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Financial Times

The **Black Swan**

The Impact of the Highly Improbable

Nassim Nicholas Taleb

Part 1

UMBERTO ECO'S ANTLIBRARY, OR HOW WE SEEK VALIDATION

The writer Umberto Eco belongs to that small class of scholars who are encyclopedic, insightful, and nondull. He is the owner of a large personal library (containing thirty thousand books), and separates visitors into two categories: those who react with “Wow! Signore *professore dottore* Eco, what a library you have! How many of these books have you read?” and the others—a very small minority—who get the point that a private library is not an ego-boosting appendage but a research tool. Read books are far less valuable than unread ones. The library should contain as much of *what you do not know* as your financial means, mortgage rates, and the currently tight real-estate market allow you to put there. You will accumulate more knowledge and more books as you grow older, and the growing number of unread books on the shelves will look at you menacingly. Indeed, the more you know, the larger the rows of unread books. Let us call this collection of unread books an *antilibrary*.

We tend to treat our knowledge as personal property to be protected and defended. It is an ornament that allows us to rise in the pecking order. So this tendency to offend Eco's library sensibility by focusing on the known is a human bias that extends to our mental operations. People don't walk around with anti-résumés telling you what they have not studied or experienced (it's the job of their competitors to do that), but it would be nice if they did. Just as we need to stand library logic on its head, we will work on standing knowledge itself on its head. Note that the Black

Swan comes from our misunderstanding of the likelihood of surprises, those unread books, because we take what we know a little too seriously.

Let us call an antischolar—someone who focuses on the unread books, and makes an attempt not to treat his knowledge as a treasure, or even a possession, or even a self-esteem enhancement device—a skeptical empiricist.

The chapters in this section address the question of how we humans deal with knowledge—and our preference for the anecdotal over the empirical. Chapter 1 presents the Black Swan as grounded in the story of my own obsession. I will make a central distinction between the two varieties of randomness in Chapter 3. After that, Chapter 4 briefly returns to the Black Swan problem in its original form: how we tend to generalize from what we see. Then I present the three facets of the same Black Swan problem: a) *The error of confirmation*, or how we are likely to undeservedly scorn the virgin part of the library (the tendency to look at what confirms our knowledge, not our ignorance), in Chapter 5; b) *the narrative fallacy*, or how we fool ourselves with stories and anecdotes (Chapter 6); c) how emotions get in the way of our inference (Chapter 7); and d) *the problem of silent evidence*, or the tricks history uses to hide Black Swans from us (Chapter 8). Chapter 9 discusses the lethal fallacy of building knowledge from the world of games.

THE APPRENTICESHIP OF AN EMPIRICAL SKEPTIC

Anatomy of a Black Swan—The triplet of opacity—Reading books backward—The rearview mirror—Everything becomes explainable—Always talk to the driver (with caution)—History doesn't crawl; it jumps—"It was so unexpected"—Sleeping for twelve hours

This is not an autobiography, so I will skip the scenes of war. Actually, even if it were an autobiography, I would still skip the scenes of war. I cannot compete with action movies or memoirs of adventurers more accomplished than myself, so I will stick to my specialties of chance and uncertainty.

ANATOMY OF A BLACK SWAN

For more than a millennium the eastern Mediterranean seaboard called Syria Libanensis, or Mount Lebanon, had been able to accommodate at least a dozen different sects, ethnicities, and beliefs—it worked like magic. The place resembled major cities of the eastern Mediterranean (called the Levant) more than it did the other parts in the interior of the Near East (it was easier to move by ship than by land through the mountainous terrain). The Levantine cities were mercantile in nature; people dealt with one another according to a clear protocol, preserving a peace conducive

to commerce, and they socialized quite a bit across communities. This millennium of peace was interrupted only by small occasional friction *within* Moslem and Christian communities, rarely between Christians and Moslems. While the cities were mercantile and mostly Hellenistic, the mountains had been settled by all manner of religious minorities who claimed to have fled both the Byzantine and Moslem orthodoxies. A mountainous terrain is an ideal refuge from the mainstream, except that your enemy is the other refugee competing for the same type of rugged real estate. The mosaic of cultures and religions there was deemed an example of coexistence: Christians of all varieties (Maronites, Armenians, Greco-Syrian Byzantine Orthodox, even Byzantine Catholic, in addition to the few Roman Catholics left over from the Crusades); Moslems (Shiite and Sunni); Druzes; and a few Jews. It was taken for granted that people learned to be tolerant there; I recall how we were taught in school how far more civilized and wiser we were than those in the Balkan communities, where not only did the locals refrain from bathing but also fell prey to fractious fighting. Things appeared to be in a state of stable equilibrium, evolving out of a historical tendency for betterment and tolerance. The terms *balance* and *equilibrium* were often used.

