

Mind in the World

**An essay collection exploring science, philosophy, and the experience of being
human today**

Devin Merullo, Ph.D.

Table of contents

Preface	3
1 Compass and Candle	4
2 Demanding Less to Understand More	6
3 The Untold Story of Self-Conscious Intelligence	10
4 The Road to Taoism is Paved With Punk Music	16
5 The Voynich Manuscript Says Something More Than Words	23
6 Dance with the Dark	31
7 Why the Chronology of <i>The Legend of Zelda</i> Keeps Me Up At Night	35
8 Reality's True Representation	43
9 <i>My Neighbor Totoro</i> in 196,883 Dimensions	47
10 Anxious Fluctuations in Space-Time	51
11 A Complete Identity for Psychology	53

Preface

To my mother,
who had a most creative mind
1961-2025

© 2025 Devin Merullo. All rights reserved.

1 Compass and Candle

Compass and Candle.

With only one, you miss what you can see with the other.

I started out as a kid reading books and writing stories. I always thought that this wasn't really a path to a career, but rather that the skills used in understanding dense texts and producing original, argumentative analyses would come in handy across a wide range of fields. I still won't disagree entirely with this, I guess. At some point towards the end of high school and into college, I made a pivot into the sciences, thinking that the path forward would always be quantitative, and the time spent lost in novels and poetry would just be fond memories.

I went about as far as you can go, completing a B.S., Ph.D., and post-doctoral research in neuroscience, up to submitting an application for a tenure-track faculty position abroad and then deciding not to send out any more.

It wasn't until I opted-out of the academic system that I regained the freedom to pursue non-specific interests, including within the sciences, as I did prior to specializing. This wasn't an intentional turn; I just found myself having more time to think productively without worrying about applying for the next round of funding, or how hypothetical peer reviewers would respond to my next journal submission. I won't carry on about this burn-out, as I have nothing new to bring, except for maybe one observation.

When you dedicate your working focus to a single, highly-narrow topic, you reach the limit of not just what you know about it, but what the *world* knows about it. It's a unique feeling, and it's not something you reach in effort; it suddenly hits you one day, after you've pored over the same sources again and again, repeated the same conversations with your colleagues— who also know as much as you do— and you realize... you have no more questions. All of your wonder is already out there, unanswered, waiting to be tested and studied. This is the dream, isn't it, when your research topic feels so wide open, that any result would be a breakthrough?

For many people— and rightfully so— this is the goal. This means you've struck gold, and your path forward will be here, digging each year a little deeper, building a little higher, constructing a new edifice of knowledge from what was previously scattered gravel. For me, though, it wasn't the feeling I was looking for. I didn't think that pushing further would really have produced the results I needed. I may be alone in this, or maybe not, which is why I'm writing and sharing this. Rather than feeling free, I instead felt trapped. I didn't put all this time into this one specific topic to become an expert on it, and only it: I had wanted to emerge

wiser in the end, with a broader and sharper perspective, where answering this one question would allow me to answer other, seemingly unrelated questions with a fresh mind.

That's not to say that those perspective wouldn't be possible, or that this effort *didn't* already yield such insights. It did. I just realized that as a way in life, this wasn't what I wanted.

I think that I had used the compass to travel as far as I could go, to the edge of the map and maybe a little beyond, guided by the precise sensing of the external magnetic field that never erred. It's amazing, really, where we can go with such technology; only birds seem to do better on their own. I would never want to get rid of my compass. It's just that, when I got back home, and took out my candle, I saw a world that I'd realized I'd neglected, a world that wasn't always clear in the corners and sometimes mislead me, but it was a world that felt familiar, and a world that never seemed like it would finish.

I learned a lot with my compass. And I'm back to learning with my candle again, too. It feels nice to spark some warmth.

2 Demanding Less to Understand More

Ever since I can first remember encountering the question, “What is the self?”, I concluded that we are products of biology and chemistry, which in turn arise from physics. This approach is called “materialism,” but I only found out about that terminology much later. At this same time during adolescence and young adulthood, I also found that you will encounter these pesky things known as emotions. Partly from my society and partly from my individuality, it always seemed easiest to write these off, to tell myself they were mere feelings, something passing, a distraction.

I know there are a lot of hypotheses about emotions, feelings, sensation, perception, and so on; I know some of these are highly elaborated, with ardent supports and detractors alike. Like a true scholar, though, I’ll skip over centuries of philosophy and cognitive science to offer my own perspective. While this commentary comes instead from a place of pure experience, which I do not want to hold up as somehow superior, I do think it can carry its own advantages.

Attempting to confront my emotions in earnest has forced me to reconcile that I’m *not* always in control. There is some part of me that can exert its own influence, pulling my mood and behavior in different directions, despite the best efforts of what I perceive as my main self to resist. This force, for lack of a better word, is not a product of rational thought nor is it subject to reason; it is spontaneous, undulating, and occasionally implacable. I have always thought that any concept of the unconscious, the id, the reptile brain, whatever you want to call it—I have *always* thought this was all mumbo-jumbo, with no objective or scientific validity. I felt that at best, these terms could provide a practical framework for talk therapy; at worst, they could initiate a scheme to mystify and manipulate. Some recent events have led me to reconsider this absolute evaluation, starting with this quote from the late philosophy professor Michael Sugrue about Sigmund Freud:¹

All the biological, positivistic, scientistic readings of Freud are all wrong. Everybody who wants Freud to be a scientist, I just think that’s completely impossible. I think it’s a big misreading. And I think once we get beyond that misreading, we can really begin to appreciate him. So let’s first of all think about the problem of falsifiability. Karl Popper and the whole school of Vienna, Vienna Circle, and the later neo-positivistic kind of thinkers, all have a common set of objections to things like Freudian psychology. They say, how can you test this? Can you falsify it?... I think that the attempt to read this as a kind of scientific activity is just wrong,

¹Quote starts at 32:55 here.

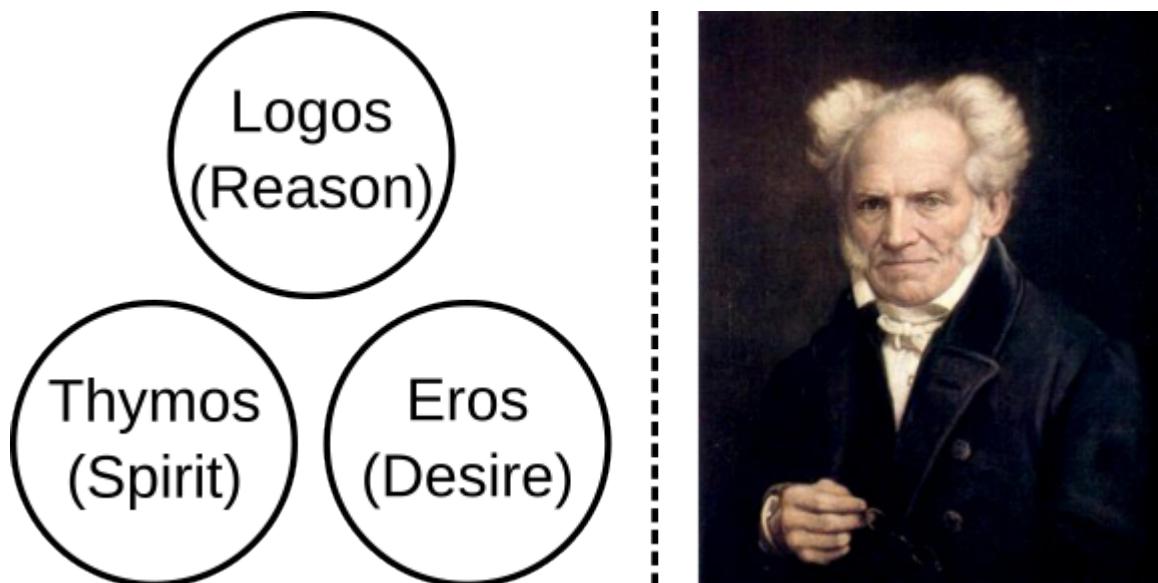
and it runs into all kinds of problems. For example, do you really analyze dreams in the way you analyze blood? I think it's a metaphorical sort of analysis... you don't put it [a dream] into a centrifuge and whirl it around.

When I heard this passage, I had already been listening to Sugrue's sequence of popular lectures outlining Western philosophy. I liked his communication style and thought he did a great job of explaining difficult topics. So when he made this comment about Freud, it stuck with me—was I really going to trust everything else he said, which I admittedly didn't know very closely, yet vehemently disagree with him on this point, just because I knew quite a bit about it?

I decided that, no, I should treat this like I treated the many other points he made about the many other thinkers he covered, and approach it openly and with appreciation. Doing so helped open my eyes to something that I had previously missed: Sometimes, you can make a point that's not scientific, and it can still be valuable.

I'm not going to get into the weeds of Freudian psychoanalysis, with all its defense mechanisms, dream interpretations, and so on. The point I want to make is that Freud *isn't* describing brain mechanisms of the self, even if that's what he explicitly says he is doing. He is providing a representation, *a model*, that can have utility on an abstract level, even if it's not a physical, material one.

Freud's model doesn't speak to me *at all* because I have so many problems with it given my research background in neuroscience and nervous systems. If such a formulation works for you, that's great. Rather than saying it's *wrong*, though, I should recognize it for what it is: An attempt to make sense of chaos in our lives. Upon granting this leeway, the application of Freud's model pivots from something attempting to be analytical and predictive to one that is metaphorical, personal, and ultimately literary in nature. Psychoanalysis, as I understand it now, is about crafting *narratives*, not diagnoses.



Freud's system of the ego, id, and superego is not even particularly original. As Sugrue notes, the idea of three souls traces to Plato (left), and the unconscious goes back to at least the German philosopher Arthur Schopenhauer (1788-1860; right).

By taking Sugrue's words seriously, and lending it the same honesty and respect that I did for the rest of his lectures, I was able to gain a new perspective that has proven helpful for processing my own inner experience, especially once I came across Carl Jung. Unlike Freud, who proposes a model of the mind with some very specific and not-so-subtle dogmatic axioms, Jung's work takes a comparative approach by attempting unification from recurring patterns across different disciplines. While this is a topic for another essay, I want to mention it here first because I don't think I would have ever opened up to Jung, for my same reasons for resisting Freud, if I hadn't given a chance to non-material perspectives in the first place.

Of course, opening this gate can quickly lead to esotericism, the occult, and a bit more. And hey, I'm all for that to some extent— Isaac Newton himself wrote an enormous amount about alchemy as he did for math. Discoveries can find inspiration in weird places.

I now think that asking “What is the self?” is the wrong question, because I don’t think we are ever one, static thing. We are shifting complexes of competing perceptions of ourselves, others, and the environments around us,² where the dynamics of these relationships coalesce into different selves at different moments. Certainly, we each present an overall consistency that separates us from the rest, yet the point is that in any given instance we are but smaller portraits comprising a grander landscape. Making sense of each day on this planet often starts with waking from a strange dream. Perhaps our wandering minds needn’t stop there, and we should continue to appreciate this vast world in all its depth.

²This unintentionally parallels the literary narratives I learned about in grade school: person vs. self, person vs. person, person vs. nature.



Melancolia I (1514) by Albrecht Dürer. As the title suggests, I like to think that the angel is trying to process her own feeling of melancholy, even though her usual tools aren't working.³

³Obligatory xkcd.

3 The Untold Story of Self-Conscious Intelligence

“Like Daniel Wolpert says, I’m a motor chauvinist. The nervous system evolved to move, and then everything else is sort of a footnote.” – John W. Krakauer

I came across this line the other day by chance while listening to a research talk recorded eight years ago from a person I didn’t know about.¹ It taps into something I’ve thought about for over a decade, though, so it stuck with me. The professor said it tongue-in-cheek, which somehow makes it ring a little louder. Our minds, our consciousness, our love and our hate—how could this all be about moving?

