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## The curse of the Black Swan

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When unexpected and emotion-engaging events become Black Swans and carry an ‘extreme impact,’ this derives not so much those qualities or from their intrinsic size or importance as from reaction, or overreaction, they generate; but one that is often as extreme and unpredictable as the event itself. Most consequential development in human history, however, stems not from such events, but from changes in thinking and behavior that are gradual and often little-noticed as they occur. In addition, when an unexpected, emotion-grabbing event becomes a Black Swan, the response is likely to become internalized, and getting people to re-evaluate through sensible risk analysis and risk communication is extremely difficult. As part of this, events that are aberrations are often unwisely taken instead to be harbingers – and continue to be so even in the face of repeated disconfirming evidence. An examination of the 9/11 response in the US illustrates these points.

**Keywords:** terrorism; risk communication; Taleb; Black Swan events; event analysis; public opinion

### 1. Introduction

In his bestselling book, *The Black Swan: The Impact the Highly Improbable*, Nassim Nicholas Taleb focuses on highly consequential events that are outliers: a ‘Black Swan’ event or episode carries ‘an extreme impact’ and lies ‘outside the realm of ordinary expectations because nothing in the past can convincingly point to its possibility’ (2010, xxii). Moreover, he extols their importance: ‘almost everything in social life is produced by rare but consequential shocks and jumps’ (2010, xxix, 11), and ‘our world is dominated by the extreme, the unknown, and the extremely improbable’ (2010, xxxii).

This article assesses the Black Swan phenomenon. It begins by reconsidering the concept while keeping the spirit, at least, of Taleb’s conception. However, instead of defining Black Swans as unexpected events or phenomena that *do* have an extreme impact, it sets out characteristics of events or phenomena that, following Taleb’s characterization, *should* be highly consequential. This formulation allows one to assess whether they become so or not.

It then argues, first, that while some unexpected and emotion-engaging events and phenomena do indeed become consequential (and therefore Black Swans),

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others fail to do so. Moreover, insofar as Black Swan events carry an ‘extreme impact,’ this quality derives not so much from their unexpectedness or from the emotions they initially trigger as from the reaction or overreaction they generate. These reactions are sometimes as unexpected as the event itself, and often they do not correlate well with the event’s size or its objective historical importance.

Second, it argues that, although some unexpected and emotion-engaging events do have considerable consequences, much consequential development in human history – probably most of it – stems not from such events, but from changes in thinking and behavior that are decidedly gradual and often little-noticed as they occur.

Finally, it identifies what can be called the curse of the Black Swan. When people take an extreme response to an event, the response seems to become internalized. In consequence, getting people to re-evaluate is extremely difficult. As part of this process, risk communication and rational decision-making also become very difficult. Moreover, events that are essentially aberrations are often unwisely taken instead to be harbingers – and continue to be, despite repeated disconfirming evidence. An examination of the response to the terrorist attack of September 11, 2001, in the United States is used to illustrate the process.

## 2. Definitions

It is difficult to nail down exactly what a ‘Black Swan’ is under Taleb’s definitions. That the event must be highly improbable – ‘outside the realm of ordinary expectations’ – seems clear enough. But that ‘*nothing* in the past can point convincingly to its *possibility*’ is not. Pearl Harbor, 9/11, and the Japanese tsunami of 2011 were all ‘outside the realm of ordinary expectations’ at the time, but few, if any, would have deemed them *impossible*. For example, for years before 9/11, people had mused about the possibility that an airliner might be hijacked and then flown into a prominent target (Graff 2011, 40, 45; Pillar 2011, 247), and it was fairly well known that terrorists had commandeered an airliner in 1994 with plans, it was widely believed, to crash it into the Eiffel Tower (Wald 2001). That Pearl Harbor might be on Japan’s target list in 1941 if it decided to launch war was explicitly considered (Wohlstetter 1962). And large tsunamis are hardly unknown in the western Pacific – Japan has been building defenses against them for centuries.

