

General Book Notes

The Heretics: Adventures With the Enemies of Science

"Treason" (Creationism)

LURID = bright, brilliant, gaudy

TUMESCENT = pompous, pretentious language / swollen due to arousal

SHIBBOLETH = a custom or tradition specific to a group that is outmoded

PRIMEVAL = ancient, prehistoric

INVEIGLE = persuade someone to do something by means of flattery/deception

PORTENT = omen, warning, bad sign

SYNDICATE = group with a common interest, whether the mafia or bank, and the verb form of the word is to transfer assets to a syndicate

- It's not just that people can't connect academic learning with the real world or their belief system, but instead that they are fearful of diving too deep into the abstractions under which both their academic and belief knowledge lie, for they will likely discover dissonance and conflict, which they don't have to face if they blindly hide behind truisms and abstractions.
- Having grown up in a scientific family and elite schools, I have faced selection bias and must acknowledge that there are middle class suburbs around the world where these backwards beliefs are taken as axioms. To question them is to spit in the face of the community's identity.

"I Don't Know What's Going on With These People" (Ghost Hunters)

IMPETUOUS = rash, reckless

EPHEMERA = things used only for a short time

CHASTENED = humbled, subdued, flattened

SUMMARILY = instantly, immediately, without any formalities

- If you're outraged at someone holding a belief, it means you haven't empathized with them enough, or understood why they think the way they do. It means you're too close-minded, not that they're necessarily correct.
- We don't fully understand the brain at all. When you look at all the UFO sightings and get those people studied by psychologists and psychiatrists, they come from myriad backgrounds and have nothing visibly wrong with them, not hallucinations, sleep paralysis, or anything else we might conjecture might be responsible. Some things really are open questions right now, we don't know if they genuinely were captured by UFOs or if there's a mental condition we don't understand right now.

"The Secret to the Long Life of the Tortoise" (Yoga)

ASCETIC = abstinent, non-indulgent

TIMBRE = tone, sound quality

BEGUILING = charming, in a deceptive way

- Belief births huge industries. Billions of people spend trillions of dollars on things that aren't actually effective or useful, but because they believe in something as part of their identity. There's huge opportunity here if you understand what people believe and why they believe it.
- Placebo only helps with perceived difficulties; pain, anxiety, depression, not with actual cancers or heart attacks.

"Two John Lennons" (Past Life Regression)

- Often, talk-based cures, like therapy, hypnosis, rely on the placebo but also make it more powerful by virtue of the fact that a figure of authority, and indeed, just another human being, is there to make the experience more formal and in our mind, more effective.

"Gross Sensations" (Vipassana Meditation)

BLITHELY = carefree, casually indifferent

- Vipassana sounds like a sick experience—meditating for 10 days straight, apparently, causes your mind to think about unusual things and behave in strange ways, leaving you with novel feelings and experiences.

- We often hold our beliefs on a pedestal ourselves, when we have several unfounded beliefs from which we hide behind abstractions.
- The Stanford prison experiment took undergrads and made them act out prison conditions. After a certain period of time, and with a convincing enough environment, they came to truly embody their characters, and good people did bad things when given enough unchecked power. It had to be called off early.

“The Invisible Actor at the Centre of the World” (Psychology)

- The human is one of the only animals that gives birth to live young prematurely, when their brains are around 2 years away from meaningful maturity, just to be able to fit the baby’s head through the birth canal.
- Dreams are so interesting. Isn’t it crazy that we can experience fantastical things in perhaps the greatest, most immersive physics engine of all—our own brain?! I must try lucid dreaming and experience sleep paralysis at one point.

MOSEY = walk in a leisurely manner

PANOLPY = array, spectacle, menagerie

TRIUMVIRATE = a group of three things (three men holding power in Rome)

- There are hundreds of hidden and subtle biases and effects that color our brain’s interpretation of the world, and it’s in our interest to try and viscerally understand the most important ones so we don’t succumb to those biases. An example is how people behave when drunk according to cultural expectations of alcohol—Latinos become friendly and peaceful, Americans become aggressive, and so on. In short, many of us who hold backwards and obviously untrue beliefs are merely victims of psychology.