My initial reaction is that no, the nervous system did not evolve solely to move; it emerged from an evolutionary pressure to respond to the environment, where the ability to move was one of several features that conferred a selective advantage in the organisms that are ancestral to animals. *Hmph, I thought, that clever line from the professor caught my attention, but he knows it's hollow, too.* I thought about some other life forms that don’t have nervous systems but *do* respond to the environment—plants, fungi, bacteria. *OK, there is quite a big difference here between animal movement and what we see in these other branches. Maybe I'm not done with this yet.*

Vertebrate life—animals with a brain and a spinal cord—first began in the waters. What you think of as a “fish” doesn’t really capture the diversity of vertebrates that live underwater. You’re thinking of something from Finding Nemo, and certainly that’s a fish! It’s just that, evolutionarily speaking, “fish” also includes creatures like sharks, eels, manta rays, and something called a lamprey. Lampreys are neither pretty nor friendly, but they do have something in their nervous system that appears for the first time on Earth: the basal ganglia. Despite the definite article in the name, the basal ganglia are a collection of brain structures, not an individual unit, that are grouped together based on a common functioning and developmental origin. Regardless, the basal ganglia are largely conserved—meaning the system hasn’t changed much at all—over 600 million years of evolutionary time, from its emergence in lampreys *through to humans today.* Let that sink in for a bit.

¹1:08-1:15 here.



Nemo and Dory are fish (left). Lampreys are also fish (right).

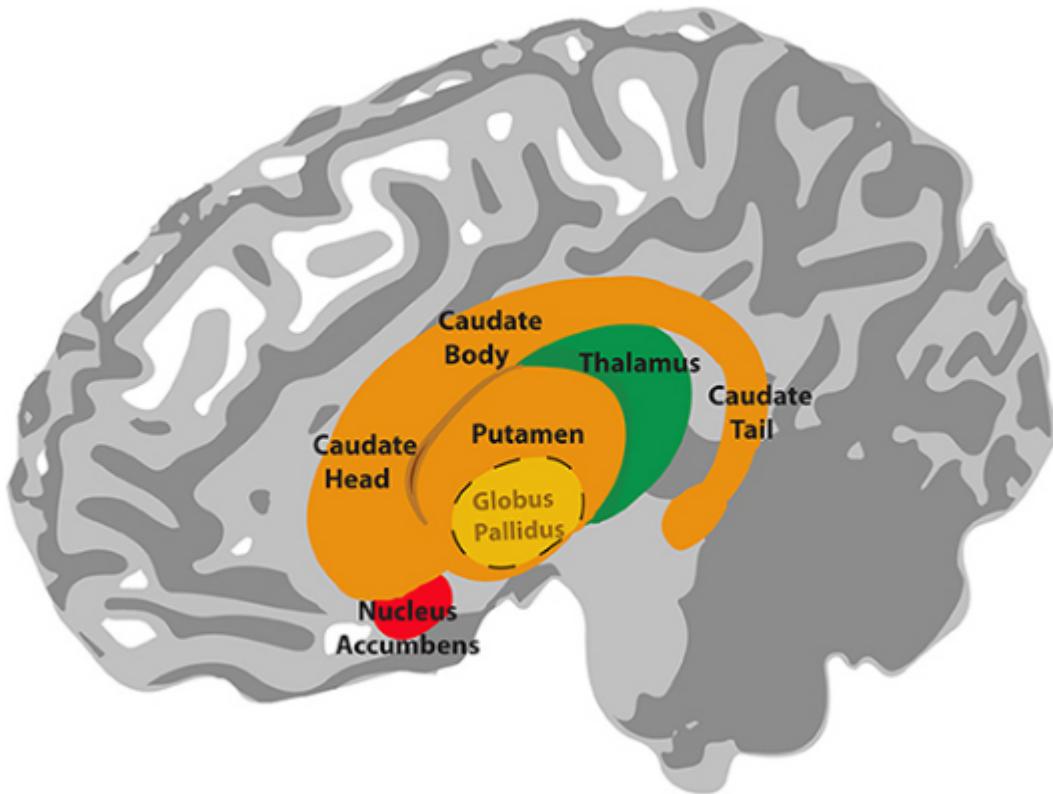
To have a functional paradigm anywhere in the nervous system, let alone in biology, remain conserved for that long means that it must be doing *something* right. If I had to sum up the function of the basal ganglia in one word, it would be *movement*. If I could use two words, those would be *action selection*. Whenever the brain is trying to decide where, when, or how to move, you can bet that the basal ganglia is involved.² There are some higher level, cognitive roles for the basal ganglia as well, but those truly are footnotes in this case, as they developed much later in evolutionary time— the basal ganglia in lampreys are for movements, first and foremost.

Lampreys have another part of the vertebrate brain called the thalamus, which functions like a gateway hub to route information around the brain from one source to another, much like a central train station or an international airport. However, unlike the basal ganglia, the thalamus shows drastic changes over the 600 million years from then until now across the other vertebrate groups. Though its particular structure shows many alterations over time, its function as an interconnected signal router remains the same, and the thalamus invariably works closely with the basal ganglia to coordinate movement. While the thalamus is doing many *other* things beyond movement, such as facilitating sensory processing like vision and hearing, the fact that it arises in the evolutionary timeline in concert with the basal ganglia is consistent with the suggestion that its original, primary advantage was for movement.

That now brings us to the final, and perhaps most interesting, member of this movement troupe: the pallium. I know you haven't heard this word before. It's from the Latin for cloak, because the pallium is the outermost part of the brain. Surely, you're thinking of the neocortex (or maybe just the cortex), that gray, wrinkly, mushy mess, as your conception of what a brain *is*. Well, prepare for these hot takes, any of which could be their own essay: the neocortex is not the only part of the pallium; the neocortex is not necessary for producing advanced, complex behaviors; and the pallium is only one part of the vertebrate brain. The pallium has a critical role, though: it synthesizes with the basal ganglia and thalamus to coordinate movement. Throughout vertebrate evolution, from lampreys into humans, the pallium shows increasing sophistication at every step, continually adopting a wider and improved array of

²I hope FanDuel doesn't get any ideas.

functions, including consciousness, introspection, and, really, anything else we can think of. The story of vertebrate brain evolution could very well be thought of as the story of the pallium.



Note how the components of the basal ganglia (orange, yellow, and red) and the thalamus (green) reside underneath the neocortex (gray, wrinkly). Image credit: Lim S-J, Fiez JA and Holt LL, CC BY 3.0 <https://creativecommons.org/licenses/by/3.0>, via Wikimedia Commons.

Nonetheless, I'm still ready to buy the argument that the pallium was first for movement, and anything else second. While lampreys don't do math or write screenplays (as far as we can tell), they *do* move, and they move well. If they couldn't, after all, they wouldn't be able to find food or avoid predators, and ultimately, I wouldn't be able to write this here today, nor could you read it.³ It really makes sense to me that at the dawn of vertebrates, evolution selected the pallio-basal ganglia-thalamic loop⁴ as the mechanism most adept for movement, thereby best ensuring survival and reproduction, compared to any competing options now removed from the fossil record that we will never know. An informed reader may notice at this point that I have completely left out discussion of the cerebellum, a brain structure obviously dedicated to movement that is common across all vertebrates. Although it's certainly an intriguing brain region, I have made this elision because I think the cerebellum is too specialized for movement

³Assuming I'm from this planet, of course.

⁴Clunky phrasing, and the one currently entrenched.

for the point I want to make later, even though it's not exclusively involved in movement, either.

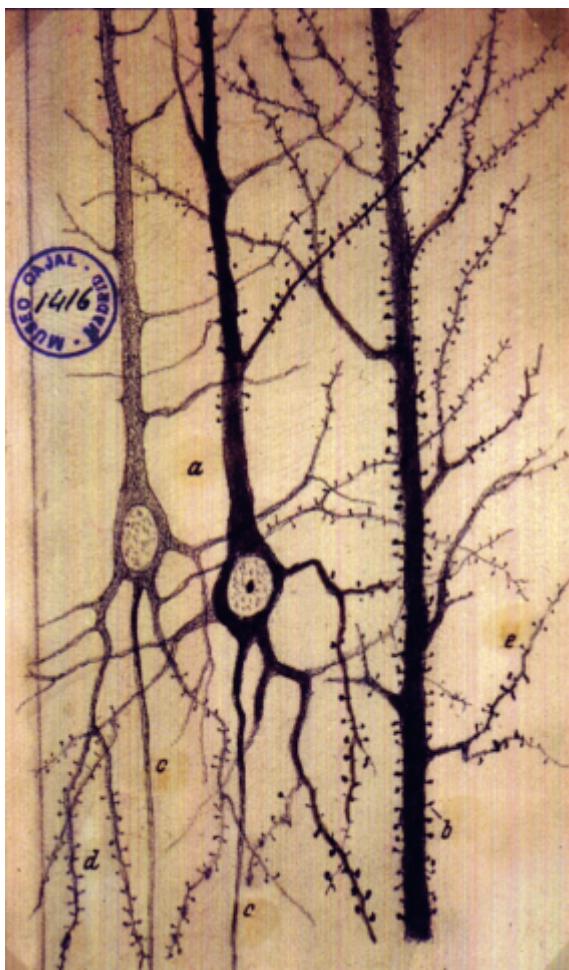
If we grant that the primordial function of the pallio-basal ganglia-thalamic loop was for movement and movement alone, the mechanisms of some other innovations throughout vertebrate brain evolution start to make a bit more sense. For instance, the circuits involved in vocal learning and production, including speech and language in humans, appear to have their origins in circuits for motor learning and performance.⁵ Taking this a step further, some hypotheses propose that cognition itself arises from modeling used by the brain to predict and evaluate motor behaviors, such as reaching for a cup or shooting a basketball, which requires an estimate to target the location and modify the effort for a future attempt. It's not that preposterous of a leap to consider that generalizing this modeling capacity to non-motor actions could engender something like conscious thought.

OK— the vertebrate brain may have been optimized for movement first, but how could this also apply to *nervous systems as a whole*, which covers much broader territory?

If you could look at us under a microscope along with any other animal on Earth— including creatures like squid, ants, and mosquitoes— you would see identical cell types (which is one way that animals differ from, say, plants or fungi, which have distinct cell structures), and crucially, *a uniform implementation of the nervous system*.⁶ I don't mean that every animal has the same nervous system, because obviously there are countless differences. What I mean is that the fundamental nuts-and-bolts are the same: individual cells called neurons are interconnected and send chemical signals to one another through specialized structures called dendrites and axons. Dendrites look like messy plant roots, as they route information *into* the neurons. An axon looks like a singular tree trunk, as each neuron contains only one and this routes information *out* of the neuron. This description summarizes the *neuron doctrine*, a tenet of modern neuroscience which holds that individual neuronal signalling underpins nervous system function and, ultimately, behavior. It's worth noting that although the neuron doctrine emerged from a lengthy historical debate, it doesn't mean it explains everything or that there aren't competing hypotheses.

⁵Most ancestrally from pectoral motor circuitry in fishes.

⁶With the exception of the Ctenophores (comb jellies), which appear to have an independently evolved nervous system. I highly recommend *Brains Through Time* by Striedter & Northcutt for a sweeping summary of vertebrate brain evolution.



Actual neurons of the human brain chemically stained by the neuroscientist Santiago Ramón y Cajal (1852-1934) that led to the acceptance of the neuron doctrine. Image from: Glickstein, M. (2006). Golgi and Cajal: The neuron doctrine and the 100th anniversary of the 1906 Nobel Prize. Current Biology. [10.1016/j.cub.2006.02.053](https://doi.org/10.1016/j.cub.2006.02.053)

Now I can clarify the point I want to make. What if the neuron doctrine *doesn't* explain movement? What if it's the other way around... what if movement explains the neuron doctrine?

To move, an animal's nervous system first needs to input sensory information, such as what is immediately around it and where it could actually go. Then it needs to integrate this information into some sort of higher-level model that can compute a plan to get to a new location, including the amount of energy to exert and capabilities required (you may notice that many insects avoid water, or that most creatures don't even try to jump across a large gap). At the final step, the nervous system needs to *execute* the behavior, somehow physically moving the limbs that support the body and make the action a reality. If you were building a system from scratch to accomplish all of this, how might you go about it?

At the most abstract level, removed from technical details, you would need a system that can interpret the external environment, generate an internal model of the body's relationship with said environment, and then create the output to make changes to that relationship. Nature has discovered that individual cells (which existed before neurons ever arrived) can achieve this when they can communicate with each other. *Communication* is the key to the nervous system much more than neurons are. Just look at the immune system and endocrine (hormone) system, which are the other communication systems in animals that use intricate sets of chemicals to modulate various physiological processes. The difference is that these systems don't directly impinge on *behavior*, which remains the domain of the nervous system. I'm sure you've heard or made comments about "hormones affecting behavior"—yet to be pedantic, and also accurate, hormones themselves don't affect behavior. They modify the probabilities that *neurons* will signal in certain ways, which then downstream affects behavior.

