What We See Most Is Not Always What Is True:
Frequency, Belief, and the Mathematics Behind Our Decisions

Human beings learn by noticing patterns. We observe, remember, and gradually build understanding from repeated experience. What we see often becomes familiar; what is familiar becomes believable. I began to notice this in my own thinking — how easily repetition could turn into certainty, even when I had not questioned the full picture.

Over time, this natural process evolves into formal knowledge, especially in statistics, where decisions are guided by data and evidence. Yet even in structured thinking, we tend to simplify the world. We imagine balance — that outcomes are evenly distributed, that populations follow neat curves, or that randomness means equality. These assumptions help us think clearly, but they are not always true.

In reality, the world is uneven. Patterns exist beneath what appears random, and what we encounter most often is not always representative of the whole. At the same time, each of us builds a personal model of the world based on our own experiences — a kind of individualised statistics. We do not see reality directly; we see a version of it shaped by what we have repeatedly encountered.

When Frequency Becomes Belief

In everyday life, we rely on frequency more than we realise. What appears often feels important. What we encounter repeatedly feels true. I found myself trusting certain ideas simply because they appeared frequently, not because I had examined their validity. However, the frequency we perceive is not always the same as the true distribution of events. We tend to notice what is visible, memorable, or repeated, rather than what is statistically representative. As a result, our internal understanding of the world may be shaped by partial or biased information. Mathematics allows us to step back — to question whether what we see often is truly what occurs most.

The Hidden Pattern of Numbers: Benford's Law

One example of hidden structure is Benford’s Law. It shows that in many real-world datasets, smaller leading digits appear more frequently than larger ones.

$$P(d) = log_{10}\left(1 + \frac{1}{d}\right)$$

This means that 1 appears far more often than 9 (Benford, 1938; Hill, 1995). At first, this felt counterintuitive to me. If something is random, shouldn’t everything be equally likely? But this is precisely the point — randomness in the real world is not always uniform. This made me realise that what “feels fair” is not always how reality is structured.

The Shape of Attention: Zipf's Law

Zipf’s Law describes how frequency decreases with rank:

$$f(r) = \frac{C}{r^s}$$

A few elements dominate, while many others appear rarely. We see this in language, cities, and even social attention. It made me wonder whether what I notice most in life is simply what happens to be most visible — not necessarily what is most meaningful.

Frequency and Human Connection

These patterns extend beyond data into everyday life. We tend to feel closer to people we see often. Familiarity builds comfort, and comfort can turn into preference — even emotion. Sometimes, it feels almost humorous:

“if I want to be someone’s first choice, perhaps I simply need to appear more often than everyone else.”

But beneath that light thought lies something deeper: our feelings are not entirely separate from the patterns of exposure we experience.

Data, Decisions, and Fairness

Mathematics helps us make decisions based on evidence. When data supports something, it feels justified. But justified does not always mean fair. Data reflects how it is collected. What appears frequently may simply be what is most visible. I began to question whether decisions I once considered “objective” were actually shaped by incomplete perspectives.

Mathematics, then, is not only a tool for answers – it is a tool for questioning.

Conclusion

We understand the world through patterns, and frequency plays a central role in shaping those patterns. What we see repeatedly becomes what we believe. Yet mathematics reminds us that frequency is rarely simple, and rarely fair. Benford’s Law shows that even numbers do not distribute as evenly as we expect, while Zipf’s Law reveals that attention and occurrence are concentrated rather than balanced. Together, these ideas challenge a deeply held intuition — that what we encounter most often must represent reality as a whole.

At the same time, each of us carries a personal model of the world, built from our own experiences, observations, and repeated exposures. These models are useful, but they are incomplete. They reflect not only what is true, but what is visible to us. Decisions supported by data and evidence may appear rational and justified. However, they are not always fair, because the data itself is shaped by unequal distributions, selective exposure, and underlying structures that are not immediately apparent.

Mathematics, therefore, does more than describe the world — it reshapes how we think about it. It encourages us to question not only the answers we find, but also the data we rely on and the patterns we assume. This is why mathematics matters — not only to understand the world, but to understand ourselves. And perhaps the most important insight is this:

> "what appears most often is not always what is most true,
>
> and what seems most justified is not always most fair."

References

Benford, F. (1938). The law of anomalous numbers. Proceedings of the American Philosophical Society, 78(4), 551–572.

Hill, T. P. (1995). A statistical derivation of the significant-digit law. Statistical Science, 10(4), 354–363.

Nigrini, M. (2012). Benford's law: Applications for forensic accounting, auditing, and fraud detection. Wiley.

Newman, M. E. J. (2005). Power laws, Pareto distributions and Zipf's law. Contemporary Physics, 46(5), 323–351.

Zipf, G. K. (1949). Human behavior and the principle of least effort. Addison-Wesley.