11-20:text 9/2/09 11:11 AM Page 501

Presidential address: Swimming with the black swan

by J.C. Ngoma*

Synopsis

The idea of the 'Black Swan' comes from the fact that prior to the discovery of Australia, it was assumed by the medieval Europeans that are all swans were white, because no European at the time had ever seen a black swan, even though these did exist. The sight of one black swan in Australia by the European explorers invalidated millennia of belief that all swans were white.

However, in the context of Nassim Nicholas Taleb, a brilliant author of the book by the same name, a Black Swan is a metaphor referring to any event that is rare, has an extreme impact, and is explainable and predictable, but only in hindsight. Taleb points out to us how we confidently predict the future based upon our past experiences when in reality we have no real idea what the future will bring. While we know that Black Swans are hugely disruptive and can radically alter the course of our future, we still allow them to enter our waters and disrupt our cosy plans with unexpected and devastating impact. Even though we can see how these black fowls have affected us and the majority of those living in our surroundings, whether positively or negatively, we continue to be blinded to their existence.

Black Swans occur when there is a disjoint between what we know and what we think we know. This disjoint is fuelled by facets of our human psychology that make us overconfident in our pronouncement about the future.

Despite the fact that we cannot forecast the future accurately in a world of Black Swans, this paper tries to point the reader to the fact that if we endeavour to keep our minds and eyes wide open, we should be able to identify the generators of Black Swans, and learn to mitigate their impact. We should be able to swim with the Black Swan.

Introduction

'When anyone asks me how I can best describe my experience in nearly forty years at sea, I merely say, uneventful. Of course there have been winter gales, and storms and fog and the like. But in all my experience, I have never been in any accident... of any sort worth speaking about. I have seen but one vessel in distress in all my years at sea. I never saw a wreck and never have been wrecked nor was I ever in any predicament that threatened to end in disaster of any sort'.

E.J. Smith, 1907, Captain, *RMS Titanic*

The Royal Mail Ship (RMS) *Titanic* was an Olympic-class passenger liner owned by the British shipping company White Star Line and built at the Harland and Wolff shipyard in Belfast, United Kingdom. For her time, she was the largest passenger steamship in the world.

On 10 April 1912, the *Titanic* left Southampton, England on her maiden voyage to New York City. The *Titanic* used some of the most advanced technology available at the time. She was touted as the safest ship ever built, so safe that she carried only 20 lifeboats—enough to provide accommodation for only half her 2 200 passengers and crew. This discrepancy rested on the belief that since the ship's construction made her 'unsinkable,' her lifeboats were necessary only to rescue survivors of other sinking ships. Furthermore, lifeboats took up valuable deck space.

The *Titanic* was equipped with Marconi's new wireless telegraph system and the two Marconi operators kept the wireless room running 24 hours a day. On Sunday, 14 April, the fifth day at sea, *Titanic* received five different ice-warnings, but Captain Edward Smith was not overly concerned. The ship steamed ahead at 22 knots (about 40 km/h), and the White Star Line's Managing Director J. Bruce Ismay hoped to arrive in New York a day ahead of schedule.

On the night of 14 April 1912, wireless operator Jack Phillips was busy sending passenger's messages to Cape Race, Newfoundland, from where they could be relayed inland to friends and relatives. He received a sixth ice-warning that night, but did not realize how close the *Titanic* was to the position of the warning, and put that message under a paperweight at his elbow. It never reached Captain Smith or the officer on the bridge.

* *Tranter Holdings (Pty) Ltd*

© *The Southern African Institute of Mining and Metallurgy, 2005. SA ISSN 0038–223X/3.00 + 0.00. Address presented at the Annual General Meeting on 13 August 2009.*

11-20:text 9/1/09 12:17 PM Page 502

Swimming with the black swan

By all accounts, the night was said to be uncommonly clear and dark, moonless but faintly glowing with a sky full of stars. The stars were so bright that one officer mistook the planet Jupiter, then rising just above the horizon, for a steamship light. The sea was unusually calm and flat. The lack of waves made it even more difficult to spot icebergs, since there was no telltale white water breaking at the edges of the icebergs.

Then, at 23:40 hours lookout Fred Fleet spotted an iceberg dead ahead. He notified the bridge, and First Officer William Murdoch ordered the ship turned hard to port. He signalled the engine room to reverse direction, full astern. The ship turned slightly, but it was too large, was moving too fast, and the iceberg was too close. Just seconds later, Captain Smith's ship sank, making it one of the greatest maritime disasters in history. Within hours, 1 502 lives were lost, with only 705 lives saved. It was a great shock to many that, despite the extensive safety features and experienced crew, the *Titanic* sank. This was a typical Black Swan.

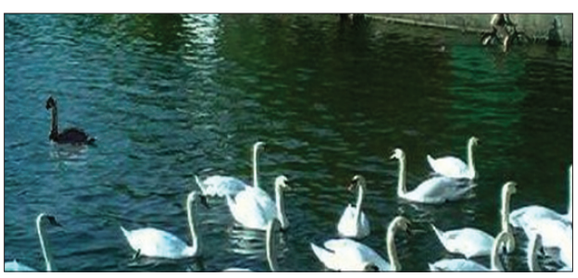
Statements like those of Captain Smith are so common, particularly in the financial sector. In September 2006, a US fund called Amaranth, ironically named after a flower that 'never dies', had to shut down after it lost close to US$7 billion in a few days, the most impressive loss in trading history. A few days prior to the event, the company is said to have made a statement to the effect that investors should not worry because the company had twelve risk managers. Remember that these are people who use models that use past data to produce risk measures on the odds of such events in the future. Even if they had one million risk managers, there would not have been any meaningful difference to their prediction; they still would have blown up.

The two above-mentioned stories illustrate a severe limitation to our learning from observation or experience and the fragility of our knowledge. We tend to believe that just because something has never happened before that it will not happen in future.