Puzzlingly in this regard, Taleb emphatically denies that the financial crisis of 2008 was a Black Swan because, he analogies, ‘you know with near certainty that a plane flown by an incompetent pilot will eventually crash’ (2010, 321). However, although many suggested that the decades-long escalation in US housing prices (for example) was a bubble that might sometime crash or at least substantially soften, there was still great surprise (as he points out repeatedly) *when* it actually happened. Also generally unexpected were the extent of the consequences of the crash. It seems, then, that although the event was, like a tsunami, anticipated in some sense, both its timing and the extent of its consequences were well ‘outside the realm of ordinary expectations.’ That surprise would seem to qualify it to be a Black Swan by Taleb’s definition.

Taleb also includes one other proviso in his definition of a Black Swan: ‘in spite of its outlier status, human nature makes us concoct explanations for its occurrence *after* the fact, making it explainable and predictable’ (2010, xvii, emphasis in the original). However, people, especially historians, do this with virtually *all* events

and developments, not simply with ones that achieve Black Swan status. The quality scarcely separates Black Swan events from any other kind.

For the purposes of this article, we will avoid defining Black Swan events as ones that actually have great consequences in favor of one that stresses two characteristics that, in the spirit of Taleb's discussion, *should* render an event or phenomenon consequential as well as iconic. First, it should be an outlier – substantially unexpected, surprising, unpredicted. And second, at the time it occurs it should grab the emotions – be electrifying – and become popularly embraced as a major happening.

In our view, Taleb's treatment suffers from selection bias – a phenomenon he derides repeatedly. All of his Black Swans have extreme impacts because that is how a Black Swan is defined. To avoid this, it is important to consider not only important events and episodes that lie 'outside the realm of ordinary expectations' and have had an 'extreme impact,' and thus become Black Swans, but also ones that have failed to do so even though they are were as unexpected and were as popularly embraced when they occurred.

### **3. The varying reaction to unexpected and emotion-engaging events**

Some seemingly highly improbable and popularly embraced events and episodes have generated an 'extreme impact,' maintaining a sort of perpetual resonance in the mind. However, other events and episodes that are similar have not been so accepted.

This process seems to be remarkably unpredictable and sometimes fluid, and it is filled with cognitive biases and with what often seems to be the capricious application of emotional and social whim. And it generally seems to be the reaction to the event – as difficult to predict as the extreme event itself – that is determining. An array of examples can illustrate these conclusions.

To begin with, one might compare the reactions to two unexpected and highly shocking events: 9/11 and the worst terrorist event in the developed world before then, the downing of an Air India airliner departing Canada in 1985 in which 329 people, 280 of them Canadian citizens, perished. One became a Black Swan while the other failed to do so.

As journalist Gwynne Dyer (2006) points out, because Canada has only one-tenth the population of the United States, it suffered in 1985 'almost exactly the same proportionate loss that the United States suffered in 9/11.' But the Canadian tragedy did not have long-lasting consequences. In considerable part, this is because, although the event was unexpected and shocking, there was no extreme Canadian reaction. Continues Dyer,

here's what Canada didn't do: it didn't send troops into India to 'stamp out the roots of the terrorism' and it didn't declare a 'global war on terror.' Partly because it lacked the resources for that sort of adventure, of course, but also because it would have been stupid. Instead, it tightened up security at airports, and launched a police investigation of the attack. The investigation was not very successful, and 21 years later, most of the culprits had still not been punished. But Sikh terrorism eventually died down even though nobody invaded the Punjab, and nobody else got hurt in Canada.

The September 11, 2001 attack, in contrast, did have extreme consequences. However, although a stronger reaction to 9/11 than that inspired by the Canadian tragedy was probably 'unavoidable,' as Dyer acknowledges, the extreme, even