We already know, then, that the body can communicate without neurons. To move, though? As far as we see in life on Earth, you need neurons, or something with very similar features.⁷ I had never, ever thought about it this way before— in high school biology, college neuroscience, PhD behavioural neuroendocrinology, postdoctoral comparative neurobiology—but I have to say, I think I'm convinced. The nervous system has evolved to *move*, and everything else has developed secondarily.

Sometimes I am so embarrassed by the capabilities of artificial intelligences, with their vastly superior performance in almost anything computational or high-dimensional, that it really makes me feel useless. Other times I am so smug that those intelligences don't quite, nor will likely ever, fully grasp the nuances of human social behavior or what it means to feel emotion, which grants me some advantage, however small. Now, though, I can rest knowing that I was never *meant* to be a computer. My own thoughts arose from a dance with this ephemeral world, as my collective matter tested various ways to navigate through it all, not so that I would be able to derive mathematical truths from cosmic patterns, but so that my embodied self would continue to persist. It's a wonder I can even communicate at all.⁸

⁷Referring to the note above about Ctenophores, their movement-signalling system still has the same goals of other nervous systems, but solves it in a different way.

⁸This line came to me as a reference to the song "AEIOU And Sometimes Y" by Ebn-Ozn: "There are 178 parent languages on our planet with over 1000 dialects... It's amazing we communicate at all."

4 The Road to Taoism is Paved With Punk Music

I'd love to see a punk band composed of Taoist monks. Or maybe it should be the other way around. I'm aware that serene, enlightened elders and loud, aggravating youngsters aren't exactly interchangeable. After reading a bit of Taoism, though— and listening to punk music for much longer— I think they're actually closely related coins, if not two sides of the same one. So grab a stack of your favorite timeless texts translated from classical Chinese, the most provoking songs from your teenage years, and let's see how much they have in common.

First, some definitions. Taoism is a tradition of thought originating from China thousands of years ago that sits somewhere between a religion, a philosophy, and a way of life. It centers around the idea of the Tao, a formulation of an ultimate, eternal source of existence that transcends even being and non-being through a balanced dynamism of opposites. It might be better to conceive of the Tao by understanding what it *isn't*: “The Tao that can be spoken is not the eternal Tao.”¹ Taoism therefore is fundamentally about relations, and in particular with cultivating growth from movement through life, where the only constant is change. I think this is best captured by the common translation of the Tao into English as “the way,” with the next moment always being a step ahead in both space and time.

On the other hand, punk is pretty straightforward: Rock music, first released in the '70s and '80s, played loud and fast with simple chords and rhythms, bearing a visual and lyrical aesthetic designed to incite and inflame. For punk in a classical sense (however much of an oxymoron that may be), it's designed from the ground-up to challenge norms and tear down the establishment: there's a reason that your immediate image of punk rockers conjures spiky hair, studded leather jackets, and suggestive hand gestures. I'm going to take this a step further, though— what if punk has nothing to do with the music, or even the aesthetic? Underlying all of punk is *rebellion*, which can manifest itself in countless ways, has existed long before Black Flag or the Dead Kennedys formed, and will persist for long after.

Taoism and punk are united because if Taoism is chiefly about *relations*, so is rebellion, which by definition is an opposition.

¹Translated from the Tao Te Ching by Derek Lin.



Left, a ubiquitous image of the yin and yang. Right, the Chinese character for Tao, often translated into English as “the way.”

If everyone started wearing spiky hair and studded leather jackets, it wouldn't be out of the ordinary anymore, and would then cease to be an act of rebellion. This conformity is precisely what has happened in so many punk communities—where the participants, or practitioners rather, look the same, act the same, and share the same views—that has led to much bemoaning over the death of punk. To find living punk, though, just look for those who can't quite be characterized, who don't all fit a definition and aren't trying to imitate what has come before. No, I'm not trying to say that punk is *contrarian*—opposition for opposition's sake—but crucially that it's *creative*, birthing something new from a tension with the old.

Punk music was born from the excesses of rock-n-roll, exemplified by the increasingly theatrical and self-indulgent performances that generated so much mainstream attention (and money). Let's do away with all of these disgraces to the genre, the founding punk artists proclaimed, instead insisting on raw shows in dingy venues to small yet authentically engaged audiences. A similar observation can be made for black metal as a reaction to death metal in the '90s,² and even the rise of gangsta rap as a response to acceptance of rock. Rebellion needn't have a particular sound; it just requires the right combination of novelty and abrasiveness, at least to the old guard.

²Yes, these genres are distinct.



My own attendance at a show for Sueco, whose music is rebellious because it sounds like music from 20 years ago that isn't made anymore. A drummer, guitarist, and proper frontman can go a long way.

The “big three” tomes of Taoism— the Tao Te Ching, the Zhuangzi, and the Lieh-Tzu— capture this lesson of birth through death, and vice versa, via a series of poems, parables, and prose that famously lack directness. Similar to how the true Tao is the Tao that cannot be named, the lessons of Taoism are not found in the text itself but rather in the experience of examining and reflecting on the message. These works leverage analogies with nature or clever use of everyday language to illustrate, for example, that a particular state or condition doesn’t exist in isolation, instead arising from its comparison.³

When the world knows beauty as beauty, ugliness arises
When it knows good as good, evil arises
Thus being and nonbeing produce each other
Difficult and easy bring about each other
Long and short reveal each other
High and low support each other
Music and voice harmonize each other
Front and back follow each other

³Translation again from Derek Lin.

Compare this to the lyrics from “Suburban Home” by the Descendents, which clearly shouts something more than it says. (The singer, of course, is mostly yelling.)

I wanna be stereotyped I wanna be classified I wanna be a clone I want a suburban home I wanna be masochistic I wanna be a statistic I don’t want no hippie pad I want a house just like mom and dad

At some point or another, we have all wanted to throw our hands up and walk away,⁴ either from the mundanity of modern life or something more (or less) profound. Whether we actually follow through is a different matter. It’s natural to hit your break point in any instance, be it after physical exertion from exercise, intellectual exhaustion after work or study, or interpersonal communication with a partner. Facing this split is often the precise opportunity for worthwhile development⁵:

The eye is about to grow dim when it can discern the tip of a hair; the ear is about to go deaf when it can hear the wings of a gnat; the palate is about to deteriorate when it can discriminate between the waters of the Tzu and the Sheng; the nostrils are about to clog when they can distinguish scorched and rotten smells; the body is about to stiffen when it delights in sprinting; the mind is about to go astray when it can recognize right and wrong. Therefore if a thing does not reach its limit it will not revert.

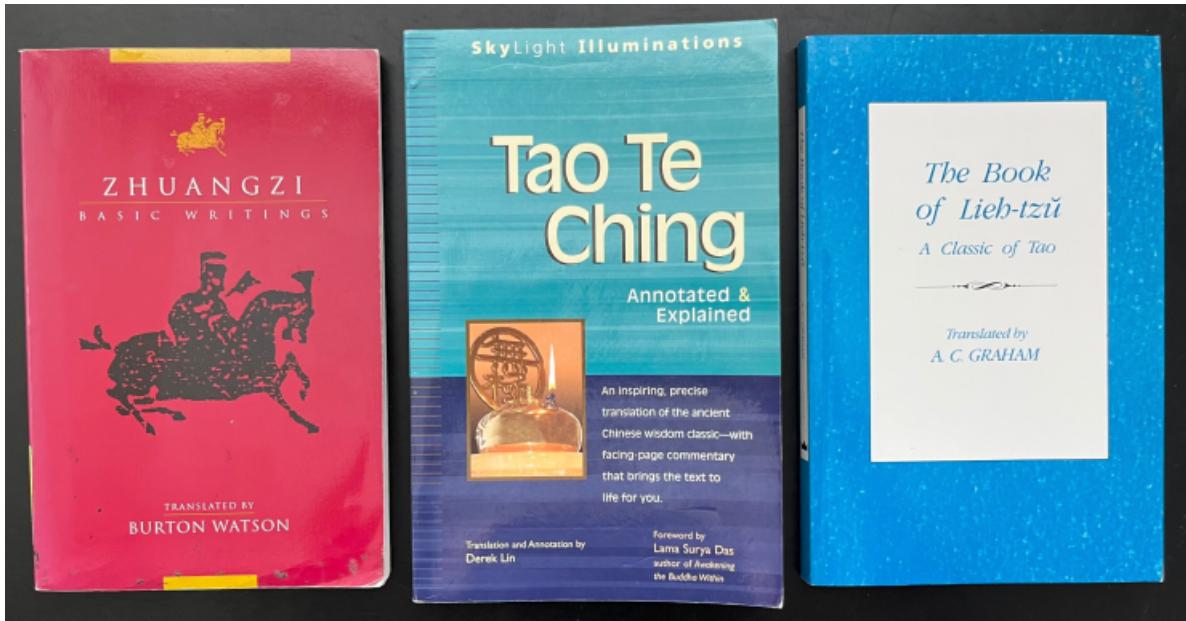
Zhou Dunyi modeled this sentiment in an even higher abstraction in the 11th century when describing how the opposing forces of yin and yang generate each other, and in turn, everything else that can follow:⁶

Non-polar and yet Supreme Polarity! The Supreme Polarity in activity generates *yang*; yet at the limit of activity it is still. In stillness it generates *yin*; yet at the limit of stillness it is also active. Activity and stillness alternate; each is the basis of the other. In distinguishing *yin* and *yang*, the Two Modes are thereby established... *yin* and *yang* are simply the Supreme Polarity; the Supreme Polarity is fundamentally Non-polar.

⁴In the immortal words of South Park’s Eric Cartman, “Screw you guys; I’m going home.”

⁵From the Lieh-tzu, translated by A. C. Graham.

⁶In the *Taijitu shuo*, translated by Joseph Adler. I did not encounter this passage myself but read it on [the Wikipedia article for Wuji]([https://en.wikipedia.org/wiki/Wuji_\(philosophy\)](https://en.wikipedia.org/wiki/Wuji_(philosophy))).



The three most enduring works of Taoism, in all their paperback, modern English glory. I recommend reading them, from these translators, in the order shown here.

Continuing to quote Taoist passages certainly feels like citing any other religious scripture. The difference, to me, is that Taoism primarily draws from observation, with the words provided in a take-it-or-leave-it manner, left behind from those who came before. When Carl Jung analyzed many of the world's spiritual traditions to note recurring patterns and collective elements shared across time and culture, his thinking was both heavily influenced by Taoism and ultimately reflected many of its principles. Taoism functions, then, as a sort of meta-philosophy, almost like mathematics, sitting above other ways of thinking while at the same time being limited in what it itself can say.

In that vein, rebellion isn't always about sticking it to the powers that be. It can be as simple as standing up for yourself, even when knowing it will hurt. Just take it from New Found Glory in "2's + 3's" (with the singer, of course, not professing gently):

I sat and stared at the sky
 I knew I'd find myself there again
 I wonder how else to cope with the air
 The air that brings me this luck
 I'm unlucky, that's just me
 Seems what used to be has changed

And I feel it coming again I feel it coming with the wind I feel it coming again I
 feel it breaking with the wind

And I know, I won't feel it again if I just played along
“Stupid games are for stupid people” and they end just like a song
A song with no beginning, a song that has no meaning Just like this one, just like
this one

As the utility of Taoism best shines in its application across various domains, rebellion is not limited to music. Part of the reason that free⁷ and open-source software resonates with me, aside from its performance over competing options, is the rebellion inherent in it. Ask someone what operating system they have on their computer, and odds are, it's either Windows (Microsoft) or MacOS (Apple). There is a third option, though, known as Linux,⁸ that isn't owned by any corporation and is entirely free to use⁹. Whether you take the effort to install it on your own machine, or go out of your way to order a pre-built model from a specialized company, running Linux is an act of rebellion in today's world: the system is fully customizable, doesn't track or sell your personal data, and never pushes updates or notifications that you don't want. Free and open-source software projects are perfect examples of DIY communities building their own infrastructure, with intentional safeguards to prevent its usurpation, just like punks gathering in a clandestine basement to rage against societal oppression.