Concept of the Black Swan

Background

A black swan (*Cygnus atratus* or by its native name 'Mulgo'), is a bird of Australia, including Tasmania. The story is that before the discovery of Australia, medieval Europeans had only seen white swans, and so were convinced that all swans had to be white, an unassailable belief as it seemed completely confirmed by empirical evidence. The existence of a black swan was unimaginable. However, the first sight of this black bird by European explorers in the 17th century, invalidated millennia of belief that all swans were white.



Definition

The idea of a Black Swan was initially put forward by the enlightened Scottish philosopher, David Hume, to represent the unexpected, the stuff you do not know or do not know that you do not know. Hume argued that no amount of observations of white swans can allow the inference that all swans are white, but the observation of a single black swan is sufficient to refute that conclusion.

The idea has, in recent times, been popularized by Nassim Nicolas Taleb ('Taleb'), a statistician, would be philosopher, former options trader, and author of the best-selling books *Fooled by Randomness* and *The Black Swan*, on which this paper is based. Taleb uses a black swan as a metaphor for totally unanticipated high-impact events. He suggests that with our one-track minded focus on the traditional perspective on development risk, we tend to ignore a category of risk whose consequences can be devastating. He calls this a 'Black Swan'. D.K. Matai, the founder of the Asymmetric Threats Contingency Alliance (ATCA), a philanthropic network of politicians, academics and business leaders, who concurs with Taleb, uses the term 'asymmetric risk' to convey the same idea as Black Swan—asymmetric because such risks fall outside the realms of normal bell-shaped distribution of events, which is the foundation of modern risk management. If positive, these events can be considered to be asymmetric opportunities. Taleb points out that when you look at threats and opportunities that individuals, organizations and societies encounter, from a historical perspective, those with the greatest consequences have mostly been total surprises.

So, for an event to be classified as a Black Swan, it has to meet three criteria:

- It must be an outlier, i.e. as it must lie outside the realm of our regular expectations, because nothing in the past can convincingly point to its possibility
- It must carry an extreme impact
- After the fact, our human nature enables us to accept it by concocting explanations that make it seem to have been expected.

A Black Swan can also be the reverse of this definition, i.e., the non-occurrence of an event that is highly expected and probable. The teenage girl that survived the recent plane crash on the coast of Madagascar is a Black Swan.

It must be noted from the abovementioned criteria that Black swans are random events. It is therefore fascinating that after they occur, many observers claim to be able to see that the occurrence was inevitable, for reasons for which they proceed to define. However, these post-event explanations are essentially false and unreliable. They are highly influenced by hindsight bias, which makes use of posterior information.

Why are Black Swans important?

The idea of a Black Swan is based on the structure of randomness in empirical reality. A small number of Black Swans explain almost everything in our world, from the success of ideas and religions, to the dynamics of world events such as world wars, the rise of global terrorism, to market crashes, to all important discoveries that have had a

11-20:text 9/1/09 12:17 PM Page 503

huge impact on our lives, be it positively or negatively, and to all elements of events that affect our daily lives.

The Black Swan logic makes what you do not know far more relevant than what you know. Since our world is dominated by the extreme, the unknown, and the very improbable, instead of focusing on the known, and the repeated, we need to use the extreme event as a starting point and not treat it as an exception to be pushed under the rug. Since Black Swans are unpredictable, instead of naively trying to predict them, we need to adjust to their existence.

The two provinces: extremistan or mediocristan

In trying to get us to understand the concept of the Black Swan better, Taleb introduces two neologisms: the two provinces of 'extremistan' and 'mediocristan', in which two types of randomness reside. The ideas behind mediocristan and extremistan are worth exploring in more depth.

Mediocristan

Mediocristan is not necessarily a land so much governed by mediocrity, but rather a terrain of the ordinary, the part of the world that conforms to the bell curve. It answers to statistics and knowable probabilities. In mediocristan, particular events do not contribute much individually—only collectively. A good example is if you were to collect a number of trees of various heights and plant them in your garden. Now, suppose you bring in the tallest tree that you can think of and plant it among the existing trees; it would not contribute much to the average height of the entire tree population. The supreme law of mediocristan can therefore be stated as follows: 'When your sample is large, no single instance will significantly change the aggregate or the total'. The largest observation will remain impressive, but eventually insignificant to the sum.

Extremistan

This is a world where the occurrence of events is asymmetric in nature. A good example is if you were to bring a number of people in one room and check their net worth. Add to the population the wealthiest person, whose net worth could be in the region of, say, R10 billion. How much of the net worth would he represent, 80%, 90%? The rest of the population would represent only a small fraction of his net worth. The supreme law of extremistan can therefore be stated that: 'In extremistan, inequalities are such that one single observation can disproportionately affect the aggregate or the total.' In other words, one unit can easily affect the total in a disproportionate way.

In extremistan, past events are faulty guides to projecting the future. Bill Gates may be the world's richest person, but it is not unthinkable that someday, someone will be twice as rich. In extremistan there is little room for the bell curve or Monte Carlo simulation, used by risk managers of banking institutions, since events are far from the centre. It is not that Monte Carlo is of no value... on the contrary, it is very useful, but only if used in mediocristan. It is, however, not good at capturing the risk of the highly improbable, found in extremistan. Though the Monte Carlo simulation tools typically run a portfolio through hundreds or thousands of potential market scenarios, they often assign minuscule odds to extreme market events. For instance, these models were supposed to help quantify and manage the risks of the recent mortgage-backed securities, credit-default swaps and other complex instruments, but given the events of the past couple of years, it appears that the models often gave big institutions, as well as small investors, a false sense of security.

It is possible to live in both worlds at the same time. There are parts of our lives which inhabit mediocristan and parts which dwell in extremistan. Not knowing the difference can be problematic, if not fatal. And often, it is difficult to know where one world starts and the other ends.

Species of Black Swans

There are two species of Black Swans. There are those that are truly black, those that represent that which you do not know that you do not know, such as the sinking of the RM*S Titanic*, or a plane falling from the sky. And then there are those that are not truly Black Swans, at least by those that caused them. I get tempted to put the Asian financial crisis that occurred in the late 1990s into the category of a Black Swan, though financial. In reality almost all financial crises are human made, and usually start as Grey Swans, and then turn into Black Swans as they spread across wider geographical areas.