self-destructive, nature of the reaction to 9/11 was not. In 2001, there was a great wariness about sending American troops abroad in costly ‘nation-building’ exercises: indeed, George W. Bush had campaigned in the previous year on the desirability of having a ‘humble’ foreign policy. Moreover, the US had responded to highly damaging terrorist losses in the past with much milder measures that proved to be entirely politically acceptable. When sending troops to help police the Lebanon civil war in 1982, for instance, President Ronald Reagan grandly declared, ‘In an age of nuclear challenge and economic interdependence, such conflicts are a threat to all the people of the world, not just to the Middle East itself.’ However, when 241 troops were killed by a terrorist bomb in 1983, he withdrew the rest, and this unexpected and shocking episode failed to have an extreme impact – to become a Black Swan. Indeed, it scarcely came up in the 1984 election which Reagan won handily. And when a terrorist bomb in the luggage compartment brought down an American airliner over Lockerbie, Scotland, in late 1988, the American response was simply to launch an exhaustive investigation to identify and apprehend the perpetrators. The tragedy did not even inspire a comprehensive program to X-ray all checked baggage – that came into place only after 9/11, 13 years later. Later terrorist destruction also failed to inspire an outsized reaction even though, like Lockerbie, investigators soon found that these events were not simply one-off events but had clear international connections: the attack on the World Trade Center in 1993, bombings of US embassies in Africa in 1998, the attack on the USS Cole in Yemen in 2000 (Graff 2011).

Keeping these experiences in mind, a plausible position after 9/11 would have been to argue that the dastardly deed that killed nearly 3000 did not justify the invasion of Afghanistan which, judging from recent and not-so-recent history, would likely cost far more American lives. An alternative policy, in line with that earlier pursued after the other destructive acts by international terrorists, might have been to go more surgically after the culprit group, expanding police and intelligence work, and working with sympathetic allies, including in particular Saudi Arabia and Pakistan, to pressure the Taliban in Afghanistan to turn over al-Qaeda members in the country. Some Afghanistan experts think that such a policy approach might well have worked and could have led to the apprehension of Osama bin Laden which, of course, was not accomplished by the invasion. Moreover, the consequent invasion of Iraq in no important way was caused – or required – by 9/11. Rather, proponents of such a war seized upon the opportunity to advance their pre-existing agenda.

In contrast, notes Dyer, ‘The right goal was *not* to fall into Osama bin Laden’s trap, and *not* to act in ways that spread suspicion and hostility in Muslim communities at home and abroad.’ This plausible option was not even broached in 2001 (or scarcely in the years thereafter) – a clear lapse in the process of rational decision-making. But that this should be so was not necessarily predictable beforehand.

Similarly, although it was perhaps inevitable that the unexpected and shocking Pearl Harbor attack would live on in infamy, the degree to it would have extreme consequences over the long term was not. As with 9/11, that result depended on the reaction. In 1941, there was a strong anti-war movement in the United States, generated in particular by the experience of the American entry into World War I which many took to have been the result of crafty European manipulation. As part of this, many considered the American opposition to Japanese expansion in the Far East – mainly in China – to be ill-advised, potentially sucking the country into a distant, opaque conflict that had nothing whatever to do with American security and

well-being – trade at the time with Japan was four times greater than that with China (Russett 1972; 58–60; see also Mueller 1995, ch. 7).

With this as background, a plausible position after Pearl Harbor – though likely one difficult to sell politically – would have been to argue that the attack that killed 2400 Americans did not justify a directly confrontational war in the Pacific in which 10s, perhaps 100s, of 1000s of American lives would be lost. An alternative policy might have been to shore up the protection of US territory and, with the help of allies in the area, to engage in a patient, far less costly cold war-like harassment of the much over-extended Japanese empire through naval and air deployments and through support for local anti-Japanese armies and guerrilla movements. That such a policy option was not even broached in 1941 (or scarcely in the many decades thereafter) is testimony to how much the attacks changed everything. However, that such a clear lapse would take place in the evaluation of plausible alternative policies in one of the most important decisions ever made by American officials – a decided lapse, therefore, in rational decision-making – was not necessarily predictable beforehand (Sagan 1988, 916). Interestingly however, while the US went headlong into a war in the Pacific, it did restrain itself from immediately declaring war on Germany – a condition soon rectified when Germany declared war on the US.

Both 9/11 and Pearl Harbor had great consequences and also became iconic – suggesting that it does not take large forces to cause unexpected and shocking events to do so. Pearl Harbor was an attack on military targets by a large and important state that provided the impetus for, and marked the beginning of, a conflict that resulted in the deaths of millions. September 11 was an attack on civilians by a small sub-state group with highly limited capacities that triggered a cascade of consequences that, however dire, were far less destructive than the Pacific War. Yet these extreme events seem comparable in much of their longer term impact – both became Black Swans. A large military force caused this to happen in 1941, but just a small band of terrorists did so in 2001.