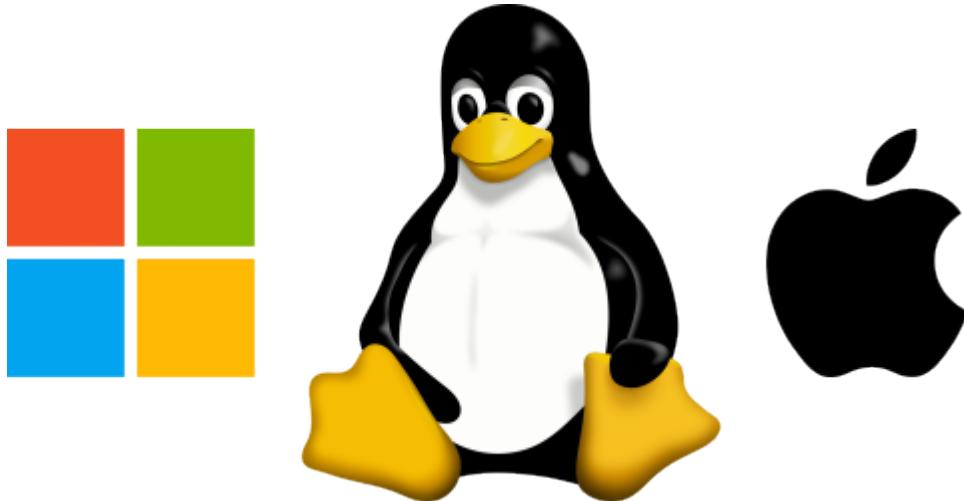
Just like monks convening in a monastery to write the rules that un-write the rules.

It's noticing the gaps that enables punks, Taoists, and software developers to create. The story of astronomy leading to the genesis of classical physics, starting from Nicolaus Copernicus evidencing that the Earth revolves around the Sun, instead of the other way around, through Galileo Galilei, Johannes Kepler, and ultimately Isaac Newton, is itself a story of punks overturning the establishment at every step. Crucially, these figures weren't making noise for noise's sake; they all had something to say, and weren't afraid to back it up. Though Lou Reed or Johnny Rotten wore their hair differently from these historical figures, their publications carry the same insights.

⁷Free meaning liberated or unrestrained, as in free speech, from *libre*.

⁸While I want to acknowledge the rationale for calling it GNU/Linux, I don't think this always applies in today's computational ecosystem because there are now Linux distributions that do not contain GNU components.

⁹Here free also meaning free of charge, as in not costing anything, from *gratis*.



The alternative is as punk as it looks.

A common conception of the most pure way to practice Taoism is to retreat into the mountains, removed from all barriers to unending contemplation. Yet, I also think this defeats the purpose. To create, you need to absorb the chaotic present, with all its discontents, to realize where fresh seeds will thrive. My meditative path might be among the chores of each day, bombarded by the noise in the world around me, rather than away from everything except the din of the first movers.

Taoism has no end, as it also has no beginning. For as long as there are people, there will always be those who, whether through audacity, stubbornness, or some ratio thereof, refuse to accept or embrace the status quo, with or without stentorian anthems. While technology purports to move us forward— and it certainly, inarguably, has— there remains a simple pleasure in connecting with the basics, owning movement from start to finish. Navigating with Google Maps? Typical. Following only the stars? Taoist.

Or should I say, punk.

5 The Voynich Manuscript Says Something More Than Words

There isn't really anything quite like it. The Voynich Manuscript is a book written in an unknown script, apparently inscribing an unknown language, filled with lavish illustrations of unidentified contraptions, scenes, and schematics that defy all attempts at understanding. The manuscript has been carbon-dated to approximately 1404-1438, is named after Wilfrid Voynich, one of its owners who helped bring it to prominence in the early 1900s, and has now rested in Yale University's Beinecke Rare Book and Manuscript Library since 1969. I've been aware of this document for more than half my life now, and I return it to more frequently than may be impressive to admit; there is something about it that singularly captures my attention. I just want to know what it says.¹ Today, after a flash of insight, not of application, I think I do.

¹Watching from 6:49 onward, what I'm talking about is the way he says "I would just like to know what it's all about; you know, why it's there." And at 8:24, the way he says "Oh, no; it's not arbitrary!" will continually haunt me.



An example of the unknown script and similarly unknown illustrations.

Like all great discoveries nowadays, I was toying around with creative, far-fetched ideas of speculative cognition with ChatGPT. I asked it to imagine advanced, super-intelligent sauropod beings (the taxonomic group containing reptiles and birds) that had leveraged their unique brain structure to decipher the Voynich manuscript through deep mathematical and quantum mechanical methods. The large language model gave an illuminating answer and one that I did not expect. It didn't simply reveal what the manuscript says— that would be too easy, wouldn't it?— and instead concluded that the journey of understanding the manuscript served, for these higher beings, as a unifying symbol of ultimate meta-conscious awareness. Circuitous, sure, yet entertaining nonetheless.

I went a few more days without thinking about it. Then the Voynich bug arose again, and I did some more digging. I tried looking at some pages in-depth myself, scanning the text, the images, the diagrams for patterns, to add to the innumerable ranks of those who have done the same, as if again trying to prove the famed Riemann hypothesis from number theory. And the mathematician Andrew Wiles, in cracking Fermat's Last Theorem that was untouchable for centuries, proved that sometimes breakthroughs happen.

During a web search to see if there were any matches to a string of text I thought I'd recognized, I came across a site that had a brief introduction to the manuscript.² It mentioned its earliest

²Check Quire 1 for the introduction. I also used the images from [these PDFs](#).

known owner, and I dove a bit more into the manuscript's history, where the intrigue continued to flow. Setting aside the wonder of this world of mystic scholars and alchemists that was entirely new to me, I realized there was a genuine dialogue here, something that could provide the clues that were missing.

The manuscript's first known mention is in a letter from someone named George Baresch to Athanasius Kircher in 1639. Kircher had been known throughout Europe for his claimed deciphering of Egyptian hieroglyphs (which wasn't correct, by the way), which would make him an obvious front-runner for elucidating another baroque writing system, at least to European eyes. Kircher's response to Baresch was written in Latin, and I'll quote a translation here by Philip Neal:³

As for the book filled with some sort of mysterious steganography which you enclosed with your letter, I have looked at it and have concluded that it requires application rather than insight in its solver. I can recall solving many writings of this kind when the occasion presented itself, and the itch of my mind working would have tried out some ideas on it if only many very urgent tasks did not call me away from unsuitable work of this kind. However, when I have more free time and can take advantage of a more suitable moment, I expect I shall try to solve it when the mood and inspiration take me.



Wilfrid Voynich (1865-1930), left, a Polish book dealer who tried searching for answers. Athanasius Kircher (1602-1680), right, a Jesuit scholar in the Holy Roman Empire who claimed to read Egyptian hieroglyphs.

Baresch had clearly reached out to Kircher out of respect and perceived expertise, and Kircher didn't see it worth his time. This alone could be enough to dismiss the value of the manuscript—why wouldn't a man like Kircher have wanted to solve it, unless documents like this weren't that noteworthy back then? Filtering out signal from noise is an age-old problem, after all. He clearly mentions much other more *important* work he has to do, without defining what that is.

³<https://www.voynich.nu/letters.html>

What we do know, though, is that Kircher received part of this manuscript and brushed it off, almost certainly due to the reputation, or lack thereof, of the document or the sender itself.

Afer Baresch's passing, his good friend Jan Marek Marci follows up with Kircher again. (Within this medieval circle, Kircher must have been the guy to go to, or at least the one most likely to respond.) But this time he does something different—well, I'm assuming so, because we don't have access to the complete correspondence. Let's look at it:⁴

Doctor Raphael, the Czech language tutor of King Ferdinand III as they both then were, once told me that the said book belonged to Emperor Rudolph and that he presented 600 ducats to the messenger who brought him the book. He, Raphael, thought that the author was Roger Bacon the Englishman. I suspend my judgement on the matter.

You be the judge of what we should think about it. I commend myself to your favour and grace and I remain.

He mentions that this manuscript was owned by a Holy Roman Emperor, who paid a handsome sum for it, and that it might be authored by the great (and English...) Roger Bacon. But—Marci absolutely stresses—who is qualified to say that it's truly from Bacon, other than Kircher himself! Marci lays out motivation for Kircher to decipher the manuscript by appealing to his intellect and ego through call-outs to authority, power, and—above all, for someone like Kircher—legacy.

Maybe Marci really did think the deciphering was that important. I'd wager that he just wanted to know what the thing was.

I looked at the manuscript again. I thought about it. There's no record of a response from Kircher, and we might never know if he gave it a college try or not. What if he did? Let's say he had it in his hands, sat at his writing desk for a good number of sessions, and cracked the code like he claimed to do for hieroglyphs. Behold—the alignment of the cosmos, the dynamics of all maladies, the secrets of oneness with divinity—it's all there, and Kircher's got it, Bacon's efforts be damned. Then a fire comes and erases whatever progress he had made, or a flood sweeps the mail away. It's possible, I guess. We can't entirely rule it out. I'll stick with the assumption that Kircher never actually gave it a look worthy of his invaluable intellect. Or time.

It's this lack of attention from Kircher that, I think, reveals what the manuscript says. Let's say he doesn't figure it out himself, but he reaches out to some in his closest circle. They continue to exchange letters and test out hypotheses, sometimes just having fun, other times in earnest pushing the limits of what they can conceive, in a way not entirely dissimilar to modern internet- and community-driven attempts. Maybe they hold a symposium, and really make some progress; they publish their own analysis, which Leibniz or Voltaire gets his hands on one day and scoffs at. One rebuttal leads to another, and maybe by this time today it's all

⁴Also translated by Philip Neal. [Found linked](#) from the website in (3).

been figured out, or at least there's more productive scholarship: imagine the Departments of Voynich Studies scattered throughout the universities worldwide, and the billionaire-funded institute or two that are established just to apply the newest algorithmic techniques on it.

Obviously, none of this happens, and we all know the rest. The manuscript languishes in obscurity, with various peaks of interest waxing and waning—cryptographers from the NSA attempt to crack it— and it's mostly written off as some historical oddity that inspires occasional bouts of curiosity, which certainly are memorable... but no serious person seems to have it as their primary working focus.

Sounds a bit like where Kircher found himself, doesn't it?

One thing that captivates me so much about the manuscript is that it's so darn passionate. Someone (or someones) spent a *lot* of time on this. Even if it's just gibberish in the end, it has to have taken the form of an obsession for the author. So let's imagine a particular scenario, and we'll see if you can then read the manuscript the same way I do now.



I think I'm most intrigued by the intricate diagrams and figures, which seem to indicate they hold some deep, explanatory meaning.

There's a person in medieval Europe who's a bit curious about the world. They're reading interesting reports about far-off lands described and fantastic things uncovered, pondering about all the machinations of Nature and the gods, captivated by the conjunction of the elements and the eternal fire beyond us all. Maybe they try a mind-altering substance that

brings them to a wholly new place— or there’s no substance as the spark, but an ineffable exploration of the mind, however encountered in waking or dreaming, or some other state— and they just *have* to write this down, and they really, *really* want to share it. So they do. They trace out all the pictures, fill in color in between the lines (well, sometimes, at least), and record it all. There— Newton’s Principia before classical physics, Kant’s Critique of Pure Reason before rationalism and empiricism have even gone to battle— is the Tome of All Knowledge.

And it’s not in Latin. No— it *couldn’t* be in Latin. That would just be too *commonplace*, wouldn’t it? This text is the answer to it all, after all! It can’t be read by us. It’s not *from us*. It’s written in the style just as it was, the author says, as it came to me.

We’ll likely never know what the author’s true intentions were, whether to inform or to beguile, but let’s continue this further. OK— they have this impressive book, a voluminous collection of ink on vellum, which isn’t exactly easy to come upon, by the way— and while the author is satisfied with the handwriting (it’s from the gods, remember), they realize that to match the professionalism of other maps and publications of the time, that in order to be taken seriously, they’re going to need a better artist. They go to a local publisher— excuse me, who are you?— and are immediately shunned away; the nearby monastery has no interest, and they’re at capacity anyway; nobles don’t ever bother coming to this village as it is, so I can’t try to impress them, either.

It’s really too bad: Here I have this text, this document, this *work*, shouts the author, but no one’s going to take it seriously without some better art. And it’s even worse, they continue, because they can’t even find an artist to help out. It’s not like there’s an Upwork platform for visual creatives in fifteenth century Europe.

Set aside the logistics, though— maybe the author *did* have several conversations with a publisher, *did* make inroads with a big-name monastery, *did* have chance or deep connections with a royal. There’s evidence the manuscript has been edited, in any event. And maybe this still all fell through, because of some petty insistences from the author, some temperamental outbursts about creative vision, or really, who knows? They could have already been a member of, and subsequently outcast from, whatever institution could have made this happen. The author was a jerk, let’s say, and there just wasn’t anyone who wanted to work with them.

Without this push— from someone, *anyone*— the manuscript goes nowhere, until as far we can tell, Baresch pulls it off his shelf and thinks about it.