The Asian financial crisis

The Asian financial crisis of the late 1990s, which hit many of Asia's miracle economies, was sudden, triggered by an unexpected currency crisis in Thailand. The Asian financial crisis was particularly shocking because it happened at a time when most nations in this region were doing well. Growth rates were high, inflation was low, and government deficits were minimal. Just prior to the crisis, at the peak of euphoria around the early 1990s, many in the region were talking about the arrival of the Pacific Century. Though some signals were ominous, including bubbles in real estate markets and rising trade deficits, these signs were generally dismissed as either unimportant or manageable. All nations have ups and downs, and these miracle economies were apparently invincible, judging from their amazing past performance.

Not many could have predicted that a currency crisis could trigger a regional financial crisis, which then escalated into both an economic crisis and a political crisis. One explanation of the Asian crisis is that it was fundamentally demand driven, based on a bubble of optimistic projections. Rapid growth led to capital inflows from foreign investors who wished to profit from future growth, increased borrowing by domestic firms who believed their investments would continue to be profitable, and rising imports for domestic consumers who believed their rapid income growth would continue indefinitely. People were basing the future success of these economies on past performance. They were blind to the possibility of a Black Swan.

The mere slowing of this growth in 1996 led to the sudden slowing of capital inflows in countries where central banks tried to maintain one-sided pegged exchange rates against their major trading partners. As a result, surpluses in the balance of payments suddenly turned to deficits, and though central banks tried to create the illusion of stability,

11-20:text 9/1/09 12:17 PM Page 504

speculators quickly figured out that they were running out of foreign currency reserves, and capitalized on it, forcing catastrophic devaluations that burst the bubble. And like all pyramid schemes, the economy ultimately collapsed, taking many naïve foreign investors with it.

The US financial crisis

On the other hand, the current financial crisis, which started in the US, and has resulted in one of the worst recessions of our time, was not as sudden as the Asian financial crisis. This was more grey than black. The US financial crisis (or global crisis because of the way it has affected the rest of the world economies), was created out of pure stupidity and greed. Though there are other factors to the crisis, the trigger was the sub-prime borrowing. Sub-prime borrowers are, by definition, an appalling credit risk, as they have no source of regular sustainable income. Yet it was on this fragile base that a most elaborate financial superstructure was shabbily erected.

How did the crisis start? Exploiting a perceived gap in the market, a significant number of US banks moved away from the traditional plain vanilla, prime mortgages with their low returns and turned to this new, multi-flavoured lending model. This model led to a new relationship between borrower and lender: the mortgage broker introduced buyers to the bank, which granted a loan, and the buyer then made monthly payments.

Unbeknown to the home buyers and investors on the stock market, however, was that the mortgage loans were being parcelled up by the banks into neat packages and sold on to investors. Loans made against that historically solid security foundation had been turned into readily traded assets, which remarkably offered high returns in an era of low interest rates. Endorsing these loans were the credit rating agencies, firms with solid respected names like Standard and Poor's and Moody's, which lent their stamp of approval to packages and structured mortgage debt. Once the credit agencies approved these sub-prime 'assets', the alchemy was complete. Now, sub-prime mortgages had been disguised as first-class assets and, best of all, yielded far better returns than better quality debt. After all, it was the banks that paid the rating agencies, not the consumers and investors they were meant to protect.

The banks sold on the packaged mortgages to clients in the bond markets or created special units known as structured investment vehicles (SIVs), conduits or special purpose vehicles (SPVs) in which investors could park their money. SIVs were a useful device. Since they could be kept off the balance sheet, SIVs did not have to appear in the annual accounts and were notionally self-funding; they did not count against a bank's capital requirements for prudential purposes. Financial institutions could therefore expand their lending without putting undue strain on their capital, and in many cases, the shareholders, the ultimate owners of the banks, were ignorant of their existence. In summer of 2007 Halifax Bank of Scotland (HBOS), Britain's biggest mortgage lender, disclosed for the first time that it was stepping in to take Grampian, a conduit with £18 billion of commercial paper on its books, back on its balance sheet after it had encountered funding difficulties. As it had a strong balance sheet, HBOS was able to handle the transaction and restore confidence in Grampian. However, this started to create mistrust from investors as well as among banks. How could a financial institution that sells itself as a different kind of bank, focusing on the needs of the consumer, blunder into the sophisticated area of finance without feeling the need to fully disclose either its decision or the amounts of cash tied up in the enterprise to its shareholders?

The whole sub-prime and securities process was now likened to meat processing. It was like a butcher getting the low-priced, sub-prime cuts that could not be sold over the counter, mixing them up with other cuts, and putting them through the grinder to be made into sausages. These could then be sold to the unsuspecting customers, who would be unaware of, or unconcerned about, their content. In the same way, the sub-prime securities ended up as assets in the balance sheets of banks, in portfolios of investments held by insurance companies and pension funds, in money market funds, and in mutual funds and unit trusts on both sides of the Atlantic, where unsuspecting investors lapped them up as good legitimate assets. And so the argument went that with these bits of meat spread around in lots of sausages, if there was a problem with some of them, no single consumer would be seriously ill, even though a large number would have a stomach upset. At the heart of this mortgage boom there was, of course, a central paradox: how was it possible to make money by lending large sums to people who had not a hope in hell of paying it back? When greed is at play, very few are interested in asking these questions, and that is when the Black Swan strikes. So complex was the system that no one quite knows where all this structured debt has ended up.

What has been experienced in the current global credit crisis is not the first and neither will it be the last. In the summer of 1982, large American banks lost close to all their earnings (cumulatively), about everything they ever made in the history of American banking—everything. They had been lending to South and Central American countries that all defaulted at the same time—a Black Swan. All that while, the bankers led everyone, especially themselves, into believing that they were 'conservative'. Bankers are not conservative, just phenomenally skilled at self-deception by burying the possibility of a large, devastating loss under the rug. In fact the travesty repeated itself a decade later, with the 'risk-conscious' large banks once again under financial strain, many of them near bankrupt, after the real estate collapse of the early 1990s in the US, in which the now defunct savings and loan industry required a taxpayer funded bailout of more than half a trillion US dollars. As always, the Federal Reserve Bank protected them at the expense of the tax payer. The irony is that when the 'conservative' bankers make profits, they get the benefits in the form of huge bonus payouts, but when they make huge losses, investors are never compensated.