Relatedly, the terrorist events in Canada in 1985, in Lebanon in 1983, and in international terrorist attacks against US interests in the years before 9/11, although unexpected and shocking when they occurred, failed to become Black Swans, and they had few long-run consequences. Something similar happened with the Indian reaction, or non-reaction, to the terrorist shootings in Mumbai in 2008.

It may also be instructive in this regard to compare 9/11 with the Japanese tsunami of 2011. The latter was, of course, far more destructive in its physical consequences – near 20,000 lives were lost and a great deal of property was destroyed. Yet because it failed to generate an extreme reaction, the tsunami, however unexpected and shocking, may not achieve Black Swan status. On the other hand, the ensuing nuclear reactor accident at Fukushima, that appears to have killed no one, inspired an extreme reaction and may do so.

In like manner, one could compare the American reaction to two dramatic and unexpected events: the Gulf War episode of 1990–1991 and the Iran hostage episode of 1979–1981.

The Gulf War arose out of Saddam Hussein's takeover of Kuwait, another United Nations member, in 1990. Almost everyone at the time considered this to be highly improbable. Indeed, the venture in which one UN member attempted to conquer and absorb another, remains utterly unique in the post-World War II era. In its time, the invasion and the war to turn it back the next year stirred great attention and emotion. Shortly before beginning the war to drive Iraq from Kuwait in January

1991, 27% of poll respondents said they thought about it at least once an hour and another 22% said they thought about it every few minutes – only 10% were so blasé as to think about it once a day or less. And when launching the war, President George H. W. Bush grandly proclaimed that it would ‘chart the future of the world for the next 100 years,’ even as a front-page article in the *New York Times* speculated it might ‘change the face of domestic politics, the map of the Middle East, the realities of great-power relationships and the world economy for years or decades to come.’ The episode did have lasting impact in that it hardened American hostility toward Saddam Hussein and his regime. Yet it failed to become a Black Swan: in speeches in his unsuccessful reelection campaign a year later, Bush found that his spectacularly successful war scarcely stirred resonance even among highly supportive groups (Mueller 1994, 18, 52, 159, 160, 104).

The Iranian hostage crisis of 1979–1981 in which a few dozen Americans were held hostage by people representing an often rather formless new regime was unexpected and shocking – it very much engaged the emotions for months on end. Like the Gulf War, it informed American policy in the Middle East for decades. However, whereas the Gulf War substantially receded from recall, the hostage experience – the less important of the two events – became something of a Black Swan and continues to be vividly remembered (Mueller 2006, 105–109). Much the same can be said for the sinking of the *Titanic* in 1912 and of the *Lusitania* in 1915. The second event was far more consequential historically, but it is the earlier one that continues to be embraced in popular memory.

Thus, there are examples in which surprising and shocking episodes have had great long-term consequences: 9/11, Pearl Harbor, Chernobyl, the Iran hostage crisis, probably Fukushima. But there are also examples in which surprising and shocking episodes fail to have great long-term consequences: Lebanon 1983, Canada 1985, international terrorist acts against the US in the years before 9/11, Mumbai 2008, and probably the tsunami in Japan. In all cases, the determining force for whether an extreme event or episode becomes consequential – a Black Swan – derives much more from the reaction to it than from the event’s size or intrinsic historical importance, from its unexpectedness, or from the emotions it initially triggers.

#### **4. Consequential development mostly stems from gradual change**

Taleb’s heralding of the importance of extreme events is certainly justified, but his forceful contention that ‘almost everything in social life is produced by rare but consequential shocks and jumps’ (2010, xxix) is never systematically examined, and it is highly questionable. For example, although three of the most consequential developments of the last two or three centuries – the rise of democracy and capitalism, and improvements in human physical well-being – do owe something to Black Swan events, their progress was mostly characterized by gradual, evolutionary processes characterized primarily by trial and error.

##### **4.1. The rise of democracy**

Modern democracy’s rise has essentially been the result of a competition of ideas over two or three centuries, and it has triumphed because its ideas, ably executed and skillfully promoted – or marketed – have increasingly managed to catch on.