Quack (homeopathy)

- Homeopathy is treating like with like. If X causes a disease, cure the disease with X, diluted 30-fold (to the point of being pure water). Many “skeptics” blindly call homeopathy fiction (which it is) without any backing, thinking themselves on a pedestal. Einstein would disapprove—he would understand the moderate take—that there are no *good* studies that support the practice, but there is some limited evidence to suggest it might work in some situations to some extent. A famous study trying to see if it works basically counted the number of cancer cells before and after, and the counting process under the microscope was subject to bias, unwittingly.

INOCULATE = inject, protect from disease/vaccinate

“Some Type of Tiny Wasp” (Fictional Disease, Morgellons Disease)

- Some people complain of intense itching under their skin accompanied with thin fibers protruding from their skin. When you investigate the condition, sometimes analysis of the fibers finds that it’s clothing fibre and other times we have never seen anything like it. When people started coming forward with the disease, because it’s nothing like what medical professionals saw before, they dismissed it as delusional parasitosis, a broad term that has no ready cure aside from anti-psychotic drugs. Increasingly today we realize that it may be caused by pathological factors, but the evidence is still mixed. Despite this, individual physicians often seem convinced it’s one way or another—the modern medical institution can sometimes resemble that of antiquity, especially in the outlook of the doctors working in it. Alternatively, it may be a nervous condition making you feel itchy in a subtle way causing you to itch your own rashes into existence, and when you go to a dermatologist, they prescribe mental illness medication.
- This relates to humanity’s poor understanding of complex systems. Psychiatrists still approach disease by pattern matching symptoms to a book they have with pattern-matched treatment, nowhere near anything analytical or closed form. Yet psychologists/psychiatrists prescribe these things with absolute conviction.
- An innate bias we should tackle is that to categorize things strictly. We want to come away from a topic with a concrete, explainable take-away, a tangible learning, not feeling more confused than when we started (which sometimes is in fact the best indicator that we’re learning at all). We try to weave glimpsed facts into a clear, explanatory narrative that fits

some sexy, memorable structure (underdog, love story, etc.) loosely and subconsciously, without knowing that very often the narrative we tell ourself is a much poorer description of reality than our original set of disparate facts. What if pranayama doesn't do anything in itself, but the placebo it enacts is a powerful healing mechanism, what if Morgellons sufferers *are* crazy, but only because of rejection and incorrect prescription from myopic physicians.

"Top Dog Wants His Name In" (Schizophrenia)

- Psychiatrists believe schizophrenia to be a clinical condition because it visibly alters brain anatomy and function. Some believe medication is the best treatment, others think patients who hear voices should be allowed to make peace with those voices.
- It's important to note that the people hear *real* voices of *real* people. They aren't pretending —they hear them as much as I hear voices of my parents on the phone, flatmates when they're home.
- We have a poor understanding of all medicine in general, but particularly of mental disease. The same patient seeing multiple psychiatrists throughout the day can end up with different diagnoses.
- All mental diseases are on a continuum. All of us, myself included, exhibit small and hard-to-notice symptoms ourselves— anxiety, unfounded suspicion and fear, and more, and its up to both us and the doctors we visit to determine when it crosses some arbitrary line that means we are no longer considered "normal" and have "gone insane".

"They're Frightening People" (Multiple Personality Disorder)

FLUMES = deep, narrow stream

FOSSICK = rummage, search through something

- It's terrifying and under appreciated how easy it is to construct false memories. In fact, 20-30% of the population readily construct rich, vivid, emotionally evocative memories that simply did not happen— with important consequences particularly for legal action. Many "treatments" that look to help victims draw traumatic experiences to the forefront of their memories instead create fictional ones, fucking up situations deeply.
- People construct memories in real time by analogy to what has happened before, and their future reconstructions are colored by what has happened since the event. This is a small glimpse of how two people can observe the same event and recall it very differently in the future, sometimes adding or omitting crucial or entirely fictional details, with grave consequences.

A short aside on politics:

Authoritarianism, Totalitarianism, Fascism: loosely defined methods of governments in descending order of complete and often tyrannical control by a single ruler. China is authoritarian, Germany pre-war was Totalitarian, and during war was fascist, which is a state characterized by constant military readiness and citizen militarism.

Capitalism, Socialism, Communism:

Capitalism is an economic system of operation (and increasingly political) diametrically opposed to communism, which is just socialism on steroids. It is all about competition, market forces, and births inequality as market forces reward different people to different extents based on what others determine the value of their contribution to be. It came about when Adam Smith and some others showed how trade and acting in your own self-interest could be restricted to align with everyone's benefit (eg. Comparative advantage).

