SOCIETY OF ACTUARIES

Article from:

Reinsurance News

March 2013 – Issue 75

Synopsis of the Reinsurance Section's Sponsored Research Paper on Extreme Event Risk

By H. Michael Shumrak

"Recognizing When Black Swans Aren't: Holistically Training Management to Better Recognize, Assess, and Respond to Emerging Extreme Events," by Guntram Fritz Albin Werther, Ph.D., professor of strategic management, Fox School of Business, Temple University and Thomas Herget, president, Risk Lighthouse LLC.

This paper aims to help financial and insurance practitioners better recognize, assess and respond to large-scale, large-impact, rare events (LSLIREs), which are occurrences currently often wrongly labeled as being unpredictable black swans. A black swan, as Nassim Taleb defines it in his popular book, *The Black Swan: The Impact of the Highly Improbable*, Random House & Penguin (2007-2010 Ed.) is 1) an outlier event, which 2) carries extreme impact, and 3) "makes us concoct explanations for its occurrence after the fact." Elsewhere, Taleb says it is unpredictable, which is why people concoct explanations. Other people use the term in many and various ways, to enfold events missed by most people because they are rare, missed by computer models and/or experts, and to include events they simply seem personally to have misunderstood.

The paper also discusses building better ways to assess such events' background characteristics, emergence dynamics, logics and other foreseeable attributes. A secondary focus is educating practitioners to better respond—whether to limit damage or to take advantage of the opportunities that arise from what others are likely to miss or misjudge during and after the emergence of LSLIRE (aka black swan) events.

"True" black swan events (TBSEs) are: large-scale, large-impact, rare events that are unpredictable using current assessment and forecasting methods. Taleb's arguments about black swans are based upon various assumptions and assertions he makes about complexity and the nature of change, societal driving and shaping forces, human and practitioner limitations (even when he is confronted by forecasters' successes), using philosophy, history and experience as guidance, the limitations of learning and of being worldly learned, human cognition limits, the hard-deck limitations on the potentials of the art and science of forecasting, and, therefore, the overall advice of what constitutes best practices

The essay is organized to sequentially cover the following four topics:

1. Define true black swans LSLIREs;
2. Assess the strengths and weaknesses of Taleb's approach to explaining black swan events;
3. Better ways to forecast LRLIREs and recognize LRLIREs and TBSEs;
4. Reducing the time scale required for recognizing and assessing LRLIREs using analysts' cognitive dynamics to gain competitive advantage.

There is a risk of decreased skepticism about the correctness of models as they gain in their complexity and their perceived as well as real robustness. The most important question about any financial model is how wrong it is likely to be, and how useful it is despite its assumptions. It is not that statistics and models are wrong in any usefulness sense, but rather that every single assessment method frames one particular biased view into reality, each with very particular cognitive and philosophical assumptions embedded within it. The key takeaway from these points is that every model is most likely to misguide when it is needed most: at its statistical extremes.

Holistic approaches are inherently superior to any single-discipline assessment, be it a model or not, first because they endlessly test and enfold more views—more systemically biased assessment approaches. Before an LSLIRE emerges, more than quantities change as internal and external relationships also qualitatively change. LSLIRE forecasting involves assessing shifting system-specific patterns leading to insights about shifting forms: ***syncretism*** ("the fusion of two or more originally different inflectional forms; the combination of different forms of belief or practice"). Syncretism as a skill goes beyond mere analysis and beyond even synthesis in its orientation to subjects and their changes

If teaching and doing effective forecasting of complex events and change were impossible, whether due to the difficult, ever-changing complexity of the world, due to an inherent lack of human capacity to predict complex events well, or due to a philosophical and empirical claim that unpredictable black swans define

CONTINUED ON **PAGE 24**

H.Michael Shumrak, FSA, FCA, MAAA, is a consulting actuary with Shumrak & Company. He can be contacted at michael@h-michaelshumrak.com.

the world order, it would be difficult to explain why, for example, particular stock analysts, using the same tools and information that is broadly available to competitors working in the same organizations, can achieve "Best on the Street" status six, seven, or eight times each within a career, and do so even in very unsettled times.

