A View From the Prairie

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Complex Systems - Sudden Consequences

So many people try to "get away with" small infractions, small breaking of the rules, and slacking off on safety. Most times, they manage to not have major ramifications. However, micro failures and micro slacking sometimes lead to rare and deadly macro failures. This is a normal part of complex systems: a rare, sudden chaotic change to the system with major consequences. As humans, we push the limits - not having consequences most of the time, but sometimes, we have major consequences.

Complex systems can be described as noisy chaotic systems. City traffic is often such. When we break the rules in small ways, often those rule breaks are hidden in the noise of the system, just like how most people speeding get away with it. Sometimes, a group or family will go for generations breaking the rules without having consequences. But there are always the times when we don't get away with breaking the rules. Sometimes, breaking a rule results in major consequences.

These failures are rarely failures of a major component. In most cases, we experience a "cascade of failures" where many small failures add up to a major failure.

The Texas power failure is a prime example of many small failures suddenly adding up to a major catastrophe. Pipes freezing in one spot normally doesn't affect the whole state. But when the pipes are the natural gas supply to the electric generating plant, the freeze shuts down power. Shutting down that power shut down pumps supplying gas to other power plants. Failure cascaded upon other failures.

A few years back, a business owner was speeding down the road as he usually did. It was a Sunday morning without much traffic to get in the way. But, suddenly, there was a car in the way. The resulting crash cost him his life and the lives of several people in the car.

In computer systems, we operate as if they will always work. They don't. On large scale, they are always failing. Large data centers are constantly replacing equipment that broke. Those who do not back up their home and office computers are surprised by the failure (or ransom attack) and lose data and precious memories.

Failure Cascades On Failure

The more complex the system, the more the small failures occur. In computer systems, we have a number of techniques to minimize failures, but these techniques do not complete eliminate failures. We try to balance the risk of those failures against the cost of identifying and fixing failures. For example, we know that space radiation comes down and in some very rare cases, changes data in a computer memory. Because it is so rare, we don't worry about it in consumer computers. In data center servers, many have error detection and correction circuits on the memory to catch these and other memory failures. But the error detection circuits can fail also. Everything can fail.

Complex or chaotic systems are known for these sudden changes in the system and sudden consequences.

What if I'm wrong?

A wealthy person approached a university wanting to sponsor research that would prove his belief. Many people want to say that science proves one belief or another. But science doesn't work that way. The scientific method is a technique for proving beliefs to be false, not true. The power and weakness of science is that all beliefs are open to being proven false.

All human beings, including scientists, live by beliefs. We have beliefs passed down to us, some that we never question. Preachers and politicians confidently state their beliefs hoping that people will follow them. We hear totally contradictory beliefs stated by different people. During this pandemic, we heard scientists speak their beliefs and then change them as more data came in.

As a society, we invest in science to find where beliefs can be wrong and acting on wrong beliefs can lead us to expensive mistakes. Science is about testing those beliefs through measurement and finding where they are wrong. Scientific "truths" are only those beliefs we have yet to find a way to prove wrong. (There are scientists looking for a way to disprove gravity.)

In business, if we believe something that is false, we will eventually be hurt by that belief. Business people have to balance the "confidently striding into the future" with the knowledge that we might be on the wrong path. Lies, wrong beliefs, bad cultural habits, and mistakes in seeing reality are all harmful to business. At some point, each will cause problems with customers and employees.

This is where both periodic retreats and constant striving for measurements help keep a better connection with reality. We need to measure so that we keep connected with reality.

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Making *Information* from Streams of Data

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Risky World

There is a new phishing attack that uses morse code to hide the malicious URL from inspection. It coded a as ".-" and then used a script to decode the morse code into codes that could be used to harm.

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