

# Uncertainty

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When I was a kid around six years old, each night before I went to bed, my father would read some of the Christian bible to me. Over the course of several years, he ended up reading most of the bible to me. I remember him reading me the story of Elijah and the Priests of Baal.<sup>1</sup> Elijah is a prophet of the Jewish god, and he is arguing with the priests of Baal, another god. They are arguing over which God the people of Israel should worship. In the story, Elijah and the Priests of Baal run an experiment. The priests of Baal set up an altar, but don't light a fire under it. Elijah sets up an altar, and doesn't light a fire. The priest of Baal pray for a fire to be set, no fire appears, and Elijah taunts them that maybe their god is asleep. The Elijah pours water on his altar, and then when it is completely soaked, prays to god, and god lights the altar on fire. And thus the experiment is done, and the true god has been experimentally demonstrated.

It is interesting that such a clear experiment exists in the bible. The experiment included both the experiment and a control, and let the results determine which was the correct hypothesis.<sup>2</sup> If it had actually happened, that would be fairly clear evidence that Elijah was praying to an actual superior being. Waterlogged wood very rarely spontaneously ignites. Of course, with historical truth, you need to trust every step in the chain of passing the story if you want to trust that the story happened.

When I was older, around 12 years old, I had read enough science books by then that I realized that the bible couldn't be literally true. My strongest line of

evidence ran something like: Compare the positions of the stars six months apart and then use parallax<sup>3</sup> to measure the distance to them, then figure out the main sequence from that. In the main sequence, blue stars are brighter, red stars are dimmer. Then use the brightness to color relation to get the actual brightness of stars in the Andromeda galaxy and use the apparent brightness at Earth to figure out the distance to galaxies like Andromeda. The punch line is that the light from Andromeda has been traveling for over two million years, which is longer than the universe has existed in the bible.

Of course, why would I rate the evidence in science books higher than I rated the evidence from the bible? Am I just being arbitrary? On the face of it both pieces of evidence are just sentences I read in a book. The general question of how to reduce uncertainty and how to figure out what is more likely to be true is hard. For this specific instance, measuring the distance to the Andromeda has the advantage that it is repeatable. Anyone with a good enough telescope can repeat the experiments. So in this case, I don't have to trust that the chain of history goes all the way back for over a thousand years unbroken, I just have to trust that enough people who did the experiment reported it accurately.

When I was in high school, I was on the speech and debate team. I started out terrible at speaking, but got better. On one of the trips I was preparing for an extemporaneous speech in the school's library, and there in the new book section was Carl Sagan's book *The Demon Haunted World*. It was one of the

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<sup>1</sup>1 Kings 18:20-40

<sup>2</sup>This is also discussed in *Rationality: From AI to Zombies*, Chapter Religion's Claim to be Non-Disprovable

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<sup>3</sup>If you look at something from two different positions, the closer it is to you, the more it will appear to shift relative to more distant objects.

more life changing books I have ever read. I spent as much time reading it between speeches as I could, skipping my usual activities of debating religion or chatting with my friends.

The book was rather incredible to me at the time, it gave me a whole new way of thinking. I had never really thought that much about systematically searching for the truth before. It had a section on the baloney detection kit which made me think about what are the mistakes we can make in thinking and how we come to believe what we believe.

In it I read for the first time about the witch trials. It talked about how anything the accused did was considered as evidence of witch craft. “Either she has led an evil and improper life, or she has led a good and proper life, this is just as damning; for witches disemble and try to appear especially virtuous.”<sup>4</sup> That was unfair.

Last year, I found Eliezer Yudkowsky’s book “Rationality from AI to Zombies” and read it. It had the same quote about the witch trials.<sup>5</sup> Not only was the practice unfair, it was a violation of a law of probability, the law Conservation of Expected Evidence.<sup>6</sup> Basically, if you believe that some evidence increases the probability of your hypotheses, then the opposite *must* be evidence against your hypotheses. So if living a good and proper life is evidence that someone is a witch, living a bad and improper life must be evidence that someone is not a witch. That sounds odd.

Since reading about the evidence rule, I have used that rule to check my reactions to events to try and detect if I am making mistakes in thinking. So if say my boss does something, and I think that means he is unhappy with me, I can quickly check, if he had done the opposite, would that mean he is happy with me? It is a quick check to see if I am seeing actual evidence or mere vapors.

