding phenomena-- the sort about which we remark, “That was a once in a lifetime chance!”-- are actually more likely than we think. Even if they have a shockingly low rate of probability, the occurrence of these events are still actually commonplace. If that sounds unbelievable, just consider these examples of highly unlikely coincidences that really happened!

- One woman survived three of the world’s major shipwrecks: the Titanic, Britannic, and Olympic!
- A 10-year-old girl named Laura Buxton released a red balloon into the sky... and 140 miles away, another 10-year-old girl named Laura Buxton found it!
- Novelist Anne Parrish bought herself the same copy of a book she had as a child! Her parents had given the book away while cleaning the house many years before, but Anne always treasured her memories of Jack Frost and Other Stories. And one day, whilst browsing a riverside book stall in 1929, she found an old copy of the book. Imagine her surprise when she realized that the name and address written inside the front cover was hers! She had actually found her own childhood copy.
- A woman named Joan Ginther won the lottery four separate times, earning more than \$20 million!

I think we can safely say that each of the events on this list would fall into the category of “miraculous” or that which is such an unexpected coincidence that we can hardly believe it. But according to the author, all of these things-- especially Joan Ginther’s lottery wins-- can be explained through the improbability principle. For example, Ginther actually held a doctorate in statistics from Stanford University. She knew how to stack the odds in her favor when it came to seemingly random numbers and she also knew the science behind the most common powerball winning numbers! So, even though the chances of winning the lottery on four separate occasions are shockingly low, it’s easy to see how Joan’s story is less the stuff of urban legend and more easily explained through statistics.

# What is The Improbability Principle?

Now that we've explored a few of the most shocking coincidences, let's talk about how they can be explained. The Improbability Principle can best be described as a statistical principle that operates because of the five sub-laws under it: the Law of Inevitability, the Law of Truly Large Numbers, the Law of Selection, the Law of the Probability Lever and the Law of Near Enough. Put very simply, it means that, as a result of these five laws, improbable events are actually more commonplace than we think. To expound on this idea, let's take a closer look at the first law: the Law of Inevitability. This principle can best be summarized by saying, "something has to happen" and that something has a limited number of predictable outcomes. For example, if you toss a coin, you can know with certainty that one of two things will happen: it will either come up heads or tails.

However, those aren't the only two things that could happen. The result-- either heads or tails-- will remain the same, but there are an infinite number of other things that could happen in addition. You might drop the coin, for example. You might accidentally drop it into your dog's waiting mouth. You might drop the coin only for it to be vacuumed up 2.7 seconds later. Would you call those random occurrences? You certainly could, but statistically, if you made a list of every single outrageous outcome you could think of, it would no longer be a freak occurrence. Instead, it would be random in the same way that drawing someone's name out of a hat to choose the winner of the contest is random. You might not have been able to predict precisely which person would win the contest, but based on the fact that everyone's names were in a hat together, you can say with certainty that one of the names in the hat would win.

That's what is meant by the Law of Inevitability; it's our means of understanding that if you can predict and list every single possible outcome, you can assert that one of them will definitely occur. This is significant because it greatly reduces the surprise factor of many of the seemingly random occurrences we encounter. For example, someone



winning the lottery four times is highly unlikely and we might say it's surprising... but because there is indeed a chance that it could naturally occur, we would have to put it on a list of "potential outcomes that could occur in relation to the lottery." And if it's on the list, then it becomes slightly more predictable and thereby, slightly less surprising. The same, therefore, can be applied to any conceivable occurrence in life.

This is also true of the second law: the Law of Truly Large Numbers. To understand this principle, let's consider another occurrence we find surprising: people sharing the same birthday. For example, we obviously understand that someone somewhere must share our birthday; I know, for example, that I can't be the only person who has ever been born on the date October 21st. But did you know that if you attended a sold-out football game, populated by the standard amount of 50,000 fans, statistics dictate that you would share your birthday with 135 of the strangers also in attendance? And by these odds, you could also infer that it's also highly likely for you to meet and date a random person who also shares your birthday! (I can confirm this for sure because it actually happened to me!) This, of course, does not mean that you should assume this is fate or that you're destined to be together or that, as a result of those earlier assumptions, you should continue to date a nasty person simply because they share your birthday. Rather, it's simply statistics and we can easily explain it using the Law of Truly Large Numbers.

# Why Didn't we See That Coming?

Human beings ask this question a lot and never more than in the face of a global pandemic. When confronted with a tragic event in our personal lives, a natural disaster, or any other freak occurrence, we often want to know why we didn't anticipate-- and therefore avoid-- it. This is where the Law of Selection comes in because the Law of Selection contends that our choices can influence the likelihood of certain events as long as something has already happened. At first, that might sound like the kind of superpower that nobody wants. After all, who wants the ability to influence future things after something awful has already occurred? It doesn't give us the freedom to go back and alter what's already happened, so what's the point?

Well, the point is that even though it might not seem unique or beneficial, every single human being on the planet has the power to alter the outcome of the future by making smart choices in the present. For example, we might not be able to prevent a natural disaster or a global pandemic that has already occurred, but we can use our knowledge to avoid or be prepared for disasters that might happen in the future. For example, if you were a medieval king whose unprotected city had been ravaged, this tragic loss could inform your future decisions, motivating you to fortify your city with strong walls, a tower, a mote, and multiple new defense systems.

