BOOK II

Modernity and the Denial of Antifragility

As in Baudelaire's sad poem about the albatross, what is made to fly will not do well trapped on the ground, where it is forced to traipse. And it is quite fitting that "volatility" comes from *volare,* "to fly" in Latin. Depriving political (and other) systems of volatility harms them, causing eventually greater volatility of the cascading type.

This section, Book II, deals with the fragility that comes from the denial of hormesis, the natural antifragility of organisms, and how we hurt systems with the very best of intentions by playing conductor. We are fragilizing social and economic systems by denying them stressors and randomness, putting them in the Procrustean bed of cushy and comfortable—but ultimately harmful—modernity.

Procrustes was an inn-keeper in Greek mythology who, in order to make the travelers fit in his bed, cut the limbs of those who were too tall and stretched those who were too short. But he had the bed fitting the visitor with total perfection.

As we saw in Chapter 3, treating an organism like a simple machine is a kind of simplification or approximation or reduction that is exactly like a Procrustean bed. It is often with the most noble intentions that we do so, as we are pressured to "fix" things, so we often blow them up with our fear of randomness and love of smoothness.[1]

Book II will also discuss the competition between man and natural forces, the craving of volatility by some antifragile systems, and how we make social, political (and other) systems vulnerable to Black Swans when we overstabilize them.

[1] Where simplifications fail, causing the most damage, is when something nonlinear is simplified with the linear as a substitute. That is the most common Procrustean bed.

CHAPTER 5

The Souk and the Office Building

The Reds and the Whites all go to Zurich—War is not a prison—The turkey's thwarted projects—Remember we are in Extremistan

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TWO TYPES OF PROFESSIONS

Consider the fate of Ioannis (John) and Georgios (George), two identical twin brothers, born in Cyprus (both of them), currently both living in the Greater London area. John has been employed for twenty-five years as a clerk in the personnel department of a large bank, dealing with the relocation of employees around the globe. George is a taxi driver.

John has a perfectly predictable income (or so he thinks), with benefits, four weeks' annual vacation, and a gold watch every twenty-five years of employment. Every month, £3,082 is deposited in his local Nat West checking account. He spends a portion of it for the mortgage on his house west of London, the utilities, and feta cheese, and has a bit left for his savings. He used to wake up on Saturday morning, the day when people stretch and linger in bed, anxiety free, telling himself "life is good"—until the banking crisis, when he realized that his job could be "made redundant." Unemployment would seriously hit him hard. As a personnel expert, he has seen the implosions of long careers, with persons who, laid off at the age of fifty, never recovered.

George, who lives on the same street as his brother, drives a black taxi—meaning he has a license for which he spent three years expanding his frontal lobes by memorizing streets and itineraries in Greater London, which gives him the right to pick up clients in the streets. His income is extremely variable. Some days are "good," and he earns several hundred pounds; some are worse, when he does not even cover his costs; but, year after year, he averages about the same as his brother. To date, he has only had a single day in his twenty-five-year career without a fare. Because of the variability of his income, he keeps moaning that he does not have the job security of his brother—but in fact this is an illusion, for he has a bit more.

This is the central illusion in life: that randomness is risky, that it is a bad thing—and that eliminating randomness is done by eliminating randomness.

Artisans, say, taxi drivers, prostitutes (a very, very old profession), carpenters, plumbers, tailors, and dentists, have some volatility in their

income but they are rather robust to a minor professional Black Swan, one that would bring their income to a complete halt. Their risks are visible. Not so with employees, who have no volatility, but can be surprised to see their income going to zero after a phone call from the personnel department. Employees' risks are hidden.

Thanks to variability, these artisanal careers harbor a bit of antifragility: small variations make them adapt and change continuously by learning from the environment and being, sort of, continuously under pressure to be fit. Remember that stressors are information; these careers face a continuous supply of these stressors that make them adjust opportunistically. In addition, they are open to gifts and positive surprises, free options—the hallmark of antifragility, as we will see in Book IV. George was used to having, once in a while, a crazy request, one he was free to decline: during the Icelandic volcano scare, when U.K. air traffic was shut down, he was asked by a rich old lady to drive her to a wedding in the South of France—a two-thousand-mile round-trip journey. Likewise, a prostitute faces the small probability of seeing a severely infatuated rich client give her a very expensive diamond, or even an offer of matrimony, in what can be expected to be a short transitional period before her widowhood.

And George has the freedom to continue until he drops (many people continue to drive cabs into their eighties, mostly to kill time), since he is his own boss, compared to his brother, who is completely unhireable in his fifties.

The difference between the two volatilities in income applies to political systems—and, as we will see in the next two chapters, to about everything in life. Man-made smoothing of randomness produces the equivalent of John's income: smooth, steady, but fragile. Such income is more vulnerable to large shocks that can make it go to zero (plus some unemployment benefits if he resides in one of the few welfare states). Natural randomness presents itself more like George's income: smaller role for very large shocks, but daily variability. Further, such variability helps improve the system (hence the antifragility). A week with declining earnings for a taxi driver or a prostitute provides information concerning the environment and intimates the need to find a new part of town where clients hang around; a month or so without earnings drives them to revise their skills.