It should therefore be noted that in business, the main tragedy of the high-impact, low-probability event comes from the mismatch between the time taken to compensate someone and the time it takes to realize whether or not that someone has been making a bet against the rare event. People continue to bet against rare events (especially with other people's money) because they have an incentive to do so: they are paid huge bonuses reflecting their annual

11-20:text 9/1/09 12:17 PM Page 505

performance even when in fact all they are doing is producing illusionary profits that may be uncovered only later one day. And since in business the quality of returns is not observable from past data, owners of businesses, i.e., shareholders, can be taken for a ride by the managers who show returns and cosmetic profitability, but in fact might be taking hidden risks. Board members of businesses need to ensure they understand all the risks, and should look to what extent there is a heightened risk of manipulation in the reported financial results and how these are being mitigated.

Factors that arise from blindness to Black Swans

The idea of a Black Swan is simple... 'Keep your eyes wide open'. With an impressive understanding of the human social condition and our psychological tendencies, we fail to anticipate, react to, and make sense of the random events that have the greatest impact on our lives. Taleb points to five main factors that arise from our blindness to the Black Swan.

Error of confirmation

In psychology and cognitive science, error of confirmation or confirmation bias is a tendency to search for or interpret new information in a way that confirms one's preconceptions and to irrationally avoid information and interpretations which contradict prior beliefs. Confirmation bias is a type of cognitive bias and represents an error of inductive inference. The paradigm case here is that of the partisan in an argument who looks for facts that confirm his theory, but ignores or hides everything that may weaken it. This can be witnessed in a number of areas in our daily walks of life.

Politicians are good at using the confirmation bias. In political campaigns candidates do their best to point to facts that suggest they are the right people for the position they are running for, but they do everything they can to hide or obscure those parts of their record that suggest otherwise.

Oftentimes we become inebriated with hope, that outcomes should always go our way. To convince ourselves, and those around us, that such is the case, we develop narratives from cherry-picked data and information that confirm our bias. Unfortunately, when you develop your opinions on the basis of weak evidence, you will have difficulty in interpreting subsequent information that contradicts these opinions, even if this new information is obviously more accurate. Two mechanisms are at play here, confirmation bias and belief perseverance, i.e. the tendency not to reverse opinions you already have. These mechanisms make us fail to learn, if we are still alive, to face the next Black Swan.

The narrative fallacy

Narrative fallacy addresses our limited ability to look at sequences of facts without weaving an explanation into them, or equivalent, forcing a logical link, or arrow of relationship upon them. Why is that? Well, since our brains evolved a long time ago they cannot deal with a world with many variables, much less organized information, and a vastly smaller number of theories to explain them. Explanations bind facts together. Our inclination to narrate has to do with the order in which we store and retrieve information. Adding casual links to occurrences make facts easily remembered.

Consider the following sentence: 'The wife was killed and the man also died.' Compare this to: 'The man fatally shot his wife and then turned the gun on himself and died'. Although in the second instance another sentence was added, the dimension of the total is reduced. The second sentence is, in a way, much lighter to carry and easier to remember. We now have a single piece of information in place of two. As we can remember the second sentence with less effort, we can also sell it to others, i.e. market it better as a packaged idea. This, in a nutshell, is the definition and function of a narrative.

We tend to narrate in order to reduce the dimension of what we are looking at so that it can be stored in an orderly fashion in our brains. More like causality, narrativity has a chronological dimension and leads to the perception of the flow of time. Causality makes time flow in a single direction, and so does narrativity.

However, memory and the arrow of time can be mixed up. Narrativity can viciously affect the remembrance of past events. We tend to more easily remember those facts from our past that fit a narrative, while we tend to neglect others that do not appear to play a causal role in that narrative. This simple inability to remember, not the true sequence of events but the reconstructed ones, will make history appear in hindsight to be far more explainable than it actually was. Memory is more of a self-serving dynamic revision machine; you remember the last time you remembered the event and, without realizing it, change the story at every subsequent remembrance.

We pull memories along causative lines, revising them involuntarily and unconsciously. We continuously narrate past events in the light of what appears to make what we think of a logical sense after these events occur. A memory will correspond to the strengthening of connections from an increase of brain activity in a given sector of the brain by a process called reverberation—the more activity the stronger the memory. While we believe that the memory is fixed, constant, and connected, all this is very far from the truth. What makes sense according to information obtained subsequently will be remembered more vividly. We sometimes invent some of our memories—a sore point in courts of law since it has been shown that a lot of people have invented child abuse stories by means of listening to theories.

Even judges can be fooled by narrative fallacy. Take the 2006 Schabir Shaik appeal case. Note how a full bench of Supreme Court judges was fooled by the narrative created by the media. Suddenly, a phrase that was concocted by the media and attributed to retired Judge Hilary Squires, with time became reality, even in the eyes of the 'wise men' of the land. The Supreme Court judges, in their judgment of Shaik's appeal case, where they upheld his corruption and fraud conviction, attributed the phrase 'generally corrupt relationship' to retired Judge Hilary Squires. It later transpired, to the embarrassment of the Supreme Court judges, that the phrase was never used by the retired judge.

What happened here? Why could a full bench of court judges not have picked up this error when reading Judge Squires judgment? That is how narrative fallacy can fool people, even the learned.

The same is said about the assertion that the *RMS Titanic*

11-20:text 9/1/09 12:17 PM Page 506

was said to be unsinkable. Contrary to popular mythology, the *Titanic* was never described as 'unsinkable', without qualification, until after she sank. The first unqualified assertion of the *Titanic's* unsinkability appeared the day after the tragedy (on 16 April 1912) in *The New York Times,* which quoted Philip A. S. Franklin, vice president of the White Star Line as saying, when informed of the tragedy, 'I thought her unsinkable, and I based my opinion on the best expert advice available. I do not understand it.'

