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A Cascade of Sand: Complex Systems in a Complex Time

We live in a world filled with rapid change: governments topple, people rise and fall, and technology has created a connectedness the world has never experienced before. **Joshua Cooper Ramo** believes this environment has created an "'avalanche of ceaseless change."

In his book, The Age of the Unthinkable: Why the New World Disorder Constantly Surprises Us And What We Can Do About It he outlines what this new world looks like and gives us prescriptions on how

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best to deal with the disorder around us.

Ramo believes that we are entering a revolutionary age that will render seemingly fortified institutions weak, and weak movements strong. He feels we aren't well prepared for these radical shifts as those in positions of power tend to have antiquated ideologies in dealing with issues. Generally, they treat anything complex as one dimensional.

> Unfortunately, whether they are running corporations or foreign ministries or central banks, some of the best minds of our era are still in thrall to an older way of seeing and thinking. They are making repeated misjudgments about the world. In a way, it's hard to blame them. Mostly they grew up at a time when the global order could largely be understood in simpler terms, when only nations really mattered, when you could think there was a predictable relationship between what you wanted and what you got. They came of age as part of a tradition that believed all international crises had beginnings and, if managed well, ends.

This is one of the main flaws of traditional thinking about managing conflict/change: we identify a problem, decide on a path forward, and implement that solution. We think in linear terms and see a finish line once the specific problem we have discovered is 'solved.'

In this day and age (and probably in *all* days and ages, whether they realized it or not) we have to accept that the finish line is constantly moving and that, in fact, there never will be a finish line. Solving one problem may fix an issue for a time but it tends to also illuminate a litany of new problems. (Many of which were likely already present but hiding under the old problem you just "fixed".)

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In fact, our actions in trying to solve X will sometimes have a *cascade effect* because the world is actually a series of complex and interconnected systems.

Some great thinkers have spoken about these problems in the past. Ramo highlights some interesting quotes from the Nobel Prize speech that Austrian economist **Friedrich August von Hayek** gave in 1974, entitled The Pretence of Knowledge.

> To treat complex phenomena as if they were simple, to pretend that you could hold the unknowable in the cleverly crafted structure of your ideas —he could think of nothing that was more dangerous. "There is much reason," Hayek said, "to be apprehensive about the long-run dangers created in a much wider field by the uncritical acceptance of assertions which have the appearance of being scientific."
>
> Concluding his Nobel speech, Hayek warned, "If man is not to do more harm than good in his efforts to improve the social order, he will have to learn that in this, as in all other fields where essential complexity of an organized kind prevails, he cannot acquire the full knowledge which would make mastery of the events possible." Politicians and thinkers would be wise not to try to bend history as "the craftsman shapes his handiwork, but rather to cultivate growth by providing the appropriate environment, in the manner a gardener does for his plants."

This is an important distinction: the idea that we need to be gardeners instead of craftsmen. When we are merely creating something we have a sense of control; we have a plan and an end state. When the shelf is built, it's built.

Being a gardener is different. You have to prepare the environment; you have to nurture the plants and know when to leave them alone. You have to make

sure the environment is hospitable to everything you want to grow (different plants have different needs), and after the harvest you aren't done. You need to turn the earth and, in essence, start again. **There is no end state if you want something to grow.**

* * *

So, if most of the threats we face to today are so multifaceted and complex that we can't use the majority of the strategies that have worked historically, how do we approach the problem? A Danish theoretical physicist named **Per Bak** had an interesting view of this which he termed self-organized criticality and it comes with an excellent experiment/metaphor that helps to explain the concept.

Bak's research focused on answering the following question: if you created a cone of sand grain by grain, at what point would you create a little sand avalanche? This breakdown of the cone was inevitable but he wanted to know if he could somehow predict at what point this would happen.

Much like there is a precise temperature that water starts to boil, Bak hypothesized there was a specific point where the stack became unstable, and at this point adding a single grain of sand could trigger the avalanche.

In his work, Bak came to realize that the sandpile was inherently unpredictable. He discovered that there were times, even when the pile had reached a critical state, that an additional grain of sand would have no effect:

> "Complex behavior in nature," Bak explained, "reflects the

> tendency of large systems to evolve into a poised 'critical' state, way out of balance, where minor disturbances may lead to events, called avalanches, of all sizes." What Bak was trying to study wasn't simply stacks of sand, but rather the underlying physics of the world. And this was where the sandpile got interesting. He believed that sandpile energy, the energy of systems constantly poised on the edge of unpredictable change, was one of the fundamental forces of nature. He saw it everywhere, from physics (in the way tiny particles amassed and released energy) to the weather (in the assembly of clouds and the hard-to-predict onset of rainstorms) to biology (in the stutter-step evolution of mammals). Bak's sandpile universe was violent —and history-making. It wasn't that he didn't see stability in the world, but that he saw stability as a passing phase, as a pause in a system of incredible —and unmappable —dynamism. Bak's world was like a constantly spinning revolver in a game of Russian roulette, one random trigger-pull away from explosion.

Traditionally our thinking is very linear and if we start thinking of systems as more like sandpiles, we start to shift into nonlinear thinking. This means we can no longer assume that a given action will produce a given reaction: it may or may not depending on the precise initial conditions.

> This dynamic sandpile energy demands that we accept the basic unpredictability of the global order —one of those intellectual leaps that sounds simple but that immediately junks a great deal of traditional thinking. It also produces (or should produce) a profound psychological shift in what we can and can't expect from the world. Constant surprise and new ideas? Yes. Stable political order, less complexity, the survival of institutions built for an older world? No.

Ramo isn't arguing that complex systems are incomprehensible and fundamentally flawed. These

systems are manageable, they just require a divergence from the old ways of thinking, the linear way that didn't account for all the invisible connections in the sand.

Look at something like the Internet; it's a perfect example of a complex system with a seemingly infinite amount of connections, but it thrives. This system is constantly bombarded with unsuspected risk, but it is so malleable that it has yet to feel the force of an avalanche. The Internet was designed to thrive in a hostile environment and its complexity was embraced. Unfortunately, for every adaptive system like the Internet there seems to be a maladaptive system, ones so rigid they will surely break in a world of complexity.

The Age of the Unthinkable goes on to show us historical examples of systems that did indeed break; this helps to frame where we have been particularly fragile in the past and where the mistakes in our thinking may have been. In the back half of the book, Ramo outlines strategies he believes will help us become more Antifragile, he calls this "Deep Security".

Implementing these strategies will likely be met with considerable resistance, many people in positions of power benefit from the systems staying as they are. Revolutions are never easy but, as we've shown, even one grain of sand can have a huge impact.

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