During that time, it has been suitably tested, refined, and packaged to increase its appeal. Black Swan events were not irrelevant to its rise, but they acted in opposite ways. Thus, democracy had to rebound from such potentially discrediting Black Swan calamities as the reign of terror in revolutionary France and the Civil War in America – a country that had been deemed in 1848 by Alexis de Tocqueville to be ‘the most stable of all the nations on earth’ (1990, xx, xxi). On the other hand, democracy’s comparative appeal advanced when democracy won Black Swan world wars in which two of its major competitors – monarchy and Fascism – were destroyed.

However, most of the progress toward democracy has been gradual, even agonizingly so. Thus, the substantial decline of tyranny over the last several decades did not come about because democracy’s promoters abruptly improved either the product or the packaging nor was it notably impelled by extreme events. Instead, there has been a gradual and very consequential change in the receptivity of the customers: democracy has very substantially caught on as an idea whose time had come. This is particularly noticeable in Latin America where military leaders seem eventually to have become convinced that the military dictatorship was a thing of the past (Fukuyama 1992, 18–22; Higley and Gunther 1992). In large part, it seems, they did this because they felt embarrassed that their countries were so out of fashion.

#### **4.2. *The rise of capitalism***

For its part, capitalism has been counted out quite a few times. For example, in 1950, Joseph Schumpeter famously and repeatedly declared ‘centralist socialism’ to be the ‘heir apparent’ to capitalism (1950, 417). And it was in 1976 that Milton Friedman presented a paper (a very depressing one from his point of view) seeking to explain why collectivist beliefs flourish in the world of ideas (Hartwell 1995, 165). However, things have changed markedly since then. As economist Robert Heilbroner, not usually known as an ardent free – marketeer, noted in 1993,

There is today widespread agreement, including among most socialist economists, that whatever form advanced societies may take in the twenty-first century, a market system of some kind will constitute their principal means of coordination. That is a remarkable turnaround from the situation only a generation ago, when the majority of economists believed that the future of economic coordination lay in a diminution of the scope of the market, and an increase in some form of centralized planning. (1993, 97; see also Yergin and Stanislaw 1998; Mueller 1999, ch. 5)

One impressive event, the sudden, abject, and pathetic collapse of command and heavily planned economies in the late 1980s and early 1990s, played an important role in this remarkable development. It certainly caught the economics profession completely unprepared (as Taleb might point out delightedly): as Lawrence Summers observes, although there had been quite a few studies at that point about the transition of market economies to controlled or command economies, ‘there was not a single book or article on the problem of transforming an economy from the communist to a market system.’ (1992, 12)

However, the change in east Europe was part of a process that had been going on for decades (Yergin and Stanislaw 1998; Mueller 1999). Gradually, a substantial consensus has emerged that one should ‘trust the market,’ and there has been increasing acceptance of such principles as: wages and prices should be allowed



freely to find their own ranges and limits; government regulation is often unwise and can be counterproductive; the government should abandon enterprises that can be handled by the private sector; high taxes, especially at the top, can be economically counterproductive, and capricious or discretionary ones almost always are; international trade should be free; a considerable amount of economic inequality is inevitable and essentially desirable; uncompetitive enterprises should not be subsidized and should be allowed to fail; and government spending should be kept reasonably low and government deficits should be kept under control.

These notions, however politically painful, seem increasingly – but only gradually – to have been accepted by policy-makers and politicians around the world. In practice, all capitalist, or market capitalist, states may not end up looking a great deal like each other, any more than all democracies do. There may be controversy, for example, over the desirable trade-offs between growth and the distribution of wealth, or over whether it is better to go for maximum growth or to sacrifice some growth in order to reduce the amplitude of the boom and bust cycles around a generally rising growth path, or over how large a government's deficit can rise without stifling economic growth, or over the degree to which a regulation will hurt more than it will help, or over what rate of inflation is most desirable. But, substantially and increasingly, the debate is likely to be more nearly a matter of degree than of fundamental principles.