This comment was seized upon by the press and the idea that the White Star Line had previously declared the *Titanic* to be unsinkable (without qualification) gained immediate and widespread currency.

Narrative fallacy is a natural human weakness because by default, our minds seek to form theories, jump into conclusion, seek judgements and explain what we see. It takes a conscious act and will to do otherwise.

It is this same natural human weakness that accentuates the confusion in the marketplace, particularly in a time of market volatility. If you follow the financial media very closely, you will find plenty of narratives to 'explain' what is happening in the market movements. In fact, some of these narratives are contradictory, depending on who you are listening to.

The lesson here is that we should always read the financial media, in particular, and the media in general, with a pinch of salt. One, though, cannot blame the media for misleading the public. Humans like to listen to explanations for any occurrence, and the news media are in the business of selling the narratives to satisfy this thirst.

We need to try very hard to rethink the tendency of our storytelling brains to over value presumptions about cause and effect, to misjudge our capacity to predict the future based on the past. The narrative fallacy is about how, in this so unpredictable world, we fool ourselves with stories that cater to our Platonic thirst for distinct patterns. In the process, we find that the same condition that makes us simplify also pushes us to think that the world is less random than it actually is. And the Black Swan is what we leave out of this simplification.

Human nature is not programmed for Black Swans

We, humans, tend to focus on orderly and well-defined concepts, objects and social notions because we do not like to think in a messy way. Taleb is repeatedly insistent that our brain is 'the wrong user's manual' for the complex unpredictability of the world we are now living in; our inferential machinery is not made for a complicated environment; our statistical intuitions have not evolved for our current habitat; we are not well adapted to the present, post-alphabet, intensely informational, and statistically complex environment. We like comfort zones. We like bell-curve distributions, which assume independence among components of a system, because they are predictable. This results in us mistakenly thinking we understand more than we do. However, the world around us is not orderly. Black Swans do not respond to normal bell-curve distributions but to power-law distributions, which are unpredictable, so we hate them.

As humans, we behave as if we live in a random world where Black Swans do not exist. Indeed, our environment, now more than ever, is a bit more complex than we seem to realize. The modern world, being extremistan, is dominated by rare—very rare—events. D.K. Matai, partly blames globalization for the increase in rare events in the world today. 'The global economy is like a spider-web, with everything interwoven,' he adds. 'During periods of calm, this gives an appearance of greater stability, which only serves to lull us into a false sense of security, thereby increasing the potential for devastating black swan events—exemplified by the speed with which the US sub-prime lending crunch has become a global financial crisis,' he concludes.

What does this mean for wealth management? Well, in a world bombarded with Black Swans or asymmetric risks, preserving capital is no longer straightforward because accepted models (spreading bets, building efficient portfolios, etc.) cease to work. Expert advice, particularly if you are in a pensionable age group, is to put 90% of your assets into the most secure investments, such as government bonds, and invest the remainder in a wide array of high-risk ventures that provide exposure to the sort of positive Black Swans that can generate extreme returns, if all goes well.

However, human nature being what it is, instead of exposing ourselves to a low level of risk, we prefer to invest all our life savings into high risk, high return ventures. Furthermore, because human nature is not programmed for Black Swans, we tend to fall prey to scammers in our quest for these extreme returns, even where we suspect some things may not seem right. At the time of writing this paper, there were reports in the media about how businessman, Barry Tannenbaum, might have fleeced investors of as much as R10 billion. The scheme is said to have promised wild returns of up to 90% per year. No bank rate in the world could beat such a return on investment.

According to the report, the scheme was based on an apparent import and sale of ingredients for anti-AIDS drugs to companies, including respectable pharmaceutical companies such as Aspen Pharmacare and Adcock Ingram. What made the story the more credible was that Barry's father, Harold, was the founder of Adcock.

The alleged fraudulent scheme saw many victims that included a number of international investors, who are said to have put a significant amount of money in the scheme, which would translate into millions of rands. Within South Africa, there were a few high profile victims of the scheme that included former CEO of a chain store, a former JSE chairman, and a former Bond Exchange of South Africa CEO. These are people who should have known better that such a scheme sounded too good to be true. I suppose the lesson here is that if something seems too good to be true, then it is too good to be true; don't touch it.

This happened after a similar scheme, run by another Ponzi swindler, Bernard Madoff, in the United States, made several headlines. In the style of Madoff, Tannenbaum's scheme took money from investors to pay long-standing clients. It collapsed in May 2009, when it ran out of new investors. And those that were last to enter the scheme became victims. The tragedy of human nature is that one can witness events like this, and even criticize those that have fallen victim to such events, and yet fail to avoid similar pitfalls in future.

11-20:text 9/1/09 12:17 PM Page 507

The distortion of silent evidence

This error is similar to, but different from the confirmation bias, because in this error one looks for historical evidence that selects 'the rosier part of the process' while ignoring the parts of the process that do not fit our preconceptions, or creating a historical record that exclude our awareness of evidence that does not fit our mental models. This phenomenon is described as 'silent evidence'.

Taleb introduces the concept of silent evidence with a story from Cicero. In the story, Diagoras, a nonbeliever in the gods, was shown painted tablets bearing the portraits of some worshippers who prayed, then survived a subsequent shipwreck. The implication was that praying protects you from drowning. Diagoras asked, 'Where are the pictures of those who prayed, then drowned?'

Those 'drowned believers' are silent evidence. You do not take them into account because they cannot speak up for themselves. The drowned worshippers constitute a phenomenon known as 'survivor bias'. We human beings are fallible creatures, and we have a habit of seeing only the survivors of a set of experiences. The cliché is that, 'history is written by the winners.' In fact, it is written by whoever happens to survive.