Both sides of my family came from the Greco-Syrian community, the last Byzantine outpost in northern Syria, which included what is now called Lebanon. Note that the Byzantines called themselves “Romans”—*Roumi* (plural *Roum*) in the local languages. We originate from the olive-growing area at the base of Mount Lebanon—we chased the Maronite Christians into the mountains in the famous battle of Amioun, my ancestral village. Since the Arab invasion in the seventh century, we had been living in mercantile peace with the Moslems, with only some occasional harassment by the Lebanese Maronite Christians from the mountains. By some (literally) Byzantine arrangement between the Arab rulers and the Byzantine emperors, we managed to pay taxes to both sides and get protection from both. We thus managed to live in peace for more than a millennium almost devoid of bloodshed: our last true problem was the later troublemaking crusaders, not the Moslem Arabs. The Arabs, who seemed interested only in warfare (and poetry) and, later, the Ottoman Turks, who seemed only concerned with warfare (and pleasure), left to us the uninteresting pursuit of commerce and the less dangerous one of scholarship (like the translation of Aramaic and Greek texts).

By any standard the country called Lebanon, to which we found ourselves suddenly incorporated after the fall of the Ottoman Empire, in the

early twentieth century, appeared to be a stable paradise; it was also cut in a way to be predominantly Christian. People were suddenly brainwashed to believe in the nation-state as an entity.* The Christians convinced themselves that they were at the origin and center of what is loosely called Western culture yet with a window on the East. In a classical case of static thinking, nobody took into account the differentials in birthrate between communities and it was assumed that a slight Christian majority would remain permanent. Levantines had been granted Roman citizenship, which allowed Saint Paul, a Syrian, to travel freely through the ancient world. People felt connected to everything they felt was worth connecting to; the place was exceedingly open to the world, with a vastly sophisticated lifestyle, a prosperous economy, and temperate weather just like California, with snow-covered mountains jutting above the Mediterranean. It attracted a collection of spies (both Soviet and Western), prostitutes (blondes), writers, poets, drug dealers, adventurers, compulsive gamblers, tennis players, après-skiers, and merchants—all professions that complement one another. Many people acted as if they were in an old James Bond movie, or the days when playboys smoked, drank, and, instead of going to the gym, cultivated relationships with good tailors.

The main attribute of paradise was there: cabdrivers were said to be polite (though, from what I remember, they were not polite to me). True, with hindsight, the place may appear more Elysian in the memory of people than it actually was.

I was too young to taste the pleasures of the place, as I became a rebellious idealist and, very early on, developed an ascetic taste, averse to the ostentatious signaling of wealth, allergic to Levantine culture's overt pursuit of luxury and its obsession with things monetary.

As a teenager, I could not wait to go settle in a metropolis with fewer James Bond types around. Yet I recall something that felt special in the intellectual air. I attended the French lycée that had one of the highest success rates for the French *baccalauréat* (the high school degree), even in the subject of the French language. French was spoken there with some purity: as in prerevolutionary Russia, the Levantine Christian and Jewish patrician class (from Istanbul to Alexandria) spoke and wrote formal French as a language of distinction. The most privileged were sent to school in

* It is remarkable how fast and how effectively you can construct a nationality with a flag, a few speeches, and a national anthem; to this day I avoid the label "Lebanese," preferring the less restrictive "Levantine" designation.

France, as both my grandfathers were—my paternal namesake in 1912 and my mother's father in 1929. Two thousand years earlier, by the same instinct of linguistic distinction, the snobbish Levantine patricians wrote in Greek, not the vernacular Aramaic. (The New Testament was written in the bad local patrician Greek of our capital, Antioch, prompting Nietzsche to shout that "God spoke bad Greek.") And, after Hellenism declined, they took up Arabic. So in addition to being called a "paradise," the place was also said to be a miraculous crossroads of what are superfluently tagged "Eastern" and "Western" cultures.