Because finance, economics and other market-oriented disciplines are social sciences, a broad, general education in human affairs and knowledge/experience of many things is required of those who would aspire to effectively identify LSLIREs. It is better when it includes knowledge of the world, especially comparative histories, philosophies, religions and psychologies, comparative political, economic and legal systems, including knowledge of how these factors differentially integrate to form their particular societal systems. A common characteristic of people who have shown special skills repeatedly producing correct foresight about emerging change within complex human systems is broad and deep education about many things combined with a solid grounding experiences in one's areas of interest. They are well-grounded cognitively, philosophically, experientially, educationally and judgmentally in their knowledge and understanding. They all have a string or guiding thread that ties knowledge, facts, intuition, experience and understanding together. From this non-random grounding, they assess better than most.

A black-swan-dominated world is at severe odds with the very notion of analysts having any worth (if everything of significance is unpredictable), of their performance improvement (if everything, as Taleb argues, is only luck plus retrospective justification), and of the very possibility of there being serially successful analysts who can, up to eight times in the 20 years of the survey, actually perform outstandingly correct forecasts so as to be the "Best on the Street." If most people think an event is a black swan while better trained people recognize it as merely a rare, large-scale, large-impact event that others missed, significant comparative advantage accrues to the latter at the expense of the former.

LSLIRE emergence recognition, assessment and management can be thought of as a special case of futures forecasting, assessment and change management. One way to get better overall is to study people who are good at the latter—normal range forecasting—as a way to approach discussion of the skills needed in better doing the former. There are three ways LSLIRE forecasting significantly differs from best-practice, normal-time complex systems forecasting:

1) Being farther out on the probability tail than routine forecasting targets, the risk of punishment for deviating from disciplinary, industry or societal consensus is typically far greater, so fewer mainstream people risk it;
2) Timing an LSLIRE is harder; and
3) The qualitative element of judgment increases in importance as the quantitative data becomes increasingly opaque prefatory to an LSLIRE syndrome shift. Yet, beyond the normal range of forecasting excellence—way out on the probability tail—there are often people who predicted these supposed black swans while the masses failed.

It is historically common in LSLIREs that someone forecast it when the many did not. This correct forecaster had good, solid grounds for his/her expert opinion and forecast, and most people ignored the forecast resulting in the LSLIRE, emerging as a "surprise" to most of us.

In his book, Taleb said "had the risk of 9/11 been reasonably conceivable on September 10, it would never have happened." This ignores the fact that noted security expert Rick Rescorla correctly conceived that an airplane attack on the World Trade Center towers was far more than conceivable. In fact, he planned on and trained people for exactly that, and died trying to limit loss of life after the event.

We can use one of Talib's black swan stories to make our point. According to Taleb's "turkey farm" black swan example, past is no predictor of future. How, then, can we know the future, given knowledge of the past? A turkey is fed every day. Every single feeding firms up the bird's belief that it will be fed every day by friendly members of the human race until on the afternoon of the day before Thanksgiving, something unexpected happens to the turkey. We can easily normalize Taleb's

> "MEMBERS OF A HERD FOLLOW THE THING IN FRONT OF THEM. TO SEE THE LANDSCAPE YOU NEED TO BE FREE OF THE HERD, WHILE KEEPING THE HERD IN MIND."

turkey farm black swan example as an LSLIRE rather than a black swan. We might even consider it to be a normally expected event. We can do this by applying and/or considering some very simple philosophical, cognitive/perspective and analytical behavior shifts. Likewise, this black swan to LSLIRE mind-set shift is quite doable for a range of economic, socio-political and global crises. The idea is to facilitate black swan reduction to LSLIRE status rather than argue over whether machines or humans are better at being blindsided. The objective is to render both more effective in this context.

Being excellent, even in familiar, normal waters, is serious work. One must start with broad, trans-system common sense and experience using models and herd-like analyst consensus in a very uncommon way. This is because far out on the statistical tail is where models and herd-like analysis routinely fail. All human-based systems are constrained, shaped, embedded and entangled and not legacy-free. Their expected and normal behaviors can be change profiled. Interactions, though complicated, are also not legacy-free, and can be change profiled.