In order to illustrate errors of survivor bias, Taleb exposes us to an imaginery experiment with rats. Suppose that we have access to a city full of rats of all kinds. In order to determine which of these rats are the strongest, we select a random sample, one that is truly representative of the rat population as a whole. We then put the sample group into a large vat and subject the rats to increasingly high levels of radiation.

As the levels of radiation increase, many of the rats will die. By the end of the experiment (unless you take the experiment too far and kill them all) you will be left with a small number of survivors.

This hypothetical experiment, and its results, can be used to demonstrate a number of errors in the thinking.

Flaws in the methodology

First we need to think about the procedure of the experiment itself. The intention is to select the 'strongest' rats. However, while the experiment will certainly reduce the number of rats, there is no guarantee that the survivor rats will be the strongest.

The survivor rats would only be the 'strongest' in the limited sense that they were the ones best able to withstand increasing doses of radiation. They might not be the strongest in terms of ability to survive without water, or ability to climb fences. The ability to withstand radiation might or might not be a useful characteristic to survive in the real world.

Secondly, at least some of the survivor rats may have survived by pure chance. At the time the next blast of radiation was administered, a 'weak' rat may have been shielded from radiation by a 'strong' rat. Furthermore, there might be some variations in the way the radiation was distributed around the vat: in some spots (perhaps towards the rim) the rats might have absorbed less radiation that those sitting in other spots

Silent evidence involves mistaking what you see for what is really there. The tendency is for human beings to see only the survivors of some set of circumstances, and ignore those who, for one reason or another, disappeared or dropped out as events proceeded. We often find ourselves earnestly discussing the traits in a cohort of survivors when, in truth, those traits are no different from those in a much larger population. If you consider the circumstances carefully it may be apparent that the survivors emerged as a result of sheer randomness, rather than through the possession of some special qualities.

We tend to view people that seem to be very successful in their field as being uniquely talented, and to attribute their success to that talent. However, we have no access to the works of the hundreds of thousands or millions of those that are not so successful since their record does not enter our analyses. So evidence of their talent, or lack of talent is silent, and we cannot evaluate whether talent explains success or not, and should not therefore infer that 'talent' is the explanation for success based only on our observation that successful people are talented. This does not mean that hard work is not important; you need to work hard and prepare adequately for opportunities. You cannot expect to win a lottery if you do not buy a ticket. However, any chance of you winning will depend purely on randomness; it will depend on luck.

So, to understand successes, the study of traits in failure needs to be present. For instance, some traits that seem to explain millionaires, such as appetite for risk, appear only because one does not study bankruptcies. If one includes bankrupt people in the sample, then risk-taking would not appear to be a valid factor explaining success. If you were to look at the 'graveyard' of failed people, you would find it full of people who share similar traits to those of millionaires, such as courage, risk taking, optimism, etc. There may be some differences in skills, but what truly separates the people in the two groups is, for the most part, a single factor: luck, pure luck.

It is said that the first Harry Potter book was rejected by every major publisher in London (some sources say as many as 20; and when it was eventually bought by Bloomsbury, the one publisher who showed the smallest degree of interest, they paid only a small sum of money for it—sources say between £2 000 and £3 000. Clearly, none of the 'experts' who read the book in manuscript, and rejected it, had the slightest inkling of the massive money-making machine that they held in their hands.

The Harry Potter case is an all-too-typical example of the failure to identify a Black Swan at an early stage. And yet it is highly desirable to identify them, if possible, because of the beneficial outcome you may derive from them.

Getting back to rats in the experiment, a pertinent point to note is that the survivors, the chosen few, will themselves tend to conclude, falsely, that they are necessarily superior to those who perished. Usually, the nature of rats being what it is, they will conclude that they are infinitely superior to those that perished, when in fact it was by pure luck that they survived. Some human beings share this characteristic. They fail to appreciate the asymmetry of circumstances that led them to be where they are in life. Funny enough, people tend to attribute their successes to their skills, and only their failures to external events outside their control, namely to randomness.

11-20:text 9/1/09 12:17 PM Page 508

The other aspect that creeps in when people become successful is what is called epistemic arrogance. This comes about with the difference between what someone thinks they know and what they actually know. If what they think they know exceeds what they actually know, that is 'epistemic arrogance'. However, if what they actually know exceeds what they think they know, that is 'humility.' In life it is best to teach and encourage a culture of humility so that people will test their knowledge most rigorously to ensure that what they are relying on has survived testing and proved strong.

Silent evidence is what events use to conceal their own randomness, particularly the Black Swan type of randomness. However, once we immerse ourselves into the notion of silent evidence, so many things around us that were previously hidden will start to manifest themselves.

Human tend to 'tunnel'

There are a wide range of explanations as to why well-intentioned, competent professionals seemingly ignore significant risks when making plans or critical decisions. Among these is the concept of tunnelling: the neglect of sources of uncertainty outside the plan itself.

Tunnelling is what happens when people become stuck in particular ways of seeing and doing things, and the filters through which they view the world block out anything that does not support their view. Since our ideas are sticky, once we produce a theory, we are unlikely to change our minds. Once our mind is inhabited with a certain view of the world, we tend to consider only instances proving us to be right.

Tunnelling is, therefore, evident when data that support our proposition are embraced and utilized to further increase that support, while data that challenge it are ignored, dismissed, or severely discounted. As our investment of time, effort and money in developing and supporting our proposition increases, we tend to tunnel deeper. We are likely to become more anchored to our solution and, of course, reduce our ability to see outside the boundaries of our assumptions.

Tunnelling is what allowed the banking world to pursue unethical practices in the name of profiteering—to the detriment of their own survival (and that of others) and reputation—prompting the current slide into a global recession.

The Harvard research and other work emerging on filters demand that we find new tools that break this trend and allow for a clearer and wider perspective that embraces difference and change, and helps business practitioners to become 'unstuck' from old ways of seeing and doing things.

Tunnelling manifests itself in various facets of our lives. Even project managers have discovered aspects in project management practices that contribute to tunnelling. Stage gates, with all their usefulness in project management, have been found to promote tunnel vision.