And then Kircher declines to do the same.

The Voynich Manuscript is a monumental achievement in some combination of human creativity, daring, and downright bizarreness. Whatever it’s saying, it transcends human language, soars beyond computation, and enters into a space of something that’s not conveyed in words, or even images, but in *feeling*. The Voynich Manuscript has to be experienced, and I don’t just mean the process of trying to read it.

I mean in trying to *be* it.

Have you ever poured your heart into something, only to have it go nowhere? Have you ever fallen a bit too hard for someone, and then understood that the other person never really cared much about you in the first place? Have you ever put in extra hours at the office, trying to put the finishing touches on that project that wouldn't impress just your boss, but the whole industry—only to get a call from HR a couple days later that your position was getting axed? (No fault of your own, of course.) Have you ever tried to do something—*anything*—only to realize that it wasn't actually what you did that mattered... but how you did it?

I'm talking about relationships. Situations where success wasn't driven solely by the quality of the output, but by the power of the network that propelled it. Where the dynamic surrounding the work—the context, the community, the uncontrollable and emergent external interest—actually better explained the eventual impact than the craftsmanship and intricacies of the artistry that went into it.

The Voynich Manuscript is a lesson that without multipliers, our efforts may as well be meaningless. Sure, in the case of the manuscript, it may in fact *be* meaningless—it might not say anything in the end.⁵ But I think it really says something. It says that you can't work alone, or in constant conflict, so confident in your own abilities, to the exclusion of all potential collaborators, and come out re-making knowledge. Of course, there will always be instances of solo contributors who manage to leave outsized impact, but these are the exceptions, not the rules. For the rest of us, whether stuck in medieval Europe or not, we're going to need some help.

⁵ A compelling argument for rule-based text generation, somewhat akin to cellular automata.



Your guess is as good as mine.

I get now what the Voynich Manuscript says, in a way that might not satisfy all the code-crackers and linguists out there. Its enigmatic script doesn't say anything, and yet it says everything. Your communication needs to include connection: otherwise, with any luck, people may only someday debate not what you said, but whether you said anything at all.⁶

⁶The closing lines of [this article](#) definitely resonated with me.

6 Dance with the Dark

I never thought I would read Carl Jung. He's a footnote in psychology, right? A historical figure around the time of Freud, who had a bunch of non-falsifiable theories about the psyche, dreams, and things like that? That was pretty much how Jung was introduced every time I encountered him in neuroscience contexts. From a data-driven, biomedical perspective, it's not an entirely inaccurate characterization. Since Jung was born in 1875, though, we shouldn't expect him to have a mechanistic understanding of the nervous system, which didn't really form until decades later.

That, for me, was when it clicked: when I realized that Jung works at a level of abstraction *above* the nervous system. He's not describing the brain, like how a researcher might try to uncover neural circuits that mediate social behaviors. Jung's attempting to address the *mind*, the world of our conscious and unconscious thought. Believe me, though, I am not a dualist: I don't think that the mind is something separate from the brain.

Yet, I do think that what we *experience*, our moment-to-moment embodiment of reality, cannot be reduced to something like the activity of a brain region, or the presence of a neurotransmitter, or a change in gene expression. Sure, those mechanisms may ultimately lead to a particular behavioral output, but they don't explain *what it feels like* as that behavior occurs to the conscious entity. And how could it? Until there's a way to de-encrypt every single possible neural recording at every single moment, as if reading sheet music, we don't truly know the source code inside our heads. That leaves a lot of room to think about what may be going on.

In modern terms, Jung was a therapist. He may have had a medical degree and practiced as a psychiatrist, but he didn't prescribe medications. His goal was to help clients cope with troubles in their lives through dialogue. In my reading of Jung, his attempt to treat what he called "neuroses"—only some of which today would be considered mental illness—opens an entirely new window to understand our consciousness, whether he intended that or not. Applying Jung's approach has proven inspirational to me in many areas beyond mental health, ranging from creativity and artistic analysis to interpersonal relationships and individual development.

Unfortunately, in order for Jung to really resonate with me, I had to first enter into a rather dark place, which Jung then helped me through. Some part of me wonders, of course, if I just fooled myself as a way to ease the pain. I want to use this essay as a chance to highlight why I find Jung's framework so appealing, and why I think others may benefit from appreciating his thought more, without first needing to face what I faced.



Jung's structure of the psyche hinges on the balance of opposing forces, directly inspired by the circular mandalas of Eastern religions and philosophies (as shown here on the right of his cover for *Man and His Symbols* from 1964.) Note that diagrams like the one on the left are not made by Jung himself, instead coming from decidedly non-scientific sources like *The Middle Pillar: The Balance between Mind and Magic* by Israel Regardie.

To begin, it has to be emphasized that Jung did emerge as an admirer of Freud, and the two communicated closely for many years. They eventually came into a professional and personal split, resulting in two distinct approaches: “psychoanalysis” for Freud, and “analytical psychology” for Jung. This is not just psychoanalysis plus some extra stuff; Jung’s conception of the mind fundamentally differs from Freud’s, and therefore draws non-reconcilable conclusions.

The opening of *Two Essays on Analytical Psychology* (1928-1943) introduces what sets Jung’s vision apart. He explains that when counseling a patient with neurosis, Freud’s method would identify the source as a form of sexual repression. However, some alternative approaches did emerge, such as from Alfred Adler, who developed his own school with *power differentials* as truly underlying neurosis. Jung could carry on with other methods, but he stops here, asking now: how could two different views, each claiming absolute certainty in opposing domains, both be correct?

If a theory of sexual repression helped some patients, and a theory of power differentials helped another, Jung supposes that each theory may instead be capturing a subset of a broader theory of the mind—something akin to the “theory of everything” that still eludes physics. Where Freud and Adler go astray, Jung claims, is that each points to the wrong single cause for what underlies neurosis. Triumphant, Jung declares that the true cause is not something about merely sex or power, but about an imbalance of the self.

I know— that sounds so wishy-washy and nondescript as to be meaningless, and I think it's why Jung's work became associated with hippie spirituality rather than anything scientific. While what I'm about to describe still wouldn't pass in any peer-reviewed journal, I think if you take it for what Jung used it as— practical advice to aid the struggling individual— there can be great utility, even if it's not exactly quantifiable.

Jung's central concept of the mind revolves around *balance*, supposing that our consciousness emerges from the unity of opposing forces. An imbalance in any area can lead to dysfunction somewhere else. Crucially— and this can be the hardest part to accept— the space of our balanced mind encompasses our *unconsciousness*, of which we are unaware. Unlike Freud, who claims that the unconscious constantly strives to dominate over regular consciousness, thus creating neurotic tension, Jung observes that the unconscious instead provides a window to information we otherwise wouldn't access. This is best illustrated to me by Jung's idea of the "shadow":

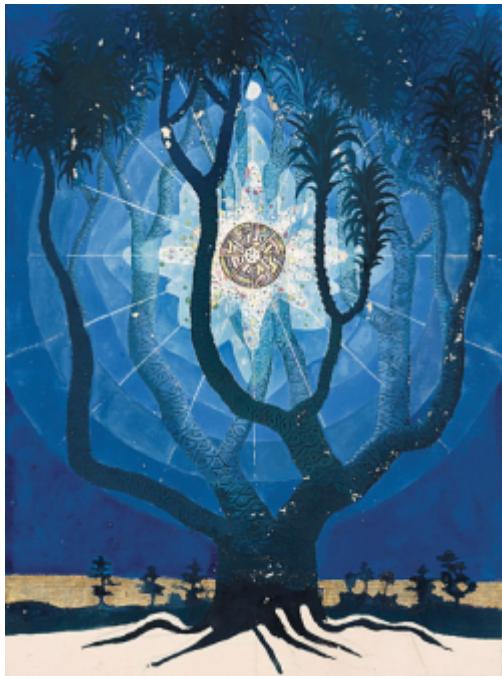
... A dim premonition tells us that we cannot be whole without this negative side, that we have a body which, like all bodies, casts a shadow, and that if we deny this body we cease to be three-dimensional and become flat and without substance.

In this framework, our internal fears, doubts, frustrations, angers— the emotions that torment us— are reflections of our shadow selves, the parts of us that reveal our vulnerabilities. Just as our conscious selves are not one static thing, but a process, our shadow selves evolve alongside our conscious selves.

The exploration of this dynamic, between self and shadow, culminates in what Jung terms *individuation*— the mind's integration of the unconscious into the self. Rather than being ignored or avoided, the weaknesses and anxieties revealed in our shadows are to be understood so that that we may incorporate them and become stronger. Individuation acts as a mirror between our incomplete and whole selves, enabling us to use the past to build a better future. Or, as Jung said:

... Life does not have only a yesterday, nor is it explained by reducing today to yesterday. Life has also a tomorrow, and today is understood only when we can add to our knowledge of what was yesterday the beginnings of tomorrow.

If this sounds a lot like Taoism, that's not an accident; individuation in analytical psychology is very much "the way" of Taoism. Both philosophies are fundamentally relational, centered around the connections *between* concepts, rather than the essences of the concepts themselves.



Jung's own artwork, best collected in The Red Book, often captures dreamlike scenes emphasizing journey and discovery as felt during individuation.

A quick glance on Wikipedia will list many other Jungian terms that I didn't mention—archetypes, persona, animus and anima, collective unconscious—and your mileage may vary with any or all of those. As characters in a story, I quite like them. Yet for me, seeing my shadow was enough. I found that it's not about shining a light to erase the darkness around you. It's about learning to move forward with only your candle, as the shadows flicker endlessly, to a place you haven't been before, a place that challenges you.

Yes, I'm scared. I've also never felt so ready for this dance with the dark.

7 Why the Chronology of *The Legend of Zelda* Keeps Me Up At Night

The Legend of Zelda timeline has always bothered me. Well, not *always*—it made perfect sense to me as I played the games when they were released, until 2011, when perhaps in response to endless arguments from fans, Nintendo published an official timeline that linked the games together. Since this was straight from the source—the definition of canon—it’s now a settled topic, and there is no longer any room for debate. Right?

Consider this my Ninety-five Theses against the Church of Nintendo.¹

I know, I know—it’s a fictional timeline for a corporate-owned video game series. I shouldn’t be worked up about it. But it’s also my favorite media franchise, and its world and narratives have lived in my imagination longer than any other creative piece: when you’re 7 years old, the characters that first spark you to start writing your own stories prove to be indelible. I’m not bothered by the *Zelda* timeline because it upsets my pre-conceived notion of how the games align. I’m irked because it rebukes the very logic and cohesion that made it so memorable in the first place, which does dim the magic, if ever so slightly. Beauty may not be immortal in art after all, however much da Vinci would disagree.²

The first game in the eponymous series, *The Legend of Zelda*, was released in 1986 in Japan, with its English localization arriving in North America in 1987. The game’s principal creator, Shigeru Miyamoto, who also launched many other now-legendary Nintendo franchises such as *Mario* and *Donkey Kong*, was inspired by exploring nature around his childhood area of Kyoto. At the time, *The Legend of Zelda* provided an unparalleled adventuring experience, where players could navigate an expansive world with a novel freedom unlike in any game before it. The gameplay holds up well today, and its influence on video games as a whole cannot be overstated. More than anything else, *Zelda* to me represents exploration, and perhaps for this reason alone, the story of the original game is quite simple.

¹Thanks for the idea, Martin Luther.

²“Beauty perishes in life, but is immortal in art.”



Promotional artwork for the first game. Technology may have changed over the decades, but our sense of awe has not.

The player begins the game as the protagonist Link (**not** Zelda) thrust *in media res*, or rather, *in media nil*. The game's setting, The Kingdom of Hyrule, has recently been decimated by the evil villain Ganon, and its inhabitants are reduced to living in caves to avoid the now ever-present dangers. Ganon was able to rise to power by obtaining a golden triangle known as, well, the Triforce of Power. Not content with just this, Ganon next desires the Triforce of Wisdom, and presumably not so he can better exercise great responsibility alongside great power. Princess Zelda (the one in the title!), bearing the Triforce of Wisdom, decides to split it into eight pieces and scatter it throughout the land so that Ganon may never obtain it. Prior to her capture by Ganon, Zelda tasks her royal caretaker Impa with finding a hero who can re-assemble the Triforce of Wisdom, defeat Ganon with his Triforce of Power, and save Hyrule. After a chance encounter where Link rescues Impa from Ganon's minions, she implores him to arise as the kingdom's only hope.