On Walking Walks

My ethos was shaped when, at fifteen, I was put in jail for (allegedly) attacking a policeman with a slab of concrete during a student riot—an incident with strange ramifications since my grandfather was then the minister of the interior, and the person who signed the order to crush our revolt. One of the rioters was shot dead when a policeman who had been hit on the head with a stone panicked and randomly opened fire on us. I recall being at the center of the riot, and feeling a huge satisfaction upon my capture while my friends were scared of both prison and their parents. We frightened the government so much that we were granted amnesty.

There were some obvious benefits in showing one's ability to act on one's opinions, and not compromising an inch to avoid "offending" or bothering others. I was in a state of rage and didn't care what my parents (and grandfather) thought of me. This made them quite scared of *me*, so I could not afford to back down, or even blink. Had I concealed my participation in the riot (as many friends did) and been discovered, instead of being openly defiant, I am certain that I would have been treated as a black sheep. It is one thing to be cosmetically defiant of authority by wearing unconventional clothes—what social scientists and economists call "cheap signaling"—and another to prove willingness to translate belief into action.

My paternal uncle was not too bothered by my political ideas (these come and go); he was outraged that I used them as an excuse to dress sloppily. To him, inelegance on the part of a close family member was the mortal offense.

Public knowledge of my capture had another major benefit: it allowed me to avoid the usual outward signs of teenage rebellion. I discovered that

it is much more effective to act like a nice guy and be “reasonable” if you prove willing to go beyond just verbiage. You can afford to be compassionate, lax, and courteous if, once in a while, when it is least expected of you, but completely justified, you sue someone, or savage an enemy, just to show that you can walk the walk.

“Paradise” Evaporated

The Lebanese “paradise” suddenly evaporated, after a few bullets and mortar shells. A few months after my jail episode, after close to thirteen centuries of remarkable ethnic coexistence, a Black Swan, coming out of nowhere, transformed the place from heaven to hell. A fierce civil war began between Christians and Moslems, including the Palestinian refugees who took the Moslem side. It was brutal, since the combat zones were in the center of the town and most of the fighting took place in residential areas (my high school was only a few hundred feet from the war zone). The conflict lasted more than a decade and a half. I will not get too descriptive. It may be that the invention of gunfire and powerful weapons turned what, in the age of the sword, would have been just tense conditions into a spiral of uncontrollable tit-for-tat warfare.

Aside from the physical destruction (which turned out to be easy to reverse with a few motivated contractors, bribed politicians, and naïve bondholders), the war removed much of the crust of sophistication that had made the Levantine cities a continuous center of great intellectual refinement for three thousand years. Christians had been leaving the area since Ottoman times—those who moved to the West took Western first names and melded in. Their exodus accelerated. The number of cultured people dropped below some critical level. Suddenly the place became a vacuum. Brain drain is hard to reverse, and some of the old refinement may be lost forever.

The Starred Night

The next time you experience a blackout, take some solace by looking at the sky. You will not recognize it. Beirut had frequent power shutdowns during the war. Before people bought their own generators, one side of the sky was clear at night, owing to the absence of light pollution. That was the side of town farthest from the combat zone. People deprived of televi-

sion drove to watch the erupting lights of nighttime battles. They appeared to prefer the risk of being blown up by mortar shells to the boredom of a dull evening.

So you could see the stars with great clarity. I had been told in high school that the planets are in something called *equilibrium*, so we did not have to worry about the stars hitting us unexpectedly. To me, that eerily resembled the stories we were also told about the “unique historical stability” of Lebanon. The very idea of assumed equilibrium bothered me. I looked at the constellations in the sky and did not know what to believe.

HISTORY AND THE TRIPLET OF OPACITY

History is opaque. You see what comes out, not the script that produces events, the generator of history. There is a fundamental incompleteness in your grasp of such events, since you do not see what's inside the box, how the mechanisms work. What I call the generator of historical events is different from the events themselves, much as the minds of the gods cannot be read just by witnessing their deeds. You are very likely to be fooled about their intentions.

This disconnect is similar to the difference between the food you see on the table at the restaurant and the process you can observe in the kitchen. (The last time I brunchd at a certain Chinese restaurant on Canal Street in downtown Manhattan, I saw a rat coming out of the kitchen.)

