

Reading: “10 Ways We Get the Odds Wrong,” Maia Szalavitz, Psychology Today

“... we overestimate the odds of dreadful but infrequent events and underestimate how risky ordinary events are.”

—Maia Szalavitz

Risk of Misjudging Risk

- ✓ Human Beings respond to risk and uncertainty in the modern world by using an ancient “processing system” (studied in our lesson on anxiety).
- ✓ This biological mechanism for fear-response is a primitive alert system that seems overwhelmed in today’s world.
- ✓ A quick response to (immediate) environmental dangers was part of our ancestors’ survival tools for millions of years.
- ✓ These tools—assessing risk—were still effective 200,000 years ago (maybe back a few thousand years) but as technology and information exponentially grew so did the shortcomings of this mechanism.
- ✓ Couple this with our difficulty in processing mathematical modelling, statistics, fake news, misinformation, too much information, click-bait headlines, the power of human invention and global change, **UNCERTAINTY**, *etc.*, and we have a recipe for potential disaster ... we have the recipe for getting the odds wrong and making bad decisions about our future.

Life or Death Decisions

Risk assessment is BOTH rational and emotional. We can easily calculate the probabilities of a bad (or good) event happening during a year or during your lifetime ... we don’t know the likelihood of an individual’s fate at a particular time, but we can build statistical tables (ask your insurance company). But how do you **respond emotionally** to the (low or high) possibility of danger? How would you balance the role of Risk and Benefit? Is it worth risking your life to drive across town to save ten dollars on a new smartphone? What is more dangerous, driving or smartphone addiction?

We worry more about flying to a far destination than driving to it, although the odds of you dying in a car crash are far higher than dying in air travel. You are more likely to be killed in a car crash than by an airplane accident, bee sting, choking on food, killed by a stranger, or experiencing an adverse effect from a vaccine.

We are more likely (over the course of our lifetime) to die from heart disease, lung disease, or cancer. We attribute more danger to some activities or events than to others, despite the facts that some actions are far more dangerous than we “feel” they are.

A **catastrophic event** like a plane crash, terrorist attack, lightning strike, or dog attack are low probability disasters that worry us more than **chronic events** like cancer or heart disease which take a long time for their impact to be noticed; smoking a few cigarettes a day or eating those few cheeseburgers a week are not “felt” as an immediate danger. Look at these two lists of statistics (for the US and Canada):

<https://injuryfacts.nsc.org/all-injuries/preventable-death-overview/odds-of-dying/>

<https://www150.statcan.gc.ca/t1/tbl1/en/tv.action?pid=1310039401>

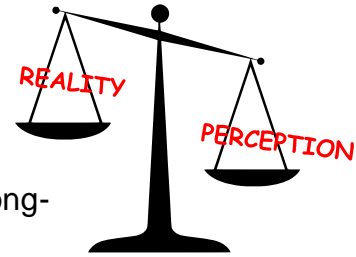
What surprised you? Where did you get the odds wrong?

Why is this important? Let's go farther and ask about **the real-world impact of getting the odds wrong**. If we misjudge dangers in our lives, then what is the risk of being wrong on a

- ✓ personal level (decisions on health, safety)?
- ✓ social level (human interactions, government planning and legislation from local to national, decisions on policy via voting)?
- ✓ global scale (changing the planet, climate change, biodiversity, food production, disease outbreaks, and extinction events, including humans; how does chronic danger and catastrophic danger come into play?)?

Risk Perception and Reality

- ✓ We tend to overhype tiny (rare, low probability) dangers and diminish (ignore, underestimate) serious (common or high probability) threats.
- ✓ We make a catastrophic mountain out of a molehill, or just ignore chronic dangers.
- ✓ Risk perception is affected by its immediacy (personal) or its abstract (long-term or anonymous) consequences.
- ✓ Risk perception is affected by the illusion of control (overestimate risk of plane travel where you do not pilot vs underestimate risk of car travel where *you* drive).
- ✓ Risk perception is affected by our choice of activities. We believe that if we do something dangerous *because we choose to*, then we are faced with less danger.
- ✓ Why do we behave this way? Let's start with our biology ...



The Biology of Fear (Amygdala)

When we discussed the evolution of life, we learned of survival traits in natural selection. If an individual has a particular (lucky) trait or tool that increased its chances of survival, then that individual can live long enough to reproduce and (possibly) pass on that trait to the next generation. As you can imagine, fear can be a useful "survivability" trait.

- ✓ Back in our lesson on anxiety, we learned that in the brain's limbic system there are two small, almond-shaped structures known as [The Amygdala](#) which are important for our [Fear-Response](#). The presence of spiders and snakes, or even images of these creatures, may scare you on a primitive level, triggering a cascade of reactions from the amygdala (sweat, shallow breathing, fear, anxiety...), but what is your reaction to the following modern *words*: Natural, Chemical, [Dihydrogen Monoxide](#), Gun, Nuclear Radiation, Electromagnetic Radiation, Pharmaceuticals, Cancer, Vaccinations, Heart Disease, Mathematical Equations? If it's negative, that's an **Aversive Response**. Ask yourself this: do you have enough information to feel the way you do? Is your first reaction to these words one of fear, anxiety, or anger?
- ✓ **We're hardwired to FEAR first, THINK second.**

- ✓ When we experience danger, our brain makes a rapid, emotional risk assessment **before even thinking about it**. Typically, we (and other animals) respond to danger by [Fighting, Fleeing, or Freezing](#) (video).