Thus, when the world plunged into widespread economic crisis in the late 1990s and then again after 2007, proposed remedies variously recommended tinkering with the system – not, as in the 1930s, abandoning it (Burgin 2012, 216). Notably, international trade was not substantially cut back (Drezner 2014, ch. 2), and there were no widespread calls for trade protectionism, for the imposition of wage and price controls, or for confiscatory taxes on the rich. And when some enterprises were deemed too big to fail, there were sometimes efforts to subsidize their recovery and to increase regulation, but not to nationalize them or to permanently take them over. The Occupy Wall Street movement in the United States was notable mainly for its impotence and ideological incoherence.

### **4.3. *Improvements in human welfare***

There have been remarkable improvements in health, life expectancy, and human physical welfare over the last two centuries. Until the nineteenth century, 80–90% of all humanity lived in what we would consider today to be abysmal poverty; by now that has been reduced to less than 20%. Since 1800, the average absolute standard of living per capita has risen by a factor of 30 (McCloskey 2015). And, until well into the nineteenth century, life expectancies everywhere in the world were around 35 years; in a process that took many decades, this has been more than doubled (mostly by preventing deaths in early life) even in most areas in what we call the developing world.

However, although there certainly have been some fairly abrupt economic, scientific, engineering, and public health breakthroughs from time to time, the process of improving human physical welfare – perhaps the most important development in human history – has mainly proceeded gradually and incrementally, not with Taleb's 'consequential shocks and jumps.' Taleb characterizes the discovery of antibiotics as 'random' (2010, 369). But it could be said that any new idea or discovery is accidental, random, lucky, or fortuitous (see Taleb 2010, 319), and Taleb's assertion

pushes the contention toward the banal. Moreover, new ideas become consequential mainly in their conscious and methodical application, not in their initial discovery. Thus, while penicillin was first discovered by Alexander Fleming in 1928, its use as a medicine occurred more than a decade later only when Howard Florey and others realized its potential and developed techniques to mass-produce it.

Indeed, because progress has been so gradual, improvements in well-being are often effectively unappreciated. Milton Rosenberg and L. E. Birdzell observe that the remarkable transformation of the West from a condition in which 90% lived in poverty to one in which only a small fraction did so took a very long time:

Over a year, or even over a decade, the economic gains, after allowing for the rise in population, were so little noticeable that it was widely believed that the gains were experienced only by the rich, and not by the poor. (1986, 6, also 265; see also Marshall 1890, 3, 4)

Clearly, the same can be said for the massive improvement in life expectancy that has proved to be so easy to take for granted.

## **5. The curse of the Black Swan**

There is one additional consideration. Unexpected emotion-engaging events that come to be embraced as Black Swans can come burdened with at least two undesirable qualities. First, there is a tendency for them to be taken to be harbingers when they may actually be more nearly aberrations. And second, because of this, efforts to communicate to people the true nature and degree of the risk may be doomed to failure even as persistent anxiety, however unjustified, may make rational policy especially difficult, even impossible. It is the curse of the Black Swan.

### ***5.1. Harbingers, aberrations, and the persistence of anxiety***

If a Black Swan event is a harbinger, its appearance should be taken to indicate that the likelihood of similar events has been much underestimated and that a complete re-evaluation is in order – as it is often put, ‘everything has changed.’ Accordingly, a sizable, and perhaps quite costly, reaction or response is justified as a direct consequence of the event’s occurrence. If the Black Swan event is an aberration however, its appearance indicates that it should continue to be regarded as highly unlikely. Accordingly, any reaction should be contained and modest: one should think carefully about doing anything costly in response, and one should seek to communicate the unlikelihood of recurrence – something, however, that may be difficult or impossible in an atmosphere that is emotion laden.

Since Black Swans are outliers, they are more likely, it would seem, to prove to be aberrations than harbingers (Mueller 2002, 2003). However, an emotion-grabbing event or episode that becomes a Black Swan seems likely to be taken as a harbinger rather than as an aberration.

This happened with both Pearl Harbor and 9/11. After Pearl Harbor, it was assumed there would be many more such events. Yet, as H. P. Willmott observes of the Japanese attackers, ‘not a single operation planned after the start of the war met with success’ (1982, 91). And, notes Jane Mayer, ‘the only certainty shared by virtually the entire American intelligence community’ in the months after September 11 ‘was that a second wave of even more devastating terrorist attacks on America was imminent’ (2008, 3). Yet, there has been scarcely any terrorist act, before or

after 9/11, within war zones or outside them, that has inflicted even one-tenth as much damage.