The human mind suffers from three ailments as it comes into contact with history, what I call the *triplet of opacity*. They are:

- a. the illusion of understanding, or how everyone thinks he knows what is going on in a world that is more complicated (or random) than they realize;
- b. the retrospective distortion, or how we can assess matters only after the fact, as if they were in a rearview mirror (history seems clearer and more organized in history books than in empirical reality); and
- c. the overvaluation of factual information and the handicap of authoritative and learned people, particularly when they create categories—when they “Platonify.”

Nobody Knows What's Going On

The first leg of the triplet is the pathology of thinking that the world in which we live is more understandable, more explainable, and therefore more predictable than it actually is.

I was constantly told by adults that the war, which ended up lasting close to seventeen years, was going to end in “only a matter of days.” They seemed quite confident in their forecasts of duration, as can be evidenced by the number of people who sat waiting in hotel rooms and other temporary quarters in Cyprus, Greece, France, and elsewhere for the war to finish. One uncle kept telling me how, some thirty years earlier, when the rich Palestinians fled to Lebanon, they considered it a *very temporary* solution (most of those still alive are still there, six decades later). Yet when I asked him if it was going to be the same with our conflict, he replied, “No, of course not. This place is different; it has always been different.” Somehow what he detected in others did not seem to apply to him.

This duration blindness in the middle-aged exile is quite a widespread disease. Later, when I decided to avoid the exile’s obsession with his roots (exiles’ roots penetrate their personalities a bit too deeply), I studied exile literature precisely to avoid the traps of a consuming and obsessive nostalgia. These exiles seemed to have become prisoners of their memory of idyllic origin—they sat together with other prisoners of the past and spoke about the old country, and ate their traditional food while some of their folk music played in the background. They continuously ran counterfactuals in their minds, generating alternative scenarios that could have happened and prevented these historical ruptures, such as “if the Shah had not named this incompetent man as prime minister, we would still be there.” It was as if the historical rupture had a specific cause, and that the catastrophe could have been averted by removing *that* specific cause. So I pumped every displaced person I could find for information on their behavior during exile. Almost all act in the same way.

One hears endless stories of Cuban refugees with suitcases still half packed who came to Miami in the 1960s for “a matter of a few days” after the installation of the Castro regime. And of Iranian refugees in Paris and London who fled the Islamic Republic in 1978 thinking that their absence would be a brief vacation. A few are still waiting, more than a quarter century later, for the return. Many Russians who left in 1917, such as

the writer Vladimir Nabokov, settled in Berlin, perhaps to be close enough for a quick return. Nabokov himself lived all his life in temporary housing, in both indigence and luxury, ending his days at the Montreux Palace hotel on Lake Geneva.

There was, of course, some wishful thinking in all of these forecasting errors, the blindness of hope, but there was a knowledge problem as well. The dynamics of the Lebanese conflict had been patently unpredictable, yet people's reasoning as they examined the events showed a constant: almost all those who cared seemed convinced that they understood what was going on. Every single day brought occurrences that lay completely outside their forecast, but they could not figure out that they had not forecast them. Much of what took place would have been deemed completely crazy with respect to the past. Yet it did not seem that crazy *after* the events. This retrospective plausibility causes a discounting of the rarity and conceivability of the event. I later saw the exact same illusion of understanding in business success and the financial markets.

History Does Not Crawl, It Jumps

Later, upon replaying the wartime events in my memory as I formulated my ideas on the perception of random events, I developed the governing impression that our minds are wonderful explanation machines, capable of making sense out of almost anything, capable of mounting explanations for all manner of phenomena, and generally incapable of accepting the idea of unpredictability. These events were unexplainable, but intelligent people thought they were capable of providing convincing explanations for them—after the fact. Furthermore, the more intelligent the person, the better sounding the explanation. What's more worrisome is that all these beliefs and accounts appeared to be logically coherent and devoid of inconsistencies.