Here is an example of how tunnelling can play out on a major project:

- Very early (and usually optimistic) expectations of project cost and time to production are established. Although at this early stage there is little information on which to base these numbers, they effectively define a base case which anchors all the work that follows. In many cases, critical commercial commitments are made based on this base case, and expectations set for the investment community.
- As the work progresses, assumptions are made to support the base case. Of course, any deviations from the base case are apt to be met with great resistance, if not hostility.
- A design configuration that seems to support the base case is defined. In order to minimize the time to sanction and to start of production, little time is spent exploring alternatives or testing the hypotheses underlying the base case.
- The stage-gate process drives considerable effort to develop and define the base case. Recycle is discouraged in order to keep progressing toward sanction.
- Eventually, when the time for sanction arrives, the time and effort invested in the early stage of the project is considered a primary indicator of the predictability of the cost estimate and time to first production.

Since the first formal assessment of risk and uncertainty usually occurs at the end of the feasibility stage, as the work progresses, uncertainty and risk are assumed to decrease, which is not the case, resulting in 'tunnel vision'. Black swans, i.e. strategic risks outside the assumptions underlying the base case, are typically not addressed by stage-gate processes. Note that Black Swan risks are typically not correlated with time or progress; if anything, their severity may well increase over time. So the first thing we can do to improve predictability is to ensure that strategic risks are identified, assessed, and managed proactively.

The next shortcoming of conventional stage-gate that we must address is the blackout period. As mentioned earlier, most projects conduct their first meaningful assessment of risks around the end of the feasibility stage—and, in many cases, much later. However, major commercial commitments are often made long before that—during commercial development. The result is usually budget overruns, as experienced in the recent arms deal or the Gautrain project. Clearly if we are to run successful projects, it is important for all risks to be understood before expectations are set, and deals are struck.

To avoid tunnelling in every aspect of our lives, we need to be open minded by proactively identifying and assessing all possible ways that recognize all risks. The result of this process can also identify opportunities. Since, the effects of tunnelling find their way in various areas of our lives, the more we learn to move away from tunnel vision to a wide-angle vision, the better prepared we will be for the Black Swan.

Implications of the black swan

The idea of a Black Swan helps us realize that we are not good at anticipating what the future will feel like, even when we can predict what will occur based on similar experiences we have had in the past. This is called 'future blindness'. This can be illustrated with the experience of buying a new car and being very excited at the prospect, and the anticipated joy and happiness that will ensue from the new

11-20:text 9/1/09 12:17 PM Page 509

car experience. But we forget what our last new car experience was like, and, in particular, we forget that after a very short time, perhaps just a few weeks, we will get used to our car, take it for granted, and will not experience the initial uplift we felt when we first acquired it. The issue at hand here is that we are not good at predicting the future. And when we try to do so, we often predict the wrong future; miss the Black Swans of our time, and when we encounter them, we rationalize their existence to make it appear as though these events were predictable.

While some Black Swan events are largely positive, many more are negative. However, one thing is clear, these events can have enormous impact on us all. This is truer in business than in other aspects of our lives. As such we need to find a way of mitigating their occurrence. One of the ways is through strategic or scenario planning. Scenario planning (sometimes called 'scenario and contingency planning') is a structured way for organizations to think about the future. This is critically important for survival, particularly in uncertain environments we have seen recently.

In traditional models of scenario planning, the method often used to consider such uncertainty is to run 'best case' and 'worst case' scenarios. Unfortunately, this method assumes relatively equal probabilities of occurrence, whereas in an environment where Black Swans are becoming more prevalent, we need to also consider bigger external shocks when we plan. Take for instance what the Internet (a positive Black Swan) has done to the media and entertainment industry. Since people can read the news or download music for free off the Internet, there have been numerous accounts of the industry's impending demise. So, what is a positive Black Swan for some (Internet) has proven to be a negative Black Swan for many (the catalyst for potential disaster for the media industry).

The important message here is that once Black Swan events emerge, businesses need to clearly understand the likely impact of such events on their particular business, and put in place a robust plan to best mitigate against any negative implications so that if actual results deviate significantly from initial projections, immediate corrective action can be taken. Clem Sunter, a prominent scenario planner, recommends businesses have an effective radar system that one can use to pick up changes in the environment quicker than one's competitors and act ahead of them. Such a radar system has three steps to it:

- Identify the trigger events which can tip the future in a different way
- Encapsulate the different futures that may eventuate in plausible and consistent scenarios (which highlight the causal chain in each case), and
- Examine the practical consequences of each scenario so that you can modify your future accordingly.

While this sounds easy, in order to have an effective radar system, we also need to apply what we have learnt about the factors that arise out of blindness to Black Swans, and be able to look into the future in a transparent and unprejudiced manner.

The following nine measures are recommended to be taken by businesses in order to plan effectively in times of increasing Black Swans:

Minimize downside risk exposure

All managers should be encouraged to conduct in-depth risk assessments so that risks are effectively managed where possible.

Ensure planning processes are in place

Business planning and scenario planning need to happen more frequently within companies than has traditionally been the case.

Build up a cash buffer

In good times, it is best to build a good cash buffer that you can fall back on when times are hard. Given the ubiquitous impact of the current credit crunch, it is likely that the cash positions of some customers will have deteriorated. If the majority of sales are on credit, it will be necessary to manage invoices, and accounts receivables (debtors) to ensure that your cash position does not suffer also. Keep an eye to ensure your 'debtors' days' figure does not creep up. A strong cash position is what you need to aim for.

Encourage long-term planning

Businesses typically focus on a one to two year planning horizon. However, some emergent trends take time to diffuse throughout a market niche, so it is important to assess the likely impact of current trends on future consumer behaviour.

Ensure managers are plugged in to various information sources

Businesses need to adapt quickly in such fluid environments. Smaller, more nimble companies will benefit, provided they are able to take advantage of obvious emergent trends in their sectors before larger incumbents have time to react. Given the speed with which information disseminates in the Internet era, management need to be cognisant of developments which will affect their business.

