X-Events in Social Processes

by John Casti

Trends and Transitions

At a random moment in time, the generic behavior of any social system is to be in a trending pattern. In other words, if you ask how will things look tomorrow, the answer is that they will be just a bit better or a bit worse than today, depending on whether the trend at the moment us moving up or down. This is what makes trend-following so appealing: It's easy and it's almost always right—except when it isn't. Those moments when it isn't are rare (infinitesimally small in the set of all time points, actually) and usually surprising within the context of the situation in which the question about the future arises. These rare events are called *critical points*, the moments where the system is rolling over from one trend to another. If that rolling over process involves great social damage in lives, dollars and/or existential angst, we call the transition from the current trend to the new one an *X-event.* In the natural sciences, especially physics, such a transition is often associated with a "flip" from one phase of matter to another, as with the transition from water to ice or to steam. Here I'll concentrate solely on human-caused X-events, not the ones that nature throws our way.

A central question arising from the above scenario is: Can we predict where the critical points will occur? In situations where you have a large database of past observations about the process and/or a dynamical model that you believe in for the system's behavior, then you can sometimes use tools of probability and statistics and/or dynamical system theory to pinpoint these points. This is often the case in the natural sciences; but it's almost never the case in the social realm. In the human domain, we generally have too little data and/or no believable model, at least no data or model for the kinds of "shocks" that can send humankind back to the Stone Age overnight. In short, we are dealing with the "unknown unknowns."

In this X-events regime, we cannot pinpoint where the critical points will be. And it's unlikely that we'll ever be able to predict their location with the same sort of accuracy and reliability that we're accustomed to in the natural sciences. This is due to the fact that events, X- or otherwise, are always a combination of context and a random trigger that catalyzes a particular event from the spectrum of potential events that the context admits. In other words, at any given time the context, which is always dynamically shifting, admits a variety of possible events that might be realized. The one event that is in fact actually seen at the next time moment is determined by a random "shove" that sends the system into one attractor domain from the set of all possibilities. Since by its very nature a random trigger has no pattern, it cannot be forecast. Hence, the specific event that turns up cannot be forecast either. Note that this does ***not*** mean that every possibility is equally likely. It simply means that while some possible events are more likely to be seen than others, the random factor can step-in to give rise a realized event that is *a priori* unlikely.

The problem with speaking here about "likelihoods" is that this terminology has built-in to it the assumption that there is some probability distribution that's known to us for evaluating the likelihood of occurrence of any of the possible events. But when it comes to the X-events regime, where there is neither data nor a model, this assumption simply cannot be justified. There may indeed exist such a probability distribution. If so, however, it lives in some platonic universe beyond space and time, not in the universe we actually inhabit. So what to do? How do we characterize and measure risk in an environment in which probability theory, statistics, and dynamical system theory cannot be effectively employed?

Complexity Gaps and Social Mood

As all human systems are in fact a combination of two or more systems in interaction, not a single system in isolation, the answer to the foregoing question that I presented in my book *X-Events* is to identify the level of complexity overload, or "complexity gap," that emerges between the systems in interaction. The size of that gap then serves as a measure of the risk of a system collapse.

To make the story as simple as possible (but not simpler, to paraphrase Einstein's famous remark), let me here focus on the simplest case of two systems in interaction, such as the financial services sector and the government regulators. The two systems each have their own level of complexity, usually associated in some way with the number of degrees of freedom the system has to take independent actions at a given time. This complexity level is continually changing over the course of time, so that the complexity difference between the two systems also rises and falls in a dynamic manner. This continually changing difference gives rise to what I call a "complexity gap" between the interacting systems. As long as this gap doesn't get too big, everything is fine and the two systems live comfortably in harmonic balance. But when the gap widens stress between the systems arises. And if the gap widens beyond a critical point the overall joint system "crashes." The only way to avoid this X-event is to narrow the gap by either increasing the complexity of the regulator or reducing the complexity of the financial sector. But human experience shows that voluntary downsizing almost never happens, nor does "upsizing." So a systemic crash is what can be expected, and in fact is what almost always takes place.

To graphically illustrate this idea, think of stretching a rubber band with the two ends of the rubber bank representing two systems in interaction. The length of the rubber band represents the difference in complexity between the two organizations, the complexity gap between them. As the band is stretched, the gap increases and you can actually feel the tension in your muscles as the gap increases. As you keep pulling, the gap reaches the limits of elasticity of the band and it snaps. That is, the system experiences a "crash," an X-event.

While it's not possible to pinpoint the precise point at which any particular rubber band will actually break, it certainly is possible to know when you're pressing the boundary of elasticity just by feeling the tension in your muscles as you continue pulling the two ends of the band. This increased tension gives us a way of *anticipating* when the system is entering the danger zone where a collapse is imminent.

At the critical point when the system is poised to crash, all it takes is an inherently unpredictable random push on the system in one direction or another to shove it over the edge into a new “phase.” Thus, where the system actually ends up after this X-event has taken place is inherently unpredictable. For human systems, the overall “social mood” of the population within which the system exists has a strong biasing effect on what does or does not emerge as the “winner” from the spectrum of possible outcomes from the crash.