Socialism is the opposite, where a distributed system—the free market—doesn't make decisions about the value of things, but instead one party—the government—does. It reduces inequality by having the "state" that is, the people, own the means of production—the land on which factories are built, factories and tools themselves, as well as the raw materials those factories work on—to give people a sense of ownership over their community. It includes no

private property, no inherited wealth, government fixed prices, free social services. Sweden has around 60% income tax for the middle class—as a *free market socialist state*. Ideas of redistributing wealth to reduce inequality have existed since Plato, Marx was the first to formalize them and suggest implementation.

There are trade-offs to both, but precedent shows that human nature makes socialism difficult to implement, often with disastrous consequences.

Classical capitalism was the original, free market theory that advocated 0 government intervention or regulation (they saw that tantamount to communism), until the great depression. Keynes advocated occasional government intervention (as we have today), and birthed the new mainstream theory, Keynesian economics, still far from communism. Socialism was the next step, where instead of complete public ownership of land, the government, who represents the people, owns many businesses and land.

Important concepts to define:

social spending: taking cash out of society and redistributing it for the welfare of the disadvantaged or poor, in the form of subsidized housing, healthcare, education, and more for the disabled, elderly, young, poor, sick, and more. It can also come in the form of homeless shelters, food kitchens, counseling and therapy services, and more.

UBI: giving people guaranteed amount of money to get them started to look for jobs/ educate themselves without having to worry about food, water, shelter. Studies show overwhelmingly people use this money well, and it would come from higher taxes on the wealthy or dismantling of current welfare systems into one unified system.

social democracy: the current state of most of the world, where you have strong, competitive economies harboring innovation, with admittedly some inequality—often large amounts at times—but also institutions in place to prevent those worst off from dying and suffering; a true Keynesian implementation.

communism: a hard-left implementation of socialist ideals that basically denies any free markets and electoral democracies, and encourages the proletariat to rise up through violent revolution. China, for example, is a Maoist ‘communist’ country, but it adheres to free market capitalism in practice despite the title of the ruling party.

Why did Marx dislike capitalism, and advocate socialism?

He saw history as nothing but one class overthrowing the next, from feudal to slave to then capitalist societies, and saw communism as the ultimate end of the continual struggle. He saw socialism

- People need to feel connected to the fruits of their labour. Modern, assembly line capitalist optimising for production means people are dispensable cogs working on one piece of the full product, detached from their work.

- Profit is another word for exploitation, not reward for “ingenuity” on behalf of the bourgeoisie.

- society has become so productive not everyone is needed to work. Instead of calling it the pejorative term ‘unemployed’ it should be termed ‘freedom’, with the government distributing the goods produced to individuals so they can enjoy utopia.

- he acknowledges corruption will take place in any system, but capitalists sin is giving value to things that have no inherent value (money) and fostering competitive resentment, anxiety, conformism, materialism over true, utopia freedom.

- he is historically important because he was the first philosopher whose work demonstrably and quickly changed the world’s action, behavior, and structure, at scale.

I truly can see the communist utopia he envisioned, and it is truly beautiful. It is sad that it is incompatible with human biology.

What is the modern's worlds take? What mixture have we settled on?

- The best approach, as with most things, is to find a middle ground, taking the best of both worlds. Use capitalist structures and methods to foster competition, social mobility, innovation, ambition and hard work, but also have regulations and social structures in place to ensure people don't starve, that problems that the market wouldn't otherwise solve (environment) are solved in the interest of all society. This is the kind of structure implemented in most places today, with some variation. The Nordic model favors more equality, less innovation, more regulation and welfare, but is still very much a capitalist free market, whereas the American model favors more innovation, less government regulation/welfare, and more inequality as a result.

- Why are 15% of academics Marxists when it empirically doesn't work? They suffer from a psychological bias where they prefer elegant, unified theories that are clearly planned rather than chaotic, patchwork free market forces which are the result of distributed action.

- Why can't people recognize this reality? As with most issues of politics, we want to tell stories, to find a tribe. This is a perfect avenue through which we can do exactly that. People pattern-match to extremes and make up stories—confabulate—if you increase social spending, we automatically become like Venezuela, things like this.