Flexible pursuit of emergent opportunities

Black Swan events trigger winners and losers. In the case of the recent swine flu outbreak, there were a number of beneficiaries. For instance, 3M, who make face masks, increased their production, which included adding shifts and increasing the number of manufacturing lines to meet demand. Similarly, Roche, maker of Tamiflu, saw a huge increase in demand for its flu drug. Companies need to remember that changing environmental conditions also bring opportunity and hence, businesses need to ensure that they are adaptable to meet these changing conditions.

Encourage Innovation

Entrepreneurship and innovation need to be encouraged in businesses. And provided the downside risk is managed the learning alone will be highly beneficial. Similarly, the disciplining effects of a downturn help ensure that resources are not squandered as easily as in boom times. If the practice learnt is carried over to boom times, the benefits to the bottom line can be immense.

11-20:text 9/1/09 12:17 PM Page 510

Ensure adequate alert systems are in place

In these uncertain times, companies need to ensure that simple alert systems are in place. Such warning systems should include those that help to watch out for distressed companies that would expose the company's business to delayed payments or even bad debts.

Seek imaginative solutions

Finally, many of the issues arising from these external shocks or Black Swan events are quite challenging and a number of tough calls often need to be made. As such, more creative solutions are needed to deal with the problems caused by these Black Swan events.

In summary, given the increased interconnectedness of us all, events in one location can quickly diffuse around the world with positive and negative effects in equal measure. Naturally, by definition, Black Swan events are difficult to predict; however, the aim of this paper is to equip readers with a number of tools and ideas to ensure that when the next Black Swan event occurs that they are better prepared to deal with it.

Conclusion

The main theme of the 'Black Swan' is that what has never been experienced in the past could happen in future. And while our minds are programmed to deal with what we have seen before, we need to realize that all too often extreme events do happen when we least expect them to happen, and when they do, they have large and long-lasting effects.

Our tendency to discard rare events happens in part because we underestimate our ignorance, and since feeling ignorant is not pleasant, we tend to put it out of our minds. Another thing is that we tend to invent stories where there are none. In other words, after the fact, we like to invent explanations for why things happened the way they did, which is much more comforting than staring at sheer randomness.

How do we escape the tyranny of the Black Swan? We have to learn to do at least two things:

- First, we have to learn how to really learn. We have to learn the ideas of epistemic humility and fallibilism. Fallibilism encourages suspicion about what one thinks one knows and leads to epistemic humility. And epistemic humility, in turn, will help us to overcome confirmation error and the fallacy of silent evidence. If we are sceptical of what we know, we will not only look for what confirms it, but also for what refutes it. And if we are sceptical of what we know we will also be much more alert about drawing positive conclusions in situations where silent evidence exists and is not accessible to us. Acknowledging the existence of silent evidence will help us to avoid drawing conclusions from partial evidence. Fallibilism and epistemic humility can also make us more aware of the possibility of unexpected events violating our mental models, and this awareness in turn can give us motivation to try to overcome future blindness, and hence be able to anticipate the next Black Swan.
- We have to learn that images in the rear-view mirror tell us very little about the road ahead. We have to learn how to properly discern systems governed by the laws of mediocristan from those governed by the laws of extremistan, and act accordingly.

If we master the above, we will be able to construct possible futures that can help us survive times of uncertainty; we will be able to learn how to swim with the Black Swan.

References

I have not given the source of every statement or fact, however, you will appreciate that some of the facts that appear here may have previously appeared in print elsewhere.

The references below are listed in alphabetical order by author.

1. Allen, M. *On the Survival of Rats in the Slush Pile*, Bradford on Avon, Kingsfied Publication, 2005.
2. Bleby, M. 'Ponzi scheme may total R10 billion', *Business Day*, 12 June 2009.
3. Bogle, J. C. and Sullivan R. N. 'Black Monday and Black Swans', *Financial Analyst Journal*, vol. 64, no. 2, pp. 30-40.
4. Brummer, Alex. *The Crunch—How greed and incompetence sparked the credit crisis*, London, Random House Business Books, 2009.
5. DFJ Portage Venture Partners, 'Ugly Duckling or Black Swan?', Ignite Presentation, 12 June 2007.
6. Firestone, J. 'Black Swan ideas—Silent Evidence, Confirmation error, Epistemic Arrogance, and Future Blindness', Online publication, 1 June 2009.
7. Gleeson, A. 'Black Swan and Strategic Planning', Online publication.
8. Mauldin, J., 'Unpacking the Black Swan', Online publication, 19 September 2007.
9. Matai, D. K. 'The Black Swan and the Age of Insecurity', Online publication, 24 November 2008.
10. Matai, D.K. 'Low Probability High Impact and Black Swan Events—The Opportunity and Risk of Asymmetric Globalisation', Keynote speech at *Global Risk Summit,* Geneva, Switzerland, 9 June 2007.
11. Parker, E. and Wen, G. J. 'The Asian Financial Crisis and the Lessons for Globalisation', online publication, January 2000.
12. Rutter, J. 'The Black Swan Survival Guide', *Dow Jones Wealth Bulletin*, November 2008
13. Sunter, C. 'Triggers that change the Future', News 24, Online publication, 1 October 2008.
14. Taleb, N. N. *Fooled by Randomness—The Hidden Role of Chance in Life and in the Markets*, London, Penguin Books, 2007 (There are earlier editions in the US and UK).
15. Taleb, N. N. *The Black Swan—The Impact of the Highly improbable*, London, Penguin Books, 2008 (There are earlier versions in the US and UK).
16. Temkin, S. Executives 'need to be alert to increased risk' in economic crisis, *Business Day*, 23 December 2008.
17. Westney Consulting Group, 'Are stages and gates destroying predictability?—The unintended consequences of Front-End Loading', Westney Advisor, Online publication, August 2008.
18. 'Fooled by Narrative Fallacy', Contrarian Investors' Journal, Online publication, 18 August 2008.
19. 'History of the *RMS Titanic*', Woods Hole Oceanographic Institution, Online Publication, updated July 2008. ◆