So I left the place called Lebanon as a teenager, but, since a large number of my relatives and friends remained there, I kept coming back to visit, especially during the hostilities. The war was not continuous: there were periods of fighting interrupted by "permanent" solutions. I felt closer to my roots during times of trouble and experienced the urge to come back and show support to those left behind who were often demoralized by the departures—and envious of the fair-weather friends who could seek economic and personal safety only to return for vacations during these occasional lulls in the conflict. I was unable to work or read when I was

outside Lebanon while people were dying, but, paradoxically, I was less concerned by the events and able to pursue my intellectual interests guilt-free when I was *inside* Lebanon. Interestingly, people partied quite heavily during the war and developed an even bigger taste for luxuries, making the visits quite attractive in spite of the fighting.

There were a few difficult questions. How could one have predicted that people who seemed a model of tolerance could become the purest of barbarians overnight? Why was the change so abrupt? I initially thought that perhaps the Lebanese war was truly not possible to predict, unlike other conflicts, and that the Levantines were too complicated a race to figure out. Later I slowly realized, as I started to consider all the big events in history, that their irregularity was not a local property.

The Levant has been something of a mass producer of consequential events nobody saw coming. Who predicted the rise of Christianity as a dominant religion in the Mediterranean basin, and later in the Western world? The Roman chroniclers of that period did not even take note of the new religion—historians of Christianity are baffled by the absence of contemporary mentions. Apparently, few of the big guns took the ideas of a seemingly heretical Jew seriously enough to think that he would leave traces for posterity. We only have a single contemporary reference to Jesus of Nazareth—in *The Jewish Wars* of Josephus—which itself may have been added later by a devout copyist. How about the competing religion that emerged seven centuries later; who forecast that a collection of horsemen would spread their empire and Islamic law from the Indian subcontinent to Spain in just a few years? Even more than the rise of Christianity, it was the spread of Islam (the third edition, so to speak) that carried full unpredictability; many historians looking at the record have been taken aback by the swiftness of the change. Georges Duby, for one, expressed his amazement about how quickly close to ten centuries of Levantine Hellenism were blotted out “with a strike of a sword.” A later holder of the same history chair at the Collège de France, Paul Veyne, aptly talked about religions spreading “like bestsellers”—a comparison that indicates unpredictability. These kinds of discontinuities in the chronology of events did not make the historian’s profession too easy: the studious examination of the past in the greatest of detail does not teach you much about the mind of History; it only gives you the illusion of understanding it.

History and societies do not crawl. They make jumps. They go from fracture to fracture, with a few vibrations in between. Yet we (and historians) like to believe in the predictable, small incremental progression.

It struck me, a belief that has never left me since, that we are just a great machine for looking backward, and that humans are great at self-delusion. Every year that goes by increases my belief in this distortion.

Dear Diary: On History Running Backward

Events present themselves to us in a distorted way. Consider the nature of information: of the millions, maybe even trillions, of small facts that prevail before an event occurs, only a few will turn out to be relevant later to your understanding of what happened. Because your memory is limited and filtered, you will be inclined to remember those data that subsequently match the facts, unless you are like the eponymous Funes in the short story by Jorge Luis Borges, “Funes, the Memorious,” who forgets nothing and seems condemned to live with the burden of the accumulation of unprocessed information. (He does not manage to live too long.)

I had my first exposure to the retrospective distortion as follows. During my childhood I had been a voracious, if unsteady, reader, but I spent the first phase of the war in a basement, diving body and soul into all manner of books. School was closed and it was raining mortar shells. It is dreadfully boring to be in basements. My initial worries were mostly about how to fight boredom and what to read next*—though being forced to read for lack of other activities is not as enjoyable as reading out of one’s own volition. I wanted to be a philosopher (I still do), so I felt that I needed to make an investment by forcibly studying others’ ideas. Circumstances motivated me to study theoretical and general accounts of wars and conflicts, trying to get into the guts of History, to get into the workings of that big machine that generates events.

Surprisingly, the book that influenced me was not written by someone in the thinking business but by a journalist: William Shirer’s *Berlin Diary: The Journal of a Foreign Correspondent, 1934–1941*. Shirer was a radio correspondent, famous for his book *The Rise and Fall of the Third Reich*. It occurred to me that the *Journal* offered an unusual perspective. I had already read (or read about) the works of Hegel, Marx, Toynbee, Aron, and Fichte on the philosophy of history and its properties and thought that I had a vague idea of the notions of dialectics, to the extent that there was

* Benoît Mandelbrot, who had a similar experience at about the same age, though close to four decades earlier, remembers his own war episode as long stretches of painful boredom punctuated by brief moments of extreme fear.