- Another problem is that political discussions can't be had scientifically, open-mindedly, and rationally, due to human nature. It's the same reason people often either believe nature OR nurture—either we're destined to be set on a particular path, or are born blank slates. We can't fully comprehend nuanced, complex, dry facts.

- Interesting to note that people often think climate denial is due to scientific illiteracy, when it's not. Most people who believe in climate change have no understanding of the science, and no capacity to, either. It's because they want to associate them selves on the ivory tower, elite and intelligent "team", or take the consensus position. This is the danger of making something that needs political action into a partisan issue.

The reason that so much debate about the efficacy of these systems exists, of course, because the economy is a complex, adaptive system. We cannot run experiments to know what works better, and can only use precedent to approximate controls. It's one school of economists, backed by research and math, against another, backed by equally valid evidence.

Some economists ("the Chicago School, led by Friedman") said the economy is too complicated to risk the government meddling with. Keynesian economics disagreed, but also suggested stagnation of output and inflation couldn't happen at the same time, which it did in the 1970s, suggesting the theory was incomplete, causing some to back the Chicago school and advocate deregulation thenceforth.

The "nordic model" refers to the extensive state welfare system, as well as strong unionization in the nordic countries. Labour unions in and of themselves are not socialist, but the agenda of workers unionizing for better rights against the minority is socialist. They also have mixed economies (part free, part planned, meaning in between capitalism and socialism), and so are further left than other western free markets.

The reasons the Nordic model works so well in Scandanavia, but wouldn't work in the US include: smaller population, less immigration, harder cultural work ethic, reduced spending on other countries and a huge sovereign wealth fund propelled by oil.

"There Was Nothing There, But I Knew It Was a Cockerel!" (Need for stories)

- At the core of confabulation is cause-and-effect. Stories are just cause-and-effect with some emotional spikes—tales of how things work and came to be. Our brains are excellent at modeling physical cause-and-effect, they have evolved to, but there is no evolutionary incentive to instinctively make accurate models of nuanced arguments and faraway realities (like climate change).
- If the story someone tells is too coherent and self-consistent, be suspicious. No reality is pure and clean and elegant and without nuance or exception. Symptom of confabulation.
- Intuition is far more complex a computational machine than conscious logic—which we didn't do until a few hundred/thousand years ago. People can tell what movie certain sweat came from by smelling it—a horror or comedy. Chicken factories hire people to pattern-match male and female chicks with nearly 100% accuracy and no physiological differences—we're remarkably like real-life neural nets being trained with less data.
- We often get predictions right, but causes deeply wrong. We use intuition to get to prediction, a complex computational program, but then confabulate some simplistic—seemingly making sense—narrative to explain our decisions to both ourselves and others.
- When thinking backwards about events that happened years ago in our lives, we're no better at explain how we felt or why we did things than random guessing. We confabulate clean narratives that, as Jobs says, "make sense in hindsight", because of course, you can make anything "make sense in hindsight".
- Religious people are genuinely happier and less stressed than atheists because the chaos and inelegant complexity of reality is not as comforting as the elegant, simple narratives we tell ourselves through religion.

I Came of Exceptional Parents (Climate Change Denial)

AD HOMINEM = attacking a person or character rather than their argument

PUERILITY = immature, childish

- The ideas of left and right came from the revolutionaries sitting across the royalists in the French parliament hall at the helm of the revolution. People align with one or the other as if they're choosing a side in a video game, choosing a tribe, an identity, not thinking about which set of beliefs best describes messy reality. That level of thinking is far too nuanced and rational for human nature.
- Traits that lead to rational voting are curiosity, open-mindedness, humility. Not intelligence, which is why very smart people can hold very dumb beliefs.

APPROBATION = approval, acceptance, praise

- Often, people just have contrarian as part of their identity, and some twisted, subtle part of them craves attention and making people's jaws drop with their outrageous beliefs. With things like climate change denial, the arguments they make are almost recursive—you question one line of argument and the justification is another line of argument, equally unfounded, said with equal conviction.

Backwards and Forwards in the Slime (Holocaust Denial, neo-Nazi)

AFFRONT = insult, offend

OEUVRE = work of art

- People selectively recognize evidence supporting their claim (confirmation bias), like the man recognizing the handles on the gas chamber doors, but not the bolts on the other side.
- Intelligent people are better than non-intelligent people at coming up with arguments to back their beliefs, but no better at rationalizing why the other side thinks a certain way or holds those beliefs. In other words, intelligence only serves to make you more stubborn.