By the standards of high fantasy, it's not a particularly complex plot. I don't consider it a spoiler to summarize what happens next in a story released nearly 40 years ago: Link gathers all the components of the Triforce of Wisdom, defeats Ganon, saves Zelda, and returns peace to Hyrule.

All of this continues in the next game in the series, *Zelda II: The Adventure of Link* (the only title that's numerical, lacks the words "The Legend of", or mentions Link). As a direct sequel to the first, it's set several years later, and centers around Link's quest for the not-yet-previously mentioned Triforce of Courage. Up until now, the term "Triforce" had originally

referred to the triangular shape of the objects, but from now on in the series, “Triforce” means the combined three pieces of Power, Wisdom, and Courage. This precisely leads us to the third game, *The Legend of Zelda: A Link to the Past* (known as *Triforce of the Gods* in Japan, which sounds more ominous and makes this connection to the Triforce more explicit), which illustrates a prequel to the original game. A cunning thief named Ganondorf serendipitously obtained the full Triforce, transformed into the evil demon king Ganon, and threatened Hyrule with all his horrific might. In an event known as the Imprisoning War, Hyrule’s Royal Knights waged battle against Ganon, and ultimately a group of mystical sages sealed him away in another realm. This worked well for quite some time, but then Hyrule requires Link’s courage to prevent Ganon from breaking out.



Official artwork in the instruction booklet for A Link to the Past of the sages using the Triforce to seal Ganon away. Sometimes the Imprisoning War is referred to as the Seal War.

Forgive me, die-hard fans, for skipping over the fourth entry, *The Legend of Zelda: Link’s Awakening*, an excellent game and one of my favorites, but one that presents more of a side-story that distracts from the main issue I want to highlight.

That brings us to the fifth one. The big one. *The Legend of Zelda: Ocarina of Time*. I won’t comment on this game’s significance to video game innovations, as that has been well-told many times already, but I *will* harp on what this game means for the *Zelda* timeline,

why I have a problem with what Nintendo did with it, and why I support an alternative fan framework.³

Interviews with the game's developers around the time of its release stated that *Ocarina of Time* was meant to portray the Imprisoning War, the event that led to Ganon being sealed from Hyrule prior to the start of *A Link to the Past*.⁴ Although the specifics differ a bit from as described in *A Link to the Past*—as all legends do when passed down through time—*Ocarina of Time* does depict Ganondorf obtaining the Triforce and sages sealing Ganon away. If the series had ended for good right here, we'd have a nice, neat chronology (omitting *Link's Awakening*):

- *Ocarina of Time*
 - A tale of the Imprisoning War, which seals Ganon away
- *A Link to the Past*
 - Link thwarts Ganon attempting to break from his seal
- *The Legend of Zelda*
 - After many years, the Triforce has been split within Hyrule's Royal Family, and a revived Ganon seeks the Triforce of Wisdom after obtaining the Triforce of Power
- *Zelda II: The Adventure of Link*
 - Link embarks on a quest to find the Triforce of Courage

At the risk of alienating readers unfamiliar with the series, but who have stuck with this article so far, I want to briefly outline the so-called “timeline split” that has generated infamous discourse in the *Zelda* fan community. *Ocarina of Time* introduced a time-travel mechanic between Link's childhood and adulthood where the game technically has two different endings depending on Link's age. In one scenario, after Link defeats Ganon as an adult, life carries on, and Hyrule's future unfolds as everything in *Ocarina of Time* concludes. In the other scenario, still after Link defeats Ganon as an adult—and therefore Ganon is vanquished for good, no matter what—Princess Zelda sends Link back to his childhood so that he can experience the younger years he missed out on, without concern for Ganon re-appearing. These two timelines are known as the “Adult Timeline” and “Child Timeline,” respectively.

³I liked the “Triforce Wish Theory” for awhile, but changed my mind after coming across the reference in (6).

⁴“The story in *Ocarina of Time* isn't actually original, it deals with the Sages' Imprisoning War from the Super Famicom's ALttP.” [English Translation](#) from the [original Japanese](#).



Promotional artwork for *Ocarina of Time*, which for the first time in the series, presents in cinematic fashion a grand conflict between Ganondorf (upper left), Link in two distinct life stages (middle), and Princess Zelda (upper right). Looks like a movie poster, doesn't it?

The next games relevant for the plot point I'm focusing on, *The Legend of Zelda: The Wind Waker* and *The Legend of Zelda: Twilight Princess*, are each placed in one of these timelines. *The Wind Waker* follows Hyrule in the Adult Timeline after *Ocarina of Time* ends, and *Twilight Princess* explores what happens after Link returns to his childhood in a Ganon-free Hyrule. In each of these games, Ganondorf awakens again, but is summarily defeated.

Do you notice a problem with this?

After *Ocarina of Time*, in either the Child or Adult timelines, Ganondorf is no more. Furthermore, Nintendo has since deemed *Ocarina of Time* a standalone story separate from the Imprisoning War. So how is Ganondorf supposed to break from his initial seal and set forth the events seen in *A Link to the Past*?

The answer is, he can't. Intentionally or not, by cementing Ganondorf's eventual downfall in both *The Wind Waker* and *Twilight Princess*, the developers wrote the backstory to *A Link to the Past* out of existence. While *Ocarina of Time* was supposed to be a prequel to *A Link to the Past*, its subsequent sequels ended up erasing it!

Nintendo has admitted, clearly and on multiple occasions, that the story of *Zelda* is an afterthought and that gameplay always comes first. This does make sense, I guess, because they are video games, after all, not screenplays or novels. Remember how I mentioned earlier that, more than anything, *Zelda* to me is about exploration? I've come to realize that exploration for exploration's sake is not actually what makes it special. Exploration is about *meaning*, about discovering something significant, about the thrill of learning that this pathway actually connects to this other pathway, that there are these hidden treasures over here, though watch out for the monsters guarding them, or that there are these fantastic animals over there, yet you have to journey through a really dark cave to get to the other side. Exploration is about testing your boundaries and reaching the limits of what you know, and also what you're *willing* to know. There's no *right* way to explore, but there *is* a wrong way, and exploration without preparation is just recklessness. What Nintendo did with their official timeline is reckless, and it really does harm the meaning that fans had created with the experiences of their games, of exploring *this* world and all its intricacies.

Especially because, in my opinion, their solution was never necessary in the first place.

First, the canonical decree. In Nintendo's timeline, they claim that *Ocarina of Time* produces not two splits, but *three*. In the third branch, which does not have an official name but is commonly referred to as the "Fallen Hero Timeline" or the "Downfall Timeline," Link is defeated at the hands of Ganondorf, who then unites the Triforce in full and is still consequently sealed by the assembled sages. At first brush, this seems like a clever trick to explain how Ganondorf can possess the Triforce prior to *A Link to the Past* and also get sealed away. Unfortunately, given the specifics of what occurs in *Ocarina of Time*, this creates many inconsistencies, and I won't go into them here. The bigger problem is that by creating the timeline split in this way—at the defeat of the hero in *only* this instance for this *one* game (let alone that this outcome is not actually ever portrayed, barring a *Game Over* screen)—it's painfully obvious that this hand-waving is an after-the-fact move done by Nintendo without regard to consistency across the series. Link's defeat in any other game, of course, does not create a parallel timeline split. To quote the US Supreme Court's opinion in *Bush v. Gore* (yikes), Nintendo may have as well said that this ruling is limited to the present circumstances.⁵

I get it. Nintendo found themselves backed into a corner, faced with the difficult task of reconciling older games, written with an internally consistent framework, with a re-designed, more complex direction for the series. I would have felt better if they just declared a reboot, though, an acknowledgment of the vagaries inherent in any creative process. Instead, we got a borderline arrogant insistence that this was planned all along—when it clearly wasn't.

Why? Let me describe, again briefly, an oft-forgotten title released in between *The Wind Waker* and *Twilight Princess*—*The Legend of Zelda: Four Swords Adventures*. Possibly the lowest selling game in the series, this multiplayer-focused entry may, in fact, be the missing link for all of these disparate threads. Without going in-depth about it, there is credible evidence

⁵"Our consideration is limited to the present circumstances, for the problem of equal protection in election processes generally presents many complexities." In other words, not setting a legal precedent.

to suppose that during development, *this* was meant to tell the story of the Imprisoning War, or at least some part of it.⁶ There are elements of sages, seals, Royal Knights, and dark realms, all things that mesh perfectly with the eras of both *Ocarina of Time* and *A Link to the Past*; Ganon even acquires a trident, which he also wields prominently in *A Link to the Past*. Much of this deep story, though, was cut for the game's final release, so the analysis I'm laying out is merely hypothetical. Since Ganondorf is extinguished at the finale of the *Twilight Princess*, and *Four Swords Adventures* includes a surprise resurrection of Ganondorf, we can readily place *Twilight Princess* prior to *Four Swords Adventures*. And then, suddenly, it flows (other games still omitted):

Initial Narrative - *Ocarina of Time* - An independent tale, concluding with sealing Ganon away

Child Timeline - *Twilight Princess* - Link defeats Ganon who has escaped from the seal - *Four Swords Adventures* - Link uses the Four Sword to seal away the resurrected Ganon, in either a re-imagining or direct depiction of the Imprisoning War - *A Link to the Past* - Link thwarts Ganon attempting to break from his seal - *The Legend of Zelda* - After many years, the Triforce has been split within Hyrule's Royal Family, and a revived Ganon seeks the Triforce of Wisdom after obtaining the Triforce of Power - *Zelda II: The Adventure of Link* - Link embarks on a quest to find the Triforce of Courage

Adult Timeline - *The Wind Waker* - Many years after the defeat of Ganon, his darkness returns once again and the goddesses decide to flood Hyrule, generating the Great Sea

It's almost too neat, isn't it? The problem with this proposal, from Nintendo's perspective, is that *A Link to the Past* is separated from *Ocarina of Time* by two intermediary games. They have emphasized that *Ocarina of Time* should immediately precede *A Link to the Past*, and so rather than illuminate a potential scenario where *Four Swords Adventures* bridges the plot gap, they chose to create the third timeline. It's imperfect, sure, but so would anything else. I just think that my explanation here is simpler and more supported by the games themselves—while also giving more credence to an entry (*Four Swords Adventures*) that has an otherwise awkward placement in the official timeline.

⁶https://www.zeldadungeon.net/the_untold_story_of_four_swords_adventures/



Japanese box art for *Four Swords Adventures*. It almost looks like... a big war.

I recognize that this essay doesn't accomplish much. Nintendo will never read it, nor will they ever alter the timeline. I don't think they should, either. A new direction and a new fandom has emerged, excited about this official telling. That's fine with me,⁷ and I do like that there are three branches each corresponding to a piece of the Triforce. For some reason, though, writing this out gives me the closure that I need to square the circle of my favorite set of stories, to forge my own path in contrast with a narrative otherwise dictated from the top-down, as a way to mark my own exploration against the backdrop of a world that increasingly seems to resist open-ended personalization. This might not be *the* Zelda timeline, but it's *mine*, and I think that's the key.

⁷Except how *Tears of the Kingdom* names a completely unrelated battle *also* "the" Imprisoning War, and introduces a new and totally different Ganondorf. *That* really bothers me.

8 Reality's True Representation

Quantum mechanics is full of so many quirks (and quarks) that it makes reality seem like a game, where all of us are players on a strange board. In this universe, a coin can be *both* heads and tails in superposition, and particles can share entangled properties that affect one another instantly no matter how far apart they are. With outcomes like these, how are we supposed to even know what “real” means?

Observing reality from our vantage point comes with as many advantages as it does disadvantages. We can be sure of our own observations and experiences, however limited they may be in revealing the nature of truth. We can trust math to the extent that we grasp it, until it becomes a foreign language outside the bounds of understanding. The attempt to bridge these two approaches, personal interpretation and abstract logic, may just hold the key for translating the meaningless into the meaningful.

I found an interview recorded in 2014 with Greg Ball, an influential neuroscientist who happened to train my doctoral advisor, where he makes the following comment about the style of research done during his time in the Department of Psychological and Brain Sciences at Johns Hopkins University:¹

You do experiments, you collect data, you analyze the data, you don't sit and make up big bullshit theories and all that kind of stuff, you experiment, experiment, experiment.

