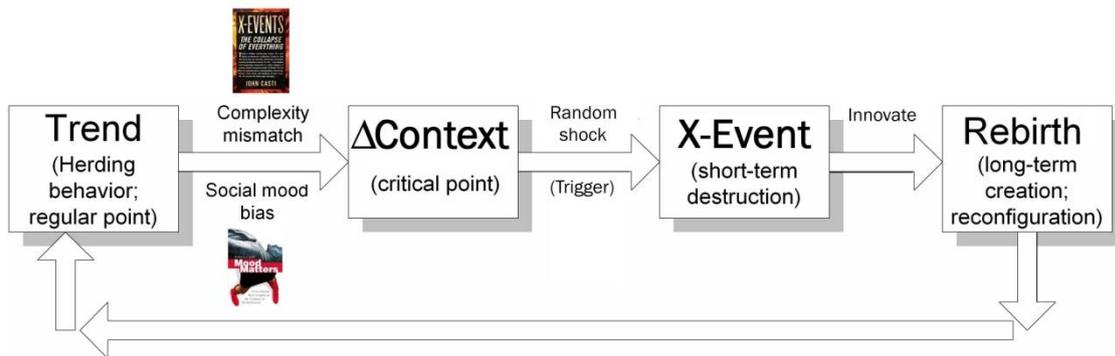


The Way the World Works

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Collective human social activity, processes involving the interaction of many individuals, all follow the same steps as they unfold from one trend to another, be the process the development of a fad in films or clothes, a financial market boom and bust, the rise and fall of a political ideology or even the birth and death of a global power. The Fundamental Diagram of Social Processes below displays the principal stages that all such processes go through as they move from the trend-following “normal” regime through a systemic crash to an ultimate rebirth. In this short paper, we briefly describe and “unpack” each box and arrow in this diagram, in order to suggest research questions appropriate to the component pieces of the diagram. For the sake of definiteness, we will use the ongoing global financial crisis to illustrate the ideas, although the arguments apply equally well to all social processes.



- Trend-Following:** From the mid 1970s to about the year 2000, the global financial markets were in an unrelenting long-term, upward trend, a “boom” phase if you like. At about the turn of the millennium this trend flattened out, and began a process of rolling over into a long-term downturn that accelerated with the crash of 2007-2008. Since mid 2009, the markets have began moving upward again in what many (including the author of this paper) feel is simply a counter-trend bounce that will be followed by another major push downward. In short, the multi-decade upward trend ended around 2000, and the financial system has been in a multi-decade long-term decline ever since.

What’s important about this story is not the details of timing, but the fact that a trend necessarily refers to a particular *time scale*. Even though the financial

market trend was onward and upward for decades, there were periods during that time when the movement went opposite to the longer-term trend. So it's really meaningless to speak of a "trend" without specifying the timescale over which the trend is unfolding. Moreover, trends *always* change, whatever timescale you consider. The argument presented in my 2012 book *X-Events* is that the ultimate cause of that change is always the same: a systemic complexity overload/mismatch.

- ***Complexity Mismatch/Overload:*** Generally speaking, human social processes involve the interaction of several systems—economy, communication, transportation, energy and the like. Each of these systems has its own level of complexity, which is continually changing over the course of time. Since these changes are not usually coordinated, a complexity gap, or mismatch, occurs between the various systems. And just like the stretching of a rubber band beyond its elastic limit, when this gap becomes unsustainable the overall system “snaps.”

In a simplified version of the financial crisis mentioned above, there were two systems in interaction: the financial services sector and the government regulators. As the financial sector created ever more complex instruments of financial speculation, things like credit default swaps, mortgage-backed securities and the like, its complexity rose to a point where even the creators of those instruments did not really understand them. At the same time, the regulatory system was more or less frozen in place at a fixed level of complexity. A foundational principle of complexity science states that in order to fully regulate any system, the regulator has to be at least as complex as the system being regulated. In other words, the complexity gap should be fairly small or you're going to have trouble. That was far from the case with the financial situation in the early years of this century, and the collapse of 2008 was the event needed to reduce the yawning gap between the banks and the regulators. Interestingly, governments have done their best since then to restore the gap with their various programs of “quantitative easing” and the like, which almost surely guarantees another crash as the complexity mismatch again widens to an unsustainable level.