The way this bias works was explored in my 2010 volume *Mood Matters*. In essence, the social mood is the force driving the change in context that ultimately combines with the random catalyst to create what we actually observe. A good metaphor to keep in mind here is that the entire process is a lot like weather forecasting. Measurements of temperature, wind velocities, humidity and the like on a given day circumscribe the set of physical possibilities for tomorrow’s weather. But what actually turns up when you look out the window is fixed by the flapping wings of that famous butterfly in the Brazilian rain forest that triggers the cyclone in Illinois today. So, again, fortune’s formula is Context + Randomness = Event.

The final question coming from this transition from trends to critical points to X-events and beyond is, What properties enable some systems to survive and possibly even prosper (i.e., be “reborn”) in the new environment society faces after the X-event has run its course? The answer to this central question of long-range planning is tied-up with the notion of system resilience.

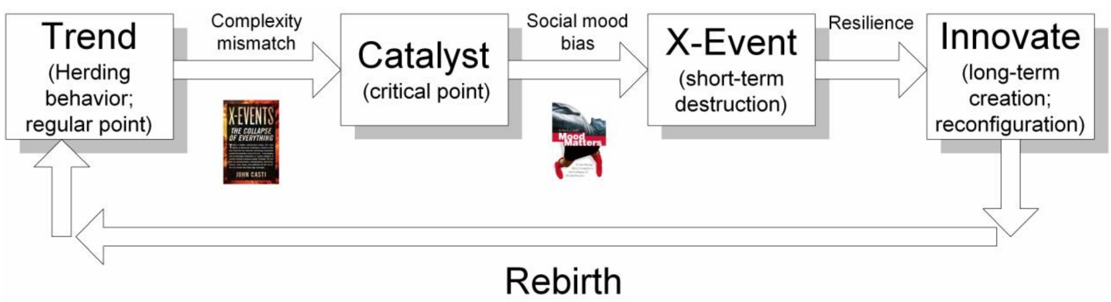
Resilience and Creative Destruction

Contrary to popular belief, the notion of a system’s “resilience” is not just jargon terminology for the concept of stability. System resilience is much deeper and more subtle than simply an expression of the ability of a system to return to its former structure and mode of operation following a major perturbation. In point of fact, returning to “doing what you were doing before” is never possible. The world moves on and you either move with it or you go extinct. So any idea of “stability,” at least as that term is used in both mathematics and everyday life, is a non-starter. But resilience is not about remaining stable in the face of uncertain disturbances (usually thought to be from outside the system itself, but not necessarily). Rather, it is about being able to *adapt* to changing circumstances while maintaining the ability to continue performing a productive function so as to avoid extinction. Sometimes that function involves doing what you were doing earlier, but now doing it in a different manner to facilitate survival in the new environment. And, in fact, oftentimes it means changing the very nature of your business in order to fit more comfortably into the new environment. In short, a resilient system not only survives the initial shock but actually benefits from it.

The idea of benefiting from an X-event brings to the front an important timescale issue. Almost without fail, when an X-event occurs it’s seen as something negative, an occurrence to be avoided, since it usually involves a major change of the status quo. And that kind of change is what most people seem to like least. So in the short-term, the X-event is regarded as a disaster of one type or another. A good example is the meltdown of the Japanese nuclear power plant at Fukushima in March 2011. In April 2012, one year after the Fukushima incident, I was giving a series of lectures in Tokyo and found just about everyone in the audiences I addressed still in a state of shock over that X-event. Many were almost as shocked when I said that if I went to sleep today and woke up in ten years, I'd be willing to bet that the majority of the people in the room would then tell me that Fukushima was not the worst thing that ever happened to Japan; rather, they would say it was the *best* thing that ever happened! Why? Simply because that mega-X-event opened up a huge number of degrees of freedom for action in the social, political, economic and technology sectors in Japan that could never have been opened by gradual, evolutionary change. It took a Fukushima-level revolutionary change to blast the country out of an orbit that they had been stuck in for the last 30 years. Only a major shock like that could shake up the relationship between society, government and industry needed to give the country an opportunity to be "reborn."

My assertion to the Japanese is a variant of Schumpeter's famous idea of "creative destruction." The sorts of X-events described in my book *must* take place in order for social organizations to open up eco-niches for new ideas, new products, new ways of doing business. The dinosaurs were not resilient enough to survive the Yucatan asteroid impact 65 million years ago, which opened up the niches for today's humans to emerge. The point here is that we should not regard X-events as something to be avoided; that cannot happen, anyway. Rather, they should be seen as being as much an opportunity as a problem. In the short-term, they are a problem; in the longer-term perspective, they are an opportunity. The resilient organization will recognize this duality and take steps today to capitalize on that opportunity.

The overall relationship between social mood, complexity gaps, critical points and system resilience is encapsulated in the following diagram:



References

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