As concerns about ‘another Pearl Harbor’ outlived even World War II, concerns about the likelihood and consequences of ‘another 9/11’ among the American public have failed to decline in the years after the attack. The event has, very much contrary to initial expectations, failed to be a harbinger, but it is still substantially accepted to be one: upwards of 75% consider the likelihood of another terrorist attack causing ‘large numbers of American lives to be lost’ in the ‘near future’ to be very or somewhat likely, about the same figure that was registered in the days after the 9/11 attacks. An American’s chance of being killed by a terrorist, even with 9/11 factored into the calculation, stands at about one in four million per year. In an important sense, then, any personal worry about perishing at the hands of a terrorist cannot be rationally justified. Nevertheless, at the end of 2001, around 40% of the public said they were very or somewhat worried that they or a family member would ‘become a victim of terrorism,’ and this percentage has scarcely changed since. In both cases, these percentages were still at roughly those levels even before the alarming and threatening rise of the Islamic State, or ISIS, in 2014.

The persistence of anxiety that these poll numbers suggest appears to be impelled not by terrorism per se, but rather by the fact that the terrorism of concern seems to be being impelled by a rather spooky foreign referent. Concerns about terrorism spiked up at the time of the second-worst terrorist attack on American soil: the bombings by a local right winger of a building in Oklahoma City in 1995. Nonetheless, unlike 9/11, this event, however unexpected and emotion-arresting, did not become a Black Swan: concerns about becoming a terrorism victim declined notably in the following years. (Mueller and Stewart 2016a; ch. 2; Mueller and Stewart 2016b, 2016c; compare Loewenstein and Mather 1990).

## **5.2. Risk communication and rational policy-making**

The process by which an unexpected and shocking event becomes a Black Swan appears to be more nearly bottom-up than top-down: people do not appear to need much guidance about how to react, and the reaction seems mainly to stem from the facts of the events themselves, not from political or media exploitation. For example, after Pearl Harbor, officials actually sought to downplay the damage inflicted by the attacks, not, as after 9/11, to exploit it. Nor are 9/11-like pictures and real-time media coverage necessary: neither was present for Pearl Harbor (Mueller 1995, 98–101).

But the phenomenon presents special problems for risk communication. If people are not manipulated into an extreme reaction to some extreme events, it seems equally likely that they cannot be manipulated out of it. That is, when people elevate an extreme event to Black Swan status, the response can become internalized in the process, and it cannot readily be changed. As risk analysts have often concluded, strong beliefs are very difficult to modify (Slovic, Fischhoff, and Lichtenstein 1980; Fischhoff 1995; Slovic 2000, 185).

There has been a long tradition of designing, operating, and maintaining systems with low probability/high consequence characteristics – ones often termed ‘extreme events’ (Stewart and Melchers 1997). Risk analysts need to be objective and rational in their deliberations and in their advice furnished to policy-makers about Black Swan events even if it might be career-threatening (Mueller and Stewart 2011, 2014,

2016a). As Sunstein (2006) puts it, ‘If people’s values lead them to show special concern with certain risks, government should take that concern into account.’ But ‘any official response should be based on a realistic understanding of the facts,’ not on ‘factual mistakes.’

However, the outsized and lasting response that defines a Black Swan event like 9/11 can lead to irrational decision-making that exaggerates the event’s importance, ignores viable and less costly alternative policy options, assumes it to be a harbinger, and neglects effectively to evaluate probabilities, costs, and consequences. In the process, it can also lead to expenditures and efforts that are unjustified or sometimes even self-destructive. At the same time, cutting back on an extant security measure, even one that fails miserably to reduce risk enough to justify its cost, runs up against the emotional counter that, regardless of the measure’s cost-ineffectiveness, any cutbacks will make us ‘less safe’ (Sunstein 2003, 2006).

This suggests again that the most consequential impact – the curse of the Black Swan – derives not so much from the unexpected and emotion-grabbing occurrence of the event as from the excessive response it inspires.

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