Social Mood Bias: While the complexity gap is for the most part a development internal to the systems involved in the interaction, the outside world is simultaneously changing as well. A major component of that change resides in the beliefs a society or group holds collectively about its future, what might be termed its “social mood.” Note that we're talking here about *beliefs*,

not feelings. Roughly speaking, beliefs stem from the logical part of the brain, the frontal cortex, while feelings arise in the emotional region of the brain. So they are two entirely different matters and change in totally different ways. Feelings quickly come and go; beliefs change far more slowly and require a lot more “oomph” to shift from one polarity to another.

My 2010 book *Mood Matters* presents dozens of examples showing how a positive social mood, belief that tomorrow will be better than today, gives rise to events of an entirely different character than those likely to be seen when the society fears the future rather than welcomes it. For instance, when the mood of a society is positive, events tend to have a “joining” character, facilitating the formation of entities like the United Nations or the European Union. But if the mood is negative (as it is today), just the opposite sorts of events usually prevail. In those circumstances, we tend to see events that are “separating” in nature, such as the inability to close international trade agreements (e.g., the Doha Round), fragmentation of political alliances (the EU today) and so on. In the context of the global financial crisis, the mood shifted from positive to negative about a decade ago, at which time events started to lean toward separating and localizing, such as rejection of immigrants, imposition of trade barriers, and inability of groups like the Eurozone members to agree on a common solution to their local debt problems.

- ***ΔContext/Critical Point:*** Both complexity gaps between different social systems and the mood of a population work in tandem to form the *context* within which specific events occur. This context gives rise to a spectrum of “possibilities,” events that *might* occur at a given time. Note that it is not at all the case that each possible event is equally likely; but any one of them is at least in principle possible. What actually occurs though is a combination of change of context plus a random trigger that picks out one event among the set of possibilities created by the new context.

A helpful image to keep in mind regarding context is that of a landscape, one that is continually changing as complexity levels, social mood and other factors dynamically unfold. When the target system, say an economic process or a political ideology is in a trending phase, the system is sitting on a plateau. This means that even substantial shocks cannot move it very much away from its current position. In other words, the current trend will continue relatively unchanged. But as time unfolds, that plateau morphs into a peak. Initially, the peak may be very broad and low, so the change passes more or less unnoticed. But as time goes on, the peak sharpens and the system ultimately finds itself

perched on a very sharp mountain top. Now even a minor disturbance can easily send the system crashing down into one or another of the valleys surrounding the peak, depending on the direction of the disturbance.

Before that crash, though, the system itself was resting at an unstable state of equilibrium, the *critical point*, at which even a minor event could send it tumbling down the hill. The closer the system is to this unstable state, the greater the risk of a major extreme event, an event needed to restore a harmonious complexity balance among the different interacting subsystems. So it is an increase in complexity in some subsystems that's not matched by a corresponding increase in others that lies at the heart of the problem of assessing risk, especially in situations for which we have no past data to draw upon, the so-called region of "unknown unknowns."

The particular valley where the system ends up will then be determined by the nature of the trigger that pushes the system off the peak. By its very nature, such a trigger is random and cannot be forecast; it has no pattern. Consequently, it is not possible to predict with any confidence which valley the system will end up in. All we can hope is to be able to forecast the change in the landscape, which will then tell us that the earlier, safe and stable plateau is gone, and we're now sitting on a peak instead of a flat surface.

Since the peak is not necessarily symmetric, some of the valleys are more likely to be realized than others. The valleys are what on the graphic shown above is termed an *X-event*. The landscape metaphor now raises the crucial question: What is the relative likelihood of ending up in one valley versus another?

Again returning to the global financial crisis as an illustration, this question translates into whether the financial system will ultimately return to where it was pre-2007, vanish completely to be replaced by something new and different, be slightly/hugely modified by new regulations and constraints or something else. Right now, we are in the transition phase of falling off the peak from 2007, but have not yet landed in one of the valleys—the peak having been so high that it will take years to land (yet one more timescale-based feature of the overall picture that the diagram encapsulates).