That One You Just Go "Eeerr" (Skepticism of para-psychology)

- Science is incomplete, and there is statistically significant evidence for things as outrageous as telepathy and psychic powers. In fact, there is better, reproducible, evidence for these things than most other similar incremental discoveries in science. Renowned scientists admit this. It's just that accepting experimental results here means rethinking all of science from the ground up, and so "outrageous results demand outrageous evidence". This shows that while these "woo-woo" theories are probably wrong, it also means many other incremental,

non-widely confirmed findings are also possibly wrong in the same way. It's just that anything of value or relevance is quickly checked several times, and so we can be sure *that* is right.

- It's important to understand that skeptics, including many scientists, are just as biased as the people they deem crazy. If you're unwilling to accept the possibility of telepathy in the face of *any* evidence, no matter how compelling, then you're definitionally close-minded and unscientific.

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A short aside on the validity of most scientific studies: most *published* scientific studies are false. You might think 5% of all results we say are true are in fact false because of the arbitrary 0.05 choice, but it's more complex than that upon closer inspection. If you have 1000 hypotheses, the majority of which are false, say, 900, and you correctly identify most of the correct relationships (80% statistical power is optimistic). You miss 20% of the true relationships because of a small sample size or imprecise measuring instruments. Of the other 900 false relationships, given a $p=0.05$, 45 will come up as true incorrectly (false positive). And since journals rarely publish correct null findings, they comprise only 10-20% of all papers published. And so of all papers published, you have 80 true positives, 45 false positives, and 20 true negatives. In other words, 45/145, or about a third, of *published* results, are wrong.

Most important, relevant, studies, are right (because they are reproduced lots of times, null findings in replication studies are published, larger sample sizes are used, and more), like the link between smoking and cancer or cardiovascular disease. But for the vast majority of studies that investigate, say, the effect of an obscure gene or set of genes on an obscure disease in specific conditions, there are no replication studies and the sample size is often small. Another important fact is that when you try to replicate studies, most don't show significant results, and even the few that do are not as strong as the first ones. Often times trying to publish these replication results is difficult since they aren't sexy. This alludes to how we're very good at having advanced statistical measures for narrow problems, but still get most things wrong.

The statistical 'power' of a study is its ability to correctly identify false relationships. In reality, most studies' methods have a power of 20-40%, not 80%. Moreover, most studies in psychology, neuroscience, medicine having environments that are complex living systems, with everything not held exactly constant as you can do with physics or chemistry. This means that even 'landmark' cancer studies (that are published as positive results) are only replicable 10% of the time.

Often times, scientists 'p-hack' and collect data until it gives a significant p-value. Ultimately, the scientific method is not broken, but incentive structures are. These include:

- Journals not publishing null results (biasing scientists towards methods that will yield significance when there isn't any)
- Lack of large-scale academic collaboration leads to small sample sizes
- Replication studies not being published by journals
- Publishing unexpected or awe-inspiring results is easier and leads to more citations (decreasing proportion of true negative to true positive realities, leading to more false positives and a larger fraction of published results being false)

Admittedly, people are acknowledging these problems and working to rethink the structure of science to change incentives and get published results to be right more often. More replication studies are being done and published, journals for negative results only are being started, organizations/journals are starting to promise publications if the method and hypothesis are interesting and robust enough regardless of outcome. But science is large and prone to human biases, and so don't count on this scaling anytime soon.

It's interesting to note that even trying out best to get at the truth means we're wrong most of the time. Imagine how often we're wrong when we try and glean truth from

observation, anecdote, and emotion in the way that humans normally do. It's no wonder that most people get most things wrong most of the time.

Epilogue: The Hero-Maker (on the importance of narratives in belief)

- Inevitably, we hold beliefs that put us, or our tribe, at the centre of the universe, and are particularly easy prey to binary, us vs them, black-and-white, hero-and-villain beliefs. When we hear a story that is a temperamental and philosophical match for us, it becomes part of our identity, and we fix our belief and change explanations and logic to match. This is human psychology, and not much can be done to combat it other than acknowledge these biases in our daily life, and practice calling them out.
- The only things we know are facts and data, in the process of interpreting and explaining them to form a theory of the world do we push and squeeze the data through our biased lenses, and end up with inaccurate descriptions of reality, incorrect narratives threading through all the disparate—and individually, correct—data points.