You cannot recognize a rare event if you don't recognize what normal looks like in each different complex system, and among them. If such better machines and better models exist, and they are understandable to people, by all means use them. Some serious difficulties are likely to remain because the meanings of facts and of patterns are usually context-specific, especially when different systems are interacting. But more importantly, since many soft plus hard factors are always brought to bear in recognitions forming judgments within specific dynamic contexts, machine intelligence answers will likely still need sophisticated human intelligence to interpret output meanings. Giving a Stradivarius to an average musician is simply an average musician with a Stradivarius. The top-ranked "Best on the Street" experts mentioned earlier are all, to one degree or another, within-system patternists focusing on patterns of information to better understand how complex systems are defined, evolve and react in specific circumstances.

For example, Bob Glasspiegel, (age 56; an eight-time "Best on the Street" winner) has been an analyst since 1998. He switched to insurance analysis from his earlier work covering firm technology stocks for a mutual fund. He has deep connections in the industry. He speaks of trying to "zero in on the important variables," explain macro-level industry "difficulties," and he often speaks of these factors' implications for the micro-level operations of various firms he analyzes. In explaining how he does this, Glasspiegel speaks of industry "headwinds … of what matters to life insurers … he scrutinizes industry data closely; talks to brokers, agents and other sales people; and draws on a long list of former company executives and employees for insights. Like Glasspiegel, each of the other eight-time "Best on the Street" winners shows an integrated thinking style with context specificity across time, macro-, micro-, firm-specific, and industry trends, within their industry's changing contexts.

A willingness to non-conform is critical to LSLIRE recognition expertness. As previously said, people skilled in synthesis are, according to Howard Gardner, author of *Five Minds for the Future,* on average older simply because it takes time to accumulate the knowledge and experience base from which to synthesize. Excellence in understanding complex systems and forecasting is a sustained, sunk-cost enterprise with endless topping up. Building up synthetic sense (common sense) comes with time. Sensible synthetic capacity is not something one has early or learns quickly so much as something one becomes capable of given sustained learning and experience. Knowing why something works is at least as important as knowing what is happening and how, especially in different human-involved, thus differently shaped and maintained, complex systems. A key to success with LSLIREs is mastering multiple perspective thinking and analysis from different cognitive assumptions, especially integrating "soft" psychological, sociological and philosophical perspectives and their changes in relation to the "hard data." The proper thinking process is open, emergent, and is essentially archaeological: facts and patterns emerge to your understanding as you iteratively scan, dig, assess and judge. These experts do not predetermine or prejudge which variables are context relevant. The idea is to think like you drive and constantly integrate and reconsider as the drive evolves.

CONTINUED ON **PAGE 26**

Things exist within particular contexts and are shaped by them. They are, in any particular societal system, neither free, nor random, but advantaged and/or constrained in knowable ways. This embedded and entangled system legacy can be profiled. Seeing and understanding the "fit" of things, one can better judge potentials and limits, possibilities and impossibilities. This particular competency is profiling more than modeling. Since no complex human-involved system has only one way to see it or understand it, multiple personal experiences and capacities improve comparative abilities in recognition.

Most excellent complex systems forecasters have varied, rather than specialized, learning, work and experiential backgrounds. Human experience shows that it is usually easier to promise to do something than to do it; to try something, than achieve it. That means that the desires, goals, and, above all, the change agendas, of actors, whether they are governments, firms or persons, are to be treated with skepticism. Each of the serial experts explained why and how a given change or accomplishment was likely to occur. If you cannot foresee a plausible and likely path, you are wishing and/or guessing.