Similarly, even things that are seemingly up to chance-- like winning the lottery-- can be altered by our choices. That's because the numbers people choose when playing the lottery aren't as random as they seem. Instead of picking numbers out of thin air-- which would be wisest-- people almost always pick numbers that have some sort of personal significance to them, like their birthday, their anniversary, their cat's birthday, or the numbers from LOST. These numbers are also hinged on a pattern; for example, birthdays or anniversaries will always follow the pattern of day/month/year. And if we look at our earlier examples and the Law of Truly Large Numbers, then we can reasonably conclude that:

- Many people will choose their birthdays or anniversaries
- Many people have the same birthdays and anniversaries
- It is highly likely that many people will choose the same lottery numbers

So, this means that if you do decide to play the lottery, your best bet is to choose less common numbers that other people are unlikely to think of. By using your new knowledge of probability and statistics, you can make choices that will influence the outcome of events in the future and pick numbers out of thin air that don't follow a pattern.

# The Huge Impact of Small Events

For the purposes of this chapter, let's return to the butterfly effect example we used in the earlier chapters. To recap, the butterfly effect hinges on the idea that even the smallest events or variations in decisions can have a significant impact on the outcome or the direction of the future-- even the gentlest flap of a tiny butterfly's wings. And as we've already seen, this principle can be applied to our understanding of probabilities as well. To flesh out this concept, let's consider the examples of some probabilities we already know a little bit about.

We know, for example, that if a cat balances all four paws on the ledge of a bathtub and tries to peer in at you while you're washing your hair, it will probably stay safely on the ledge. But if it attempts to lean in further, reaching out with two paws to splash at your bath water, we can then predict that the cat is very likely to fall in and get soaked. This is perhaps the simplest way to explain our fourth law: the Law of the Probability Lever. As you can see through this example, this principle posits that slight changes in probability which affect the outcome of one event can have a ripple effect that will influence the outcomes of future events.

This can also explain such seemingly astounding phenomena as people surviving multiple shipwrecks or being struck by lightning multiple times. For example, we might assume that these events are equally likely to happen to anyone. But in fact, individual circumstances have a powerful impact on the likelihood of these odds. For example, it simply stands to reason that if you frequently travel by boat, you are more likely to encounter the possibility of shipwrecks than someone who has never been on a boat in their life. And if, as an experienced seafarer, you know a little bit about appropriate safety measures and have access to life-saving resources, it stands to reason that you have a better chance of surviving those shipwrecks you encounter. As you can see, even though these odds might seem improbable, they can actually be easily explained through the Law of the Probability Lever!

# The Law of Near Enough

This brings us to our fifth and final principle: the Law of Near Enough. So, what does that mean? Put simply, this law means that the human brain looks for patterns amongst events. We want to make connections and “match” things to make sense of them. So, sometimes when things look similar, we don’t investigate further; we just call it close enough and say the two events match. To put this in context, think about the times when you’ve taken a multiple choice test in school. Although you circle option C as your answer, the correct answer actually turns out to be option D. But because the two answers are close, you might say, “Oh well, it’s close enough to the correct answer!” and assume that you were near enough to being right. So, the Law of Near Enough can be summarized by saying that when events are very similar, we relax our standards and say that they’re identical because they’re near enough to being the same.

Another prime example of this can be seen through the author’s own personal experience. One day, he received two emails back to back with almost identical subject headings. One read: “Meeting with Muir” and the other read “Miurs Referees List.” Although the spellings and content of the emails were obviously not the same-- and not even related to each other or from the same person!-- they were near enough to being identical that the author initially considered the event to be a laughable coincidence. Of course, he then realized that this perfectly illustrated his point because his own principles put it into context.

For example, if we read this event through the lens of the Improbability Principle and consider the Law of Truly Large Numbers, then we recognize that the author receives a few hundred emails every day! So, the odds of him receiving two emails from two separate people with similar subject headings are actually very high. This then means that it’s not really a remarkable coincidence or even all that surprising; it’s actually very easily explained! However, as the author acknowledges, despite the prevalence of this statistical data, we often struggle to accept facts about probability

because people often want to indulge thoughts that confirm our own theories rather than entertaining hypotheses which challenge them.

So, for example, if you go through life believing that you're unlucky, it's more likely that unlucky things will happen to you. But that's not because of "the energy you put out into the universe" or the pseudoscience that many self-help authors might have you believe. Instead, it's about how your self-perception influences the choices you make. Because if you spend more time worrying instead of pursuing positive and productive things that will enrich your life, the obvious outcome is that you will spend your life worrying instead of doing things that bring you happiness. By contrast, if you busy yourself with improving your life-- applying for that new job, saying yes to that date, taking up a new hobby-- it increases the odds that good things will happen to you and you'll feel luckier and more positive as a result.

## Final Summary

We often view probability as a mysterious and arbitrary force. Sometimes we believe that things happen by the hand of fate or that some people are intrinsically lucky while others aren't. We are baffled by coincidence and often wrongfully ascribe "miracle" status to a variety of occurrences that could be easily explained if we simply had the right information. That's why the author wants you to know about the Improbability Principle. Because by learning about this principle and the five sub-laws that govern it, you can broaden your understanding of the world and the laws of statistics.

This means that things we've previously considered to be miraculous or inexplicable can actually be explained by the Law of Inevitability, the Law of Truly Large Numbers, the Law of Selection, the Law of the Probability Lever, and the Law of Near Enough. These five laws impact everything about our daily lives-- from the outcome of a coin toss to your odds of being struck by lightning-- and developing an understanding of them can improve your life.



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