Why is this important? We are using ancient programming to deal with risk in a modern world. We have no trouble dealing and understanding primitive dangers like snakes, spiders and the dark, but we struggle with new (perceived) dangers of the modern world like nuclear energy, chemical contamination, long-term environmental issues, food safety, drugs, antibiotics, bioengineering, the effects of new technology ... and this information overload can be, well, risky ...

The Biology of Misinterpreting Patterns

When we discussed the scientific method, we learned of the importance of seeing patterns in nature to understand the workings of the world around us. Some patterns are simple, some may be complicated, and sometimes we see patterns/connections where none exist ([apophenia](#) & [pareidolia](#)) ... this is another flaw in our biology that can lead to getting the odds wrong.

According to Michael Shermer (Shermer, M. (2011). Patternicity. In *The Believing Brain* (pp. 59-60). New York, NY: St. Martins Griffin.), **Patternicity** is described as the following: "Our brains are belief engines, evolved pattern-recognition machines that connect the dots and create meaning out of the patterns that we think we see in nature. Sometimes A really is connected to B; sometimes it is not." He also describes these **two errors in cognition**:

- **Type I error in Cognition (false positive): Believe something is real when it is not. Pattern isn't real.**
- **Type II error in Cognition (false negative): Believe something is NOT real when IT IS. Pattern is real.**

If you are one of our primitive ancestors walking through a forest and you hear the rustle of leaves, it is safer to guess wrong and think that there is a dangerous predator after you or guess wrong and assume that there is nothing there. A Type I error gives you a

better chance of surviving and passing on that fear-response to the next generation. A Type II error means death if you guess wrong.

We are inclined to believe in something that is not there. We are inclined to misinterpret reality and get the odds wrong. For example, in Medical Student Syndrome, a high number of med students think they have the disease they are studying (have you ever looked up symptoms you may be experiencing and panicked at the possible rare disease you thought you had?).

We are naturally inclined to believe in magic, superstitions, weird connections of events, bizarre causes, whims of forest gods, fake conspiracies ... We are naturally inclined to miscalculate risks as shown in our responses to perceived risks.

This “thinking” is millions of years old and competes against modern technology, massive information content, and the scientific method.

We think we see connections (or patterns) between unconnected events, things, ideas (apophenia) or we think we see images like a face in random patterns (pareidolia). This is how a conspiracy theory can be fabricated from a few “data” points, a face can be seen in cloud formations, or we see order in a random pattern (like a disease cluster or thinking you’re on a hot gambling streak).

When we start to “see” connections between improbable events, there is a good chance we’re experiencing apophenia.

Belief in alternate explanations that fit with our own belief systems (**confirmation bias**), can lead to misconceptions of reality ... another sure-fire way to get the odds wrong.

We tend to believe that [correlation](#) is the same as [causation](#), as we used to believe that earthquakes were the work of angry gods, disease the work of evil spirits, and if we’re having a horrible day, someone put a curse on us. Just because two events seem to be connected, there is no guarantee that they are; e.g., here are some amusing correlations, where you can “connect” unconnected events: [Correlation Does Not Equal Causation.](#)

Why is Assessing Risk Becoming More Confusing in the Modern World? (some examples)

✓ **Anti-scientific Movements**

- Distrust of science and scientific facts fanned by political agendas (going back decades). In our science lesson of week 2, we also learned of how rapidly changing paradigms can create distrust and confusion.
- Myths and conspiracies are competing with scientific explanations; opinion and feeling often seem to outweigh fact and theory.

✓ **Spin**

- Entities with political or monetary motives try to sway our view of the world (see above on agendas): governments, corporations, conspiracy theorists, news channels, internet echo-chambers, or other misinformation campaigns. See this trailer for [Merchants of Doubt](#) on the power of propaganda.

✓ **Social Media**

- Bad ideas go viral in our digital age. Many people get their news from social media today and we now have an era where social media can create insulated echo chambers through its algorithms. How sure are you that the headline you're reading is not a fabrication, either a hoax or something with malevolent intent? As we learned in our internet lesson, social media has the power to cherry-pick "news" and "facts" that feed into our confirmation biases, amplifying them in a rage-and-fear-inducing algorithm.

✓ **HYPE!!!!!!!!!!**

- The media, as well as some legitimate science and other print publications, lead with attention-getting announcements using key words such as Breakthrough, Cure, Death, Cancer, Novel, Revolutionary, Danger, Gun Violence, Record, Terrorism, ...
- For example, your chance of being killed in Toronto by a stranger are far less than being killed by your spouse, but you wouldn't get that impression from the local news. Many scientific announcements in the media jump to conclusions that can be contradicted with the next study. This can lead to a distrust of science, and the media, as well.

✓ **Information Overload**

- In today's internet-dependent and internet-influenced world there is far too much information to process and to question (even in one lifetime). This comes back to the notion of trusting the source of information and how much are you willing to question that source (the survivability trait of critical thinking ... thank you, GNED 101).

Review Questions:

- ✓ Why is fear an important survival trait? What is the mechanism of the body that makes the split-second decisions on fighting, freezing, or fleeing?
- ✓ What is the danger of seeing imaginary patterns in the world (apophenia and pareidolia)? What is a Type I and II Cognition Error and why is it important?
- ✓ What are some causes of misunderstanding risk in the modern world?
- ✓ What is the difference between a chronic and a catastrophic danger? Which one can influence your risk decisions more?
- ✓ What is the risk of being wrong on a personal level, social level, and on a global scale?
- ✓ What do you fear (food products, GMOs, medical treatments, corporations, terrorism, "secret" agendas...) and *do you have enough information to justify that fear?*
- ✓ What doesn't scare you, and *do you have enough information not to be worried?*
- ✓ What is the risk of indifference or not caring about modern dangers?