Members of a herd follow the thing in front of them. To see the landscape, you need to be free of the herd, while keeping the herd in mind. To navigate the emerging landscape, one needs to understand what was and is likely coming, to appreciate why and how, and to use synthetic ability and syncretism to form and defend a judgment. The herd-like behavior of analysts and their linked near-event failure to foresee the emerging, changing landscape is very useful in helping illuminate an emerging LSLIRE and in helping time the event's "trigger point." One needs to approach LSLIRE recognition in such a way as to avoid being a casualty of the tendency of any system to protect the status quo using mainstream models, methods and analyst's judgments creatively. Successful analysts show deep study across those realms of knowledge that can normally impact their topic of interest. Another differentiating characteristic is that "within the system" analysts are solidly grounded in the study of their relatively narrow form and its change patterns while "between the systems" analysts require understandings about and between multiple systems, their unique perspectives, goals and potentials. LSLIRE experts are merely a special segment within the broader category defined as comparative systems patternists. Because their interest is in LSLIRE recognition, their principal focus is more on change processes, on the profiling change of processes, and ultimately on recognizing syncretism (changing forms) within and among different systems. In a real sense, it is the study of the re-patterning of patterns. Perhaps one might describe it as comparative syncretism. Models pre-choose variables of interest to someone, as do other analytic constructions wherein the builder of it preselects fit elements for the futures assessment. These typically fail when needed most—when something is actually changing. Philosophically, cognitively and operationally, this choice to focus upon patterns first, and facts only within their context, is critical.

To integrate a vast amalgam of constantly changing, perpetually overlapping data is to see the data as elements of a single pattern. For one to effectively see the pattern's implications in terms of past and future possibilities is to see them pragmatically. One must grow antennae. Learn to recognize things and processes in environments other than one's own and among different interacting environments. If knowledge of the "board" (system) is critical to attaining expert judgment and foresight, then the characteristics and nature of each relevant "board" influences what understanding must be accumulated to gain expertness. This suggests that nobody is a good prophet everywhere, but only in familiar areas.

There are several techniques that one might apply to recognize LSLIREs when considering them at the earlier, "normal" crisis pattern state.

Approach #1: Use Multiple Methods Arrayed Around the Assessment Target

All methods bear weaknesses, biases and errors, but different methods bear different weaknesses, biases and errors. Used as arrays, or as accumulations of many different qualitative and quantitative methods, the multiple of these different methods "patterns" a system

> "PART OF SURVIVAL IS SITUATIONAL AWARENESS ... FORESEEING WHAT MIGHT HAPPEN EVEN IF IT DOES NOT."

quite well during normal times, but more importantly, each fails differently during emerging abnormal times. This dynamic array of method failures can be used to 1) recognize impending system instability and 2) triangulate, using iterative polling of the many different methods' outputs, on underlying, even causal, issues.

Approach #2: Triangulation and Patterning Emerging Change

1. Provide simultaneous empirical data from many methods, both qualitative and quantitative, that something out of the ordinary is happening at systemic levels
2. Iterative polling of many arrayed methods over time and iterative triangulation of their deviations from former readings of system stabilities can highlight general emerging system

Triangulation of multiple method outputs that suddenly deviates provides one kind of warning of incipient large-scale pattern change path dynamics, both as to type and direction.

Approach #3: Folding In and Laying the Onion

The visual is "layering the onion," with new data, patterns and context understanding constantly folded in to the pre-existing. Iterated, this produces a second kind of holistic calculus of error reduction. It yields improvements in understanding how that system is arranged, its bias systems, how it normally works, and its change process flows, as seen by folding in, layering up, and ever reintegrating the onion. A second benefit is that the more deeply, broadly and consistently over time one folds in patterns to layer the onion, the more obvious becomes any individual pattern that does not fit. It may not fit because it is wrong, your understanding is wrong, or it may be a precursor of coming system change. Avoid pre-determining.

Approach #4: Consider a Preference for Qualitative Insights to See Change Gaps

Identify shifts in societal dynamics. One historic example of this qualitative and "idea" shift: In years just prior to the outbreak of the Civil War, de Tocqueville noted a higher willingness of Americans to escalate to the use of weapons against each other in domestic disputes.

Approach #5: Focus on Seeing Undergirding Socio-Psychological and Style Changes

People and societies usually respond to momentary, typical, and even longer-term change pressures via their normal biases and ways. When, why and how such normally stable qualitative psychological patterns begin to change is more illuminating, pre-crisis, than are metrics or variables changing.