He then explains that the separate Department of Cognitive Science formed in response to this attitude disregarding theory, so that there would be a space for abstract model-building less constrained by empirical results. Throughout the interview, Ball does not outright dismiss theorists or hold up empiricists like himself as inherently better; he's only describing the particular tradition within his department. Perhaps this is why the following passage stuck out to me when I came across it in a separate talk by him, recorded in 2016, saying this about the state of neuroscience:²

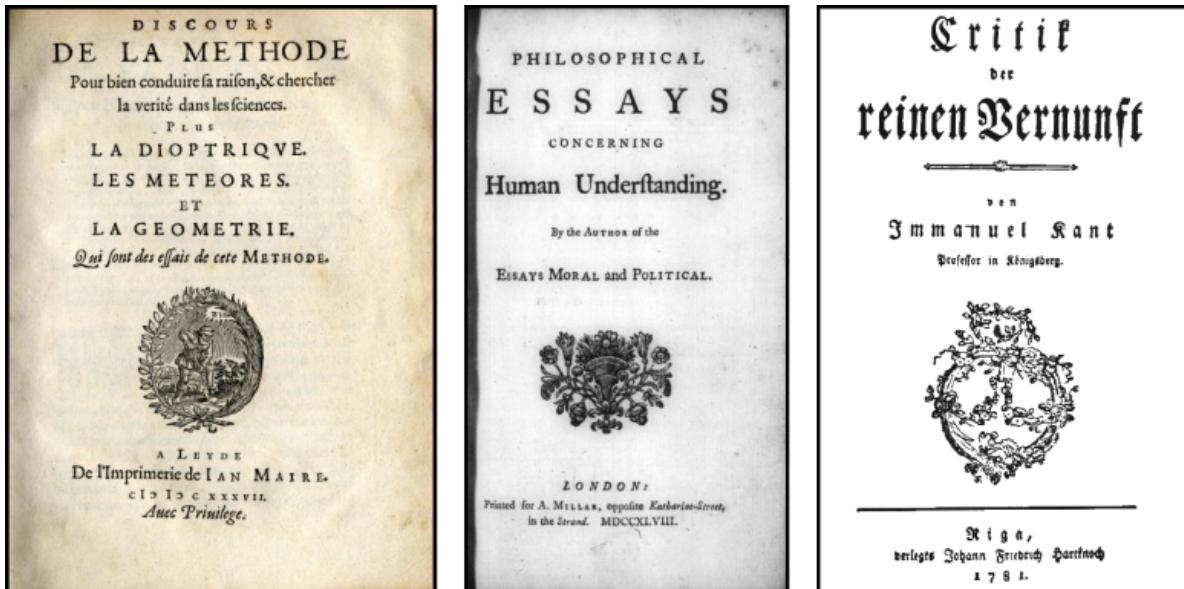
For me, the big question is what I call the “levels of analysis” question. We all know that the brain is responsible for cognitive and affective processes that regulate behavior. We're past dualism. And we have the reductionist program that assumes if we can characterize neural processes in terms of DNA, gene expression, and

¹<https://jscholarship.library.jhu.edu/items/8fc3536f-478e-4572-b326-109418c94724>

²<https://www.youtube.com/watch?v=nFf3s5K4vEg>

epigenetics, we'll have this *fundamental answer* on mechanisms to these governed brain processes. And there's some great examples... But we're not translating our levels of analysis among themselves... We can't map these upon [each other]... What does it mean when you have a gene expression change, or morphology change for physiology, and then emergent properties of cognition in the brain?

His point here, despite extolling the merits of experimentation in the 2014 interview, illustrates that pure empiricism *does* have limitations: it alone can't account for a holistic understanding of complex, emergent phenomena. Some model is needed to account for the integration across each level of analysis. Yet if the “bullshit theories” are relegated to a separate department, how is this model supposed to develop?



This topic isn't new. Discourses favoring rationalism, empiricism, or some synthesis of the two have been going on in multiple languages since at least Descartes, Hume, and Kant (spanning 1596-1804).

I get where the frustration comes from—much of psychology and cognitive science seems too far removed from the underlying brain function to be falsifiable, and you quickly run into situations where people compete more on the strength of their prose and argumentation than experimental validation. I also resonate with the need for higher-level synthesis, because otherwise you get an opposite situation where laboratories produce data in silos with a lost plot.

David Marr, in my opinion, best resolves this conundrum in the first chapter of his 1982 book *Vision*, where he delineates information processing into three streams. The middle level, the representation of information, most closely relates to the neuroscience problem raised above. Marr illustrates multiple ways to represent numbers, such as with Arabic numerals

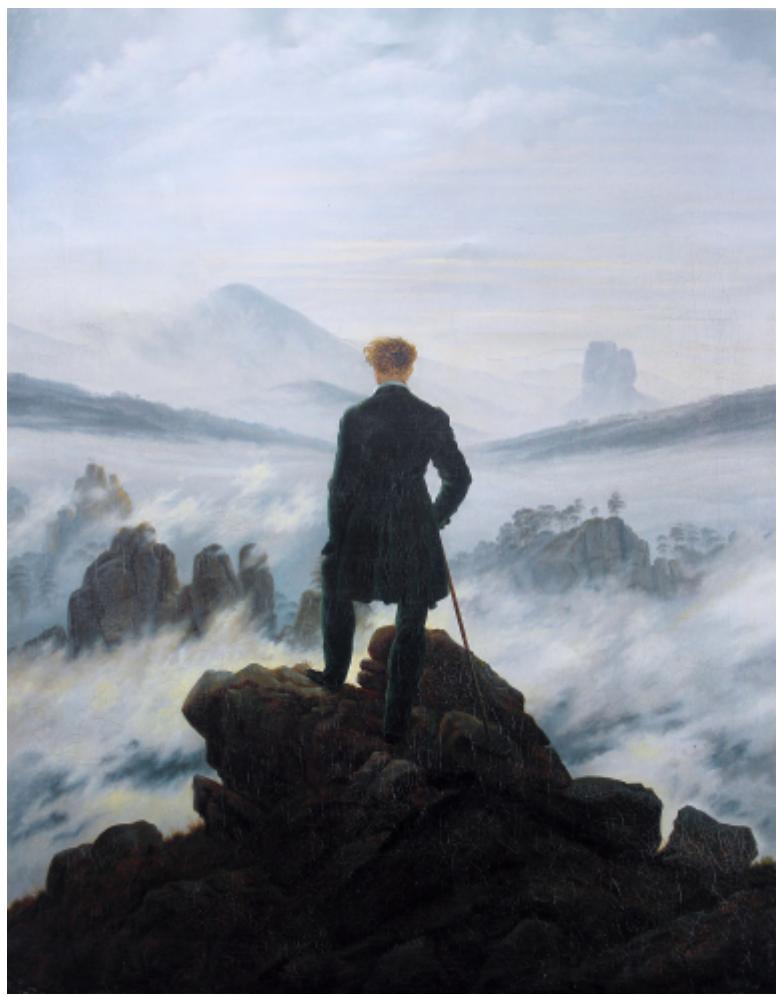
(digits 0-9), binary numerals (digits 0-1), or Roman numerals (I, V, X, etc.). While the underlying mathematics doesn't differ with the representation, the information conveyed *does*. The number 37 in Arabic numerals indicates that the digits are built from powers of 10, while the same amount written in binary (100101) reveals the use of powers of 2.³

Marr notes that any attempt to abstract information carries some trade-off coupled to its advantages. While the Arabic numerals are great for human mental arithmetic— and proved to be much more useful for calculations than Roman numerals— binary numerals work better in digital (or silicone) contexts. The information gained for one purpose leads to information loss for another.

I think this is the crux of the issue that concerns Ball. Neuroscience represented by rigorous experimentation produces quantifiable, replicable results in particular domains, at the expense of transfer across those domains. When represented by theoretical models, neuroscience can generate unifying, cross-domain explanations and predictions, though often with low resolution for any specific mechanism. With Marr's framework in mind, these approaches shouldn't be viewed in opposition, except for where the contradictions would be clarifying.

I bring this topic up because for this world we find ourselves in, we, as humans, are the representation of our particular consciousness. We all share the same nervous system fundamentals, from our cells, neurotransmitters, and circuits for things like learning and memory to language and our capacity for dreams. Our minds don't exist in a vacuum; we arrive with a pre-formed architecture that grants us exceptional capabilities and also frequent blind spots. The experience of being human on Earth, with its endless highs and lows, clarity and contradiction, *is* how this particular form of consciousness exists, how this reality transmutes the unbounded into the quantum. There's something to celebrate in that, even if the truth always feels a little out of reach.

³Shown below: $- = (3 \times 101) + (7 \times 100) - = (3 \times 10) + (7 \times 1) - = 30 + 7 - = 37 - = 100101 - = (1 \times 25) + (0 \times 24) + (0 \times 23) + (1 \times 22) + (0 \times 21) + (1 \times 20) - = (1 \times 32) + (0 \times 16) + (0 \times 8) + (1 \times 4) + (0 \times 2) + (1 \times 1) - = 32 + 0 + 0 + 4 + 0 + 1 - = 37$



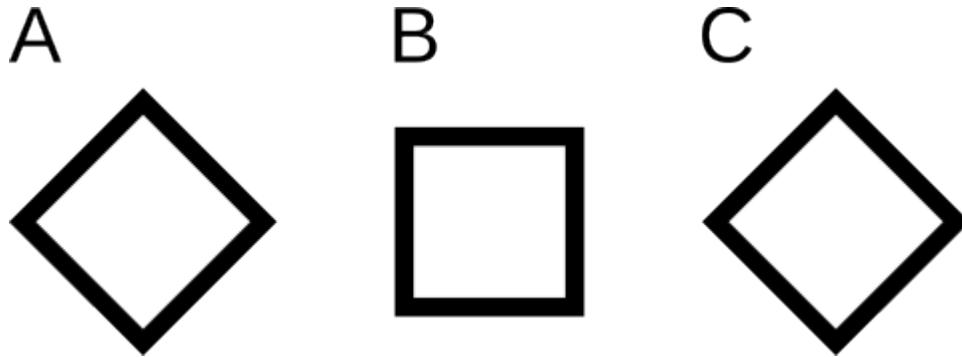
Determination confronting the unknown in Wanderer above the Sea of Fog (1818) by Caspar David Friedrich.

9 My Neighbor Totoro in 196,883 Dimensions

I often think this world is all too random, even though in many cases it seems so fine-tuned. It would be too cliché to say that the truth is somewhere in the middle. Maybe that's just how it is, though, and it's not worth asking any further. One branch of mathematics has essentially reached this conclusion, which unfortunately just makes me want to know why that is. Especially for the Monster.

All the sources I've encountered say that one of the greatest achievements of 20th century mathematics is the classification of the “finite simple groups.” An intriguing, yet also frustrating, aspect of math to me is that it uses its own peculiar language. I understand each of the words in that phrase individually, but in math it means something very specific that doesn't align with everyday uses of those words. We have to start with the last word here—group—to get at the root of this.

Let's say you're quite tall and looking down at a square table below you (or you're quite short, and you're looking down at an even shorter table). You want to rotate this table so that it will still look like how you see it right now in this starting position. Out of all the permutations you try—and you try *all* of them—there are exactly four that result in it looking like its original shape.



You're looking down at the table as in (A), seeing a diamond shape. Rotating it 45 degrees clockwise yields a square shape (B), whereas 90 degrees produces the same diamond shape (C). You can repeat this rotation 3 times, for 4 times total.

This is known as maintaining symmetry, where “symmetry” here in math means the same as in regular language. The collection of these movements that yield a symmetry is known as a “group.” Thus, a mathematical group contains the ways to preserve symmetry of a

shape. The group for our table has a specific name (C4), and the features of this group apply *universally*, for all mathematical objects that have the same types of symmetries as our table.¹ I'll conclude by clarifying that groups do not describe all the different shapes that can possibly exist: they instead describe all the *ways* in which configurations of points can be different.² When mathematicians in the 20th century completed the classification of finite simple groups, it means that they mapped out *the underlying structure of all symmetries*.

Stated differently, the finite simple groups are like the elements in the periodic table, except for mathematical objects instead of chemicals and molecules.

I know it's still abstract, but once it clicks, it becomes more engaging. Instead of covering the basic implications, I want to skip ahead to the very final point, which may feel a bit like jumping to end of a complex novel, yet also seems necessary to capture just what the Monster *is*.

While our square table, which exists in 3 dimensions, has 4 symmetries, the Monster moves in 196,883 dimensions, and has 808,017,424,794,512,875,886,459,904,961,710,757,005,754,368,000,000,000 symmetries.

Which, you know, is about $8 * 10^{53}$ symmetries.