For best use, decide which evidence supports which

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<sup>4</sup>The Demon Haunted World, by Carl Sagan, pg 408

<sup>5</sup>Rationality from AI to Zombies, by Eliezer Yudkowsky, Chapter Conservation of Expected Evidence, <https://intelligence.org/rationality-ai-zombies/>

<sup>6</sup>Formally:  $P(H) = P(H|E) * P(E) + P(H|\neg E) * P(\neg E)$  where  $H$  is the hypothesis,  $P$  is probability, and  $E$  is the evidence for the hypothesis.

hypothesis, or theory, first, before seeing the evidence. I occasionally make my predictions that if A happens, then that supports my theory, but if B happens, that weakens my theory, and then neither A nor B happen, instead C happens. Foiled again.

Making predictions before hand is good. Then pay very close attention to when the predictions fail. Failing predictions are a big hint that the model in my head does not match reality.

Of course, when applying any technique for being rational we need to remember that we have human sorts of brains. Our brains are not rational by default. Uncertainty is not a fun experience. I have an example from when I was a teenager.

When I was a junior in high school, a new girl joined the Speech and debate team, and we became friends. By my senior year, I dropped out of chess club so I could spend more time talking to her.

Near the end of our senior year, she started getting a mystery illness. She had serious dizzy spells, and tiredness, and the doctors could not diagnose her illness. She went to many doctors to try and figure this out. They tried drawing blood, and heart monitors, and even an MRI. But what illness she had remained a mystery. My atheist teenage self wrote:

I can try and logically tell myself not to worry. Ineffective. I care ‘too much. ‘This will probably all turn out to be something silly that they [Doctors] can fix in a couple days; I hope’ (Her words, my remembrance of them) Somehow the intellectual argument that humanit[y’s] best technology [is] dealing with the question seems less comforting than the less scientific justification that a supreme being is watching over me.

Back to my 2016 self. The emotions and the uncertainty were enough to make me pray to god. It took months of uncertainty, but over the course of the summer she got better. She was back to normal by the time we went our separate ways to college. I don’t think her getting better was supernatural, but it was wonderful and my prayers were answered.

Even my teenage self could see that it was odd that my human brain was praying to a god I didn’t

believe in because I had no better way to handle the uncertainty and worry.

There have definitely been times in my life when it has felt like uncertainty was driving me crazy. I sometimes wish I could eliminate it. Unfortunately, there is uncertainty, and we have to deal with it, and there is no easy way to figure out the unknown.

Uncertainty can be quite uncomfortable. A related feeling is doubt. Doubt can come from being certain, but, not being sure you can be certain any more. Sometimes people just want doubt to go away. Sometimes doubt is even considered a sin.

In the book *Anna Karenina*, after Kitty's preferred suitor runs off to chase Anna Karenina, Kitty agrees to marry Levin when he asks her a second time.<sup>7</sup> As a condition of getting married, Levin is required to confess to a Priest. During his confession, Levin tells a priest: "My chief sin is doubt. I have doubts of everything, and for the most part I am in doubt." and the Priest tell him "Doubt is natural to the weakness of mankind, but we must pray that God in His mercy will strengthen us."<sup>8</sup> I think there are two mistakes here. The first mistake is that Levin doubts everything. While I believe there is uncertainty in every belief, many things are not worth doubting. It is much more useful to be more specific in doubt. The purpose of doubt is to cause us to pay attention so maybe we can reduce our doubt by increasing our understanding or knowledge. As Eliezer Yudkowsky says:

Living with doubt is not a virtue—the purpose of every doubt is to annihilate itself in success or failure, and a doubt that just hangs around accomplishes nothing. But sometimes a doubt does take a while to annihilate itself. Living with a stack of currently unresolved doubts is an unavoidable

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<sup>7</sup>Love involves uncertainty. There is the uncertainty of what the other person thinks of you, which is trying to figure out what is going on in someone else's brain. Then there is the uncertainty of who you will be in the future, which matters when making long term promises. And lastly is the uncertainty of what they will think of the relationship in the future, which is trying to predict the future of someone else's brain.

<sup>8</sup>*Anna Karenina*, Part 5, Chapter 1

fact of life for rationalists.<sup>9</sup>

In some sense, the purpose of our brains from an evolutionary perspective, is to improve the actions we make. Empty doubts or uncertainties that have no chance of changing our actions are pointless.

The second mistake Levin makes is considering doubt a weakness. I think that doubt, when it is over something we are too certain about, is a strength, not a weakness. Doubts that cause us to search out new information or pay more attention so that we can resolve the doubt are useful. Uncertainty that causes us to be properly cautious is good. Let us cherish and use our doubts carefully.

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<sup>9</sup> Eliezer Yudkowsky, in *Rationality from AI to Zombies*, chapter: Cultish Countercultishness