Approach #6: Use an Understanding of How Things and Processes Are Embedded

Learn the embedded architectures and ways of systems or topics of interest, and how that limits or favors options and possibilities.

Approach #7: Learn to Understand How Things and Processes Are Entangled

Entanglement refers to a case where two different things, having once been one, carry prior characteristics forward in themselves, such that, though now separate, they still behave relatively similarly. A classic example is former British Commonwealth colonies that became countries, compared to non-British Commonwealth countries. It is not an accident that the United States, Canada, Australia, New Zealand and Great Britain are still similar. Learn the entanglement features of the systems, or topics of interest. From what did they derive, and how does this shape them going forward?

As with the folding in, integration, and iterative synthetic rethinking of holistic assessment in normal-time futures forecasting, the more industry mainstream analyst dissonances and model disturbances one notices, the more consideration of emerging system path deviation.

Using knowable certainty of error creatively, we have an LSLIRE timing tool. More to the point, with recognition, even if nobody knows of what is coming, we can reduce what otherwise might have been considered a black swan a theoretically, practically, knowable, and now researchable LSLIRE status. Part of survival is situational awareness, which includes, at a sane, reasonable level, foreseeing what might happen even if it does not.

CONTINUED ON **PAGE 28**

An intelligence system based on making sense of information (facts, data) gets more confused as systems get relatively more complex. Intelligence based upon learning systems' ways, patterns, change processes, legacies, and their embedded to emergent and entangled to emergent change dynamics gets less confused as systems get relatively more complex. This is why serial stock market experts are patternists: it is easier. Information-based intelligence is often different and more confusing than pattern-based, change profiling-based holistic intelligence. Knowing the interaction of ideas (logics), goals, capacities, ways, and their resilience profile yields system-specific insight about how and why certain outcomes are more likely than others, and permits seeing, via pattern shifts, how a system is changing, but NOT WHEN.

More complex systems are harder to understand than simpler ones because there is more information within the former (more facts) to be known. Seen from a patternist and holistic change process perspective, more complex systems are easier to change profile and understand as to changing "big picture" than simpler ones because they have more interlocking parts and processes, hence more recursive features, and that makes them harder to change. Because more complex systems' legacies are harder to change, and are more incremental whenever they do shift, including in an LSLIRE aftermath, patterns are easier to predict at a system response level.

An intelligence system based on making sense of information (facts, data) gets more confused as systems get relatively more complex. Intelligence based upon learning systems' ways, patterns, change processes, legacies, and their embedded to emergent and entangled to emergent change dynamics gets less confused as systems get relatively more complex. This is why serial stock market experts are patternists: it is easier. Taleb's Extremistan is a more common feature of relatively more simple systems' change. This is how and why Taleb misjudges Extremistan as a relevant condition of complex, well-embedded, human-involved, societal systems.

Recognizing an arising LSLIRE-scale syndrome shift involves knowing a system's normal sub-system harmonies and disharmonies and then noticing the quality of the pattern shift. The subsystem change can presage the syndrome (system) shift. As a visual, a known healthy person normally behaves as one syndrome (as this healthy person), but with just one sub-system beginning to shift (an oncoming illness, say), the behavior of the whole system will shift and we can foresee, through learning and experience, a new future syndrome of it even though this system (person) has no prior experience of it. A syndrome shift's recognition can be obvious before the exact cause is known, but once it is known, the emerging syndrome shift can also be change profiled several iterations out based on pattern recognition, analogy, and experience and intuition. As a matter of such syndrome futures, it matters whether the diagnosis is one cancer, liver failure, heart disease, or any another, but all instances have understandable subsequent change profile paths broadly knowable through contextually shaped analogy.

The best cognitive grounding for LSLIRE recognition and for seeing downstream implications is social psychology, comparative philosophy and history, NOT economics. Technology and modeling are invaluable complements to building the best theory and practice of LSLIRE recognition and assessment, and to the management of downstream implications. Machines are a valued complement to a more-than-adequate complex human nature, rather than a replacement for it, and learning, experience, intuition and judgment matter. ■