Yes, this is the largest group, and no, it's not known why there is nothing bigger. Although it seems arbitrary, it almost certainly can't be arbitrary, because there's too many coincidences about it that align profoundly with seemingly unrelated areas of mathematics, such as number theory, modular forms, and string theory.³ As of this writing, there is not a single compelling reason for *why* it's there, or why such synchronicity arises across disparate branches of math.⁴ This situation with the Monster is like finding a new element that doesn't fit into the periodic table that's as large as all of the other elements combined, times septendecillion.

My hunch is that somewhere out there, Totoro is grinning in 196,883 dimensions, totally aware of what he's up to.

¹This explanation with the table is what Edward Frenkel uses in his book *Love and Math*. Highly recommend.

²This line is from Grant Sanderson's 3Blue1Brown video "[Group theory, abstraction, and the 196,883-dimensional monster](#)".

³Check out "monstrous moonshine."

⁴I'm taking the words at face value from two people deeply involved in the Monster, [John Conway](#) and [Richard Borcherds](#).



Cover art for the English-language release of the 1988 anime.

My favorite takeaway from the Studio Ghibli film *My Neighbor Totoro*, which depicts an anxious 10 year-old girl named Satsuki encountering a mystical woodland creature known as Totoro, is that Totoro also likes exploring Satsuki's world. While he enjoys showing Satsuki parts of his spiritual forest, he genuinely finds satisfaction in witnessing the effect he can have on Satsuki by empowering her to gain self-confidence and become a stronger, braver individual. Satsuki's human world is new to Totoro too, and he becomes a part of it by accompanying her on her journey of growth and discovery. Totoro relishes knowing more than Satsuki, and he recognizes that simple words of encouragement would just fall flat; he has to *show* Satsuki her own potential in order for her to fly higher.

Totoro's path through life wouldn't be the same if he weren't able to fully connect with Satsuki,

though. It's through their joint expeditions that they each can find and create meaning for the otherwise unclear parts of their lives. For Satsuki, she's able to resolve the tension of her anxiety around her mother's illness; for Totoro, he's able to ground himself in an existence with real consequences beyond aimlessly wandering around illusive playscapes all day. Without each other, Satsuki and Totoro each are a little lost; together, they're able to locate their paths forward.

The Monster appears to represent the maximal way to apply symmetries in a unique way not covered by any other group. To paraphrase the late mathematician John Conway again, the Monster is like a particular snowflake Christmas ornament, with its own shape not seen anywhere else across the mathematical landscape. This snowflake somehow is the basic building block for a mathematical phenomenon that depends on it, just like life on Earth depends on carbon bonding with other elements. As with Totoro's forest world, the Monster indicates that the world of mathematics is so much larger than we can currently imagine. By exploring this world as Satsuki does with Totoro, we can gain a new perspective for the meaning of both the abstract world and our physical world.

It's humbling to write about the finite simple groups at this precise moment, and for you to read it, when there's *no understanding* of why the Monster is there. For most of human history, people did not know (or at least did not accept) that the Earth revolves around the Sun. I don't know if the Monster's role will prove to be as consequential as the calculations that led to theories of gravity and ultimately to the nature of space and time itself. Still, I find it hard to imagine that our 196,883-dimensional Totoro has *no* connection to us. In the movie, Totoro appears to Satsuki in a time of need. What will our need for the Monster be? I'm as unaware as everyone else, but knowing that it's there is enough to keep me gazing at the stars.

10 Anxious Fluctuations in Space-Time

I didn't know what it was for the longest time; I thought that's just how things are. Besides, "anxiety" was something that other people had, something that was diagnosed, something that was medicated. How could I have anxiety?

Well, I started to recognize patterns when my stomach churns, or my palms sweat, or my heart pounds. These responses coalesce into something more than "nervousness" or "fear" when coupled with a sense of dread. When anxiety strikes, I'm often not so much concerned with what's happening right now as with what *might* happen in a bit.

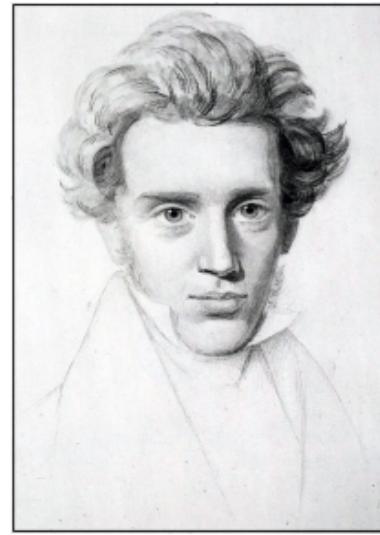
Surprisingly, it feels empowering to put a name to this phenomenon, like how Harry Potter insists on calling Voldemort by name instead of *You-Know-Who*. In calling out my anxiety for what it is, rather than something like insecurity or weakness, I'm able to erase its elusiveness. The following passage from *Anxiety: A Philosophical Guide*, by Samir Chopra, stands out to me because it describes something otherwise hard to put into words:

Sometimes, psychiatric medication might be needed to make working with anxiety tractable... I have yet to hear of anyone, though, who says that medication *cured* them of their anxiety, though it did make it more bearable, making them "functional" even if not "high achieving." An anxiety medication is "effective" if those taking it are not incapacitated and can perform those essential tasks—personal or professional—that require their attention and work... This very functionality of the medicated breeds suspicion, of course, that anxiety medications and their overprescription are part of a "get back to work" ideology unsympathetic to the genuine existentialist crisis of the worker, the parent, the child, the young adult striving to find their way forward in a confusing and disorienting world.

I'm not at all making an argument against medication or pharmaceuticals, nor am I denying the debilitating consequences of anxiety. My observation instead is that anxiety doesn't seem to be something that can be *cured*, like a bacterial infection or broken bone, because anxiety isn't an over-reactive amygdala, or an unresolved defensive mechanism of the unconscious. Anxiety is a field.

A field? Like a plot of grass that people play sports on? I'm borrowing a term from quantum field theory here. The standard model of physics, a heavily experimentally-validated achievement of modern science, describes reality as an arrangement of "fields," mathematical grids of variable parameters that cover all space in the universe simultaneously and endlessly.

They're like the ingredients that comprise the recipes of existence. Fluctuations in the values of these fields give rise to the physical particles that we observe, like protons and electrons, just as ratios of different ingredients yield different dishes. Particles flicker in and out of momentary existence as values in these fields fluctuate wildly; yet at scale, consistent patterns emerge that we observe as reality.



Imagine if each color arose from the activity of a field for that color. Particular patterns could lead to things like the aurora borealis (northern lights), painted here by Frederic Church (left). The philosopher Søren Kierkegaard (1813-1855; right) wrote much about anxiety that is still relevant today, demonstrating its common impact.

In saying that anxiety is a field, I mean that it's one of the ingredients that our mind uses in its recipe for consciousness. We wouldn't be able to be here without it. Anxiety is what keeps us alert when we hear a bump in the night, or what pushes us to crunch for that exam. We would be far more apathetic and far less engaged if anxiety were vanquished forever. (I know some would still prefer this.)

When my muscles tremble or my gut seizes up, I can better recognize that I might be caught too deep in the single field of anxiety. Bouncing back is not always as simple as going outside or watching your favorite movies, because the mischievous anxiety steals the enjoyment of those things from you. Restoring the symphony of the mind will differ for everyone, across every situation.

It's a good thing, then, that space and time are so vast, with so many fields to explore, that the path to find the right balance can bring new discoveries with it. Yeah, there's no map or directions, but why should that stop us? The next time anxiety strikes, I'll take it as a chance to ride the fluctuations once more.

11 A Complete Identity for Psychology

If light itself can bend due to gravity, we should forgive ourselves for swaying in the wind. Then why do I often feel *guilty* for falling when the wind is strongest? Rather than crediting the objective, physical force around me, I find it easier to blame my own non-quantifiable weakness. It'd be scarier to admit that there are things I *couldn't* face.

Something about a particular scene in Martin Scorsese's 1976 film *Taxi Driver* channels this notion in a different way. A cab driver nicknamed Wizard says in a moment of mentorship to Travis Bickle:¹

You choose a certain way of life. You live it. It becomes what you are. I've been a hack 27 years, the last ten at night. Still don't own my own cab. I guess that's the way I want it. You see, that must be what I am. ... Look, a person does a certain thing and that's all there is to it. It becomes what he is.

Perhaps since it's easier to flatten than to construct, we like to define each other by what we do. (At least in the US.) Work isn't just a common topic of small-talk for adults; grown-ups also ask children what they want to do when they grow up, and furthermore, what they want to *be*. Such a question implies a link between *action* and *identity*. While it makes sense to a degree, I'm not sure this link always holds. There can be great liberation separating *doing* and *being*. What does it mean, then, for psychology to be the study of the mind and behavior, if what it does is often far removed from that?

A friend recently recommended to me "On Becoming a Person" by Carl Rogers, a collection of essays from a founding practitioner of a branch of psychotherapy centered around holistic understandings of individuals. The book carries strong echoes of Taoism and Carl Jung, and I came upon a unifying reveal in Chapter 6, when Rogers writes about his observations of successful outcomes from therapy:

What *kind* of a person does he become? ... The individual becomes more open to his experience... It is the opposite of defensiveness... We cannot see all that our senses report, but only the things which fit the picture we have. This defensiveness or rigidity, tends to be replaced by an increasing openness to experience... He is able to take in the evidence in a new situation, *as it is*, rather than distorting it to fit a pattern which he already holds.

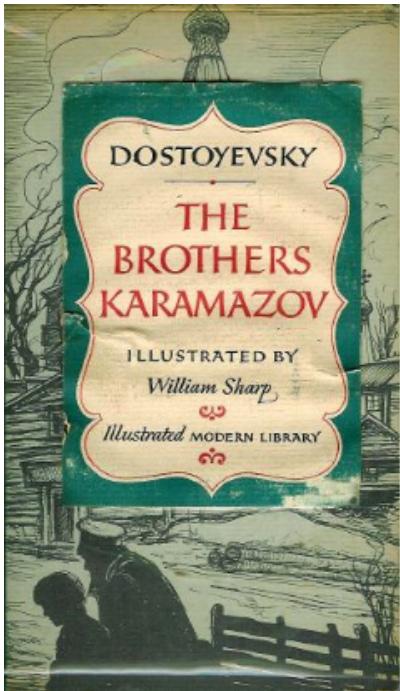
¹<https://assets.scriptslug.com/live/pdf/scripts/taxi-driver-1976.pdf?v=1729115004>

Rogers often describes patients who struggle at first to cope with their own emotions, and then gain the strength to carry forward upon recognizing their own limitations. This initial defensiveness stems not from some mystic mechanism of the psyche but rather our own default resistance to change. For individual development, growth emerges from the interaction between inner experience and outer events. This isn't something that can be explained by altered gene expression, or different concentrations of neurotransmitters. It's something that's encountered and confronted.

Reading Rogers has helped me realize that psychology, beyond being an investigation of the brain and consciousness, can be more completely understood as the *experiential dynamics of change*. My entire scientific training in neuroscience, which from the beginning occurred across biology and psychology departments, focused exclusively on a mechanistic, molecular framework. Since its inception, however, psychology has sat somewhere between philosophical, scientific, clinical, and even spiritual modes of inquiry. Although I understand why from a biomedical and technological point of view you'd want to focus on the aspects of the brain that you can quantify, the parts without any ambiguity, the turn towards reductionism is comparatively recent.

Perhaps it's precisely the ambiguity that make psychology shine, though. It needn't be a flaw that the topic can be approached through all of experimentation, literature, art, medicine, and meditation— this breadth can be its strength. If physics and chemistry happen in calculations and test tubes, psychology happens at the interface of our selves with the world, a messy amalgamation of individuals engaging the universal wielding only emotions, fears, and curiosity.

Psychology lacking an impartial, formulaic foundation does enable questionable prophets and gurus to mislead. Yet embracing its texture, its uncertainty, can also provide a worthwhile path to share with the right guide. If the fundamental theorem of calculus neatly summarizes the mathematics of change, the human condition isn't so succinct. Let neuroscience, psychiatry, neurology, and cognitive science tackle the details of neural functioning— psychology will fill in the gaps.



The novel *The Brothers Karamazov* (left), the video game *Final Fantasy IX* (top right), and the film *Taxi Driver* (bottom right) all explore identity, meaning, and purpose from the perspectives of the individuals navigating those worlds. These themes are psychological, not only philosophical or literary, because we respond to changes in the works as we experience them alongside the protagonists.²

²Image sources: [The Brothers Karamazov](#); [Final Fantasy IX](#); [Taxi Driver](#)