- ***X-Event***: If the event that the system ends up in is rare, surprising and has great social impact, we call it an "X-event." These are the types of events that change the very nature of a social structure. In the short-term, X-events are almost

always destructive, leading to loss of life, destruction of property, great financial damage and often great social and psychological disruption. For these reasons, we try valiantly to avoid such events. The continuing effort on the part of central banks around the world to support the financial systems in North America and Europe by purchasing bonds, “liquidifying” weak banks and the like are daily reminders of the kind of frantic effort to stave off the occurrence of a financial X-event that might otherwise send the global financial system off the peak and into a terminal tailspin.

History is not very kind to efforts of this sort, since they mostly amount to sweeping the dirt under the rug until the pile becomes so large that the system breaks its leg tripping over it. Such bailout efforts almost always ultimately fail, the ensuing crash ending up being much larger and far more serious than it need have been otherwise. But such is the nature of human nature to avoid taking any kind of short-term loss, even if taking that loss would leave the system in a much better position to carry-on in the future. So X-events seem to be essentially unavoidable, and in the short-term will cause much damage. That’s the bad news. The good news is that X-events are as much an opportunity as they are a problem. Here, again, timescale enters the picture.

Innovation: During the destructive phase of an X-event many organizations, institutions, companies and even entire governments are destroyed, blown away, “disappeared.” Others survive but at a subsistence level. Still others manage to maintain their integrity and function in only slightly reduced form. But a small fraction of the organizations not only survive the event but actually prosper from it. Such organizations are often termed “resilient.”

The essence of a resilient structure, as opposed to one that’s simply stable, is that the resilient organization doesn’t even try to return to its former mode of operation, but instead is adaptive enough to immediately begin exploiting the new “eco-niches” that the X-event has created in the social order. These new degrees of freedom opened up by the destructive phase of the X-event are the opportunity side of the coin.

To illustrate the idea, consider the period in the 1990s when cell phones were just starting to emerge as a life-changing technology. At that time, the Finnish firm Nokia was in the business of manufacturing bicycle tires and rubber boots for rainy days in Finland (of which there are many). But it had a small electronics arm carrying on activity far removed from the corporate mainstream. When the GSM standard for cell phones was adopted in Europe,

this was a game-changer for firms in the electronics business like Motorola, Siemens and Ericsson, who scrambled to deal with the X-event of this standard being imposed. Nokia management saw that future today, and immediately shifted their focus from manufacturing rubber products to building handsets embodying the GSM standard. This adaptability ultimately led Nokia to become the world's largest handset manufacturer—until they were finally overtaken by Samsung a year or so ago.

Interestingly, while Nokia exemplified a resilient organization twenty years ago, today it is just the opposite. The firm's inability to see the emergence of the smart phone as the future of mobile communication, as well as its earlier inability to effectively penetrate the cell phone market in the USA, is now leading to its extinction at the hands of these new X-events. This illustrates the point that resilience is a context-dependent property. So there is no such thing as "universal" resilience in the face of all possible X-events. An organization can be very resilient to some such events, while remaining totally vulnerable to others.

The Austrian-American economist Joseph Schumpeter coined the term "creative destruction" to describe the opportunities an X-event creates for innovators and entrepreneurs to enter the new social structure that appears in the aftermath of an X-event. Old ways of doing business, old political ideologies, old relationships between government and its citizens are all called into question and often destroyed in the immediate aftermath of an X-event. This destruction opens up many and varied opportunities for new ideas and products to emerge that take advantage of the new scheme of things. To quote Nietzsche, "That which does not kill me makes me strong." The same applies to societies.

- **Rebirth:** For a period of time following the X-event, companies and individuals scramble about exploring the new opportunities presented by the changed social environment. As with all evolutionary processes, some new ideas, products, and services catch-on and become part of the new social order; most fall by the wayside. Eventually, the situation stabilizes and new rules of social interaction are put in place. We might then speak of a "rebirth" of society as new trends begin, based on the new rules and scheme of things. At that point, the entire process outlined above starts over again, albeit this time at a different level of social organization, a level that some see as "progress", while others see it simply as change. But everyone sees it as something new and different.