

The Mathematics Behind Human Happiness

by Jonty du Plessis

Happiness is arguably the centre point of humanity. It is the emotion we chase and long for day in day out, defining you as a person not only to yourself but to all others on this planet. No human has a stable level of this emotion; it falls and rises in the turbulence of life. There is an infinite number of ways to perceive the concept of being happy; this core feeling is utterly perplexing and complex. Hence, my question is, can we break it down with the use of Mathematics? Now I know exactly what you are thinking: but that defeats the point and purpose of happiness! You shouldn't quantify a feeling! Maths and emotions are two completely different things that **MUST** be kept far away from each other. If you do currently feel that way, relax... I am just going to be diving headfirst into this ambivalent realm of two completely different things and hopefully find out some cool things. Maybe if you join me on this journey, a discovery that they may not be as different as we believe them to be is waiting for us. So, sit tight, restrain your contradictions, and let us explore if the art of Mathematics can explain happiness.

Let's start with something simple — or at least, something *pretending* to be simple. The idea that happiness isn't a single, immovable point but a moving average. If you could plot your happiness over time, it wouldn't be a flat line. It would look more like a seismograph during a minor earthquake — constantly trembling, up and down, sometimes dramatically, sometimes barely at all. Take a moment and think about the last time something made you genuinely grin like an idiot: maybe you got an exam result better than you expected, reunited with an old friend, or finally fixed the Wi-Fi after two days of despair. In those moments, happiness spikes like a rocket. But give it a week — maybe two — and like a balloon losing air, that joy deflates quietly back to its baseline.

Psychologists actually have a name for this: *hedonic adaptation*. It's our emotional autopilot system that always brings us back to some neutral midpoint, no matter how high the highs or how low the lows. It behaves suspiciously like a *weighted moving average* in statistics. In maths, a moving average smooths the noise — each data point doesn't count equally, because newer ones matter more. Similarly, in life, yesterday's good news still lingers a little, but it doesn't carry the same punch it did when it first happened. Mathematically speaking, your happiness $H(t)$ at any time t could be described as a rolling mean of your recent emotional experiences, with newer joys having a higher weight than older ones. It sounds coldly analytical, but in truth, it's almost poetic. Happiness doesn't vanish; it simply averages out.

And that simple observation already hints at something profound: chasing massive highs doesn't improve your long-term average. Winning the lottery, for instance, makes people euphoric for a while, but studies show that six months later, winners report similar happiness levels as before. The maths, boring as it looks, quietly tells us that *consistency beats intensity*. The small, repeated pleasures — the taste of coffee in the morning, laughing at a dumb meme, catching the bus just as it pulls in — those are what nudge your moving average ever so slightly upward day after day. The spikes fade, but the accumulation builds.

Now, before this starts to sound too wholesome, let's talk about humanity's favourite illusion: the idea that more is always better. Here enters the law of *diminishing returns*. Economists discovered it centuries ago to figure out why people stop wanting their tenth slice of bread. The principle is simple — each extra unit of something pleasurable gives you a little less satisfaction than the one before it. Imagine ordering pizza. The first slice? Pure love. The second? Comfort. The fourth? You start questioning your life choices. The satisfaction curve, if you drew it, rises sharply at first but then slowly flattens until it's basically horizontal — a perfect concave curve.

And this curve doesn't stop at food. It underpins nearly everything we chase in modern life. Money, status, followers, even holidays. The first pay rise feels exhilarating; the fifth just means you buy slightly fancier coffee beans. Psychologists Daniel Kahneman and Angus Deaton famously confirmed that after a certain income level (about enough to live comfortably), extra money barely changes people's emotional wellbeing. The mathematical line flattens. It's maddening, really, because our brains know this — yet we keep sprinting up the same curve anyway, hoping *our* graph will be the exception. But it never is.

This is where maths quietly chuckles at our expense. It doesn't gloat, but it hints: "I told you so." Because no matter how high we climb, the equation doesn't bend to ambition. It remains the same — relentless, logical, and oddly fair. It's humbling when you realize happiness follows the same laws as supply and demand. Our desire inflates forever; our satisfaction doesn't.

But there's an even deeper equation at play — one that captures how happiness behaves over time, like a living organism healing itself. This is known as *set-point theory*, which can actually be modelled using a simple differential equation. Brace yourself, it's not as scary as it sounds:

$$\frac{dH}{dt} = -k(H - S)$$

Here, H represents your current happiness, S your personal “set point” (the emotional equilibrium you return to), and k a positive constant that measures how quickly you bounce back from disruptions. You’ve basically seen this equation in physics a hundred times, even if you didn’t know it — it describes a hot cup of coffee cooling down, a spring returning to rest, or a phone battery discharging. What’s beautiful about it is the universality: nature recycles the same maths in everything, including us.

If you think about it, people differ in their k values. Some have a high k — they recover quickly from setbacks, the kind who shrug off disasters with infuriating grace. Others have a smaller k , meaning it takes longer to return to baseline. They aren’t “weaker”; their emotional inertia is just higher. It’s a mathematical kind of personality trait. You could call k the *resilience constant*. And suddenly, resilience isn’t some vague self-help word; it’s measurable in theory — the slope of your return to equilibrium.

Now, all of this might feel dangerously close to turning happiness into a physics problem. And that’s fair — it’s strange to look at something so human, so messy, and start seeing equations. But maybe mathematics isn’t diminishing the magic; maybe it’s revealing how incredible the magic *already is*. The beauty of these equations is that they don’t simplify happiness into something robotic — they show that beneath our chaos, there’s coherence. Happiness follows rules, tiny patterns hidden in the noise. We don’t have to see them to feel them working.

Because think about it: the cooling coffee, the bouncing spring, the electrical discharge — all of these processes return to equilibrium after disturbance. So do we. After heartbreak, after success, after grief — our emotions oscillate, settle, reset. That’s not cold or mechanical. It’s strangely comforting. The maths quietly reassures us: you won’t stay shattered forever, but you also can’t stay euphoric forever. Everything levels, everything flows.

But maths alone isn’t enough, of course. No equation can capture the smell of rain, the texture of a hug, or the peculiar way laughter bubbles out of nowhere. The numbers may describe the *shape* of happiness, but its *colour* is purely human. Still, knowing there’s a framework beneath the chaos can make the ups and downs easier to endure. If your happiness graph is crashing, maybe you just remind yourself — this is part of the equation. The line will bend back. It always does.

And maybe that's the quiet, almost rebellious power of seeing happiness through the lens of mathematics. It tells us we belong to the same laws as stars, springs, and waves. We are not separate from the order of the universe — we *are* that order, living it in real time through every sigh, smile, and surge of feeling. So when life feels random and unfair, when everything seems off-balance, you can take comfort in this absurd thought: mathematically speaking, you are doing exactly what you're supposed to.

Happiness isn't a constant to be solved; it's a dynamic system. It ebbs, it flows, it equalises. The trick isn't to freeze it in place — it's to dance with its curve. Because if emotions really do echo the same logic as the cosmos, then perhaps the maths of your joy isn't a cage at all — it's proof that you're stitched into something vast and beautifully ordered. Maybe that's all we need to know.