Further, for a self-employed person, a small (nonterminal) mistake is information, valuable information, one that directs him in his adaptive approach; for someone employed like John, a mistake is something that goes into his permanent record, filed in the personnel department. Yogi Berra once said: "We made the wrong mistake"—and for John all mistakes are wrong mistakes. Nature loves small errors (without which genetic variations are impossible), humans don't—hence when you rely on human judgment you are at the mercy of a mental bias that disfavors antifragility.

So, alas, we humans are afraid of the second type of variability and naively fragilize systems—or prevent their antifragility—by protecting them. In other words, a point worth repeating every time it applies, this avoidance of small mistakes makes the large ones more severe.

The centralized state resembles the income of John; the city-state model that of George. John has one large employer, George many small ones—so he can select the ones that fit him the best and hence has, at any point in time, "more options." One has the illusion of stability, but is fragile; the other one the illusion of variability, but is robust and even antifragile.

The more variability you observe in a system, the less Black Swan–prone it is. Let us now examine how this applies to political systems with the story of Switzerland.

Lenin in Zurich

I was recently in a café-turned-expensive-restaurant in Zurich poring over the overpriced menu, with prices at least triple of those in a place of equivalent quality in the United States. The world's recent crisis had made Switzerland even more of a safe haven than it had ever been, causing its currency to rise dramatically—Switzerland is the most antifragile place on the planet; it benefits from shocks that take place in the rest of the world. The friend, a writer, pointed out to me that Lenin, who lived in town, used to play chess in the café with the Dadaist poet Tristan Tzara. Yes, the Russian revolutionary Vladimir Ilyich Ulyanov, later known as Lenin, spent some time in Switzerland concocting his project of the great top-down modernist state and largest human experiment in centralized state control. It hit me that there was something eerie in Lenin's presence there, for, a few

days before, I had been at a conference in Montreux, on Lake Geneva, that took place in the same lakefront hotel where Vladimir Nabokov, the émigré Russian aristocrat and victim of Lenin, spent the last couple of decades of his life.

It seemed interesting to me that sheltering the reds and the whites, both the Bolsheviks and the aristocratic White Russians they later displaced, seems to be part of the primary business of the Helvetic Confederation. The main cities such as Zurich, Geneva, or Lausanne bear traces of the political refugees who went there for shelter: émigrés, from the Iranian royals thrown out by the Islamists to the latest African potentate executing "plan B." Even Voltaire spent some time hiding in the place, in Ferney, a suburb of Geneva near the French border (before it even joined the confederation). Voltaire, the perfectly protected gadfly, would rush to Ferney after insulting the king of France, the Catholic Church, or some other authority—what people don't usually know about him is that he also had an incentive to seek protection there for financial reasons. Voltaire was a self-made man, a wealthy merchant, investor, and speculative dealer. It is worth noting that much of his wealth came from the antifragility of stressors, as he started building his fortune during his early exile.

So, like Voltaire, there are refugees of other types: financial refugees coming from places of turmoil, recognizable by their expensive and boring clothes, bland vocabulary, contrived decorum, and expensive (shiny) watches—in other words, non-Voltaires. Like many rich people, they feel entitled to laugh at their own jokes. These (dull) people are not looking for personal shelter: it is their assets that are seeking refuge. While some political persons might prefer to hide from the risks of their national regime in France or England, more exciting places on Saturday night, it is most certainly in Switzerland that their checking account wants to be. It is economically the most robust place on the planet—and has been so for quite a few centuries.

This great variety of people and their wallets are there, in Switzerland, for its shelter, safety, and stability. But all these refugees don't notice the obvious: the most stable country in the world *does not have* a government. And it is not stable in spite of not having a government; it is stable *because* it does not have one. Ask random Swiss citizens to name their president, and count the proportion of people who can do so—they can usually name the presidents of France or the United States but not their own. Its currency

works best (at the time of writing it proved to be the safest), yet its central bank is tiny, even relative to its size.

Do these politicians biding their time before (they hope) returning to power notice such absence of government, accept that they are in Switzerland because of such absence of government, and adapt their ideas on nation-states and political systems accordingly? Not at all.

It is not quite true that the Swiss do not have a government. What they do not have is a large *central* government, or what the common discourse describes as "the" government—what governs them is entirely bottom-up, municipal of sorts, regional entities called cantons, near-sovereign mini-states united in a confederation. There is plenty of volatility, with enmities between residents that stay at the level of fights over water fountains or other such uninspiring debates. This is not necessarily pleasant, since neighbors are transformed into busybodies—this is a dictatorship from the bottom, not from the top, but a dictatorship nevertheless. But this bottom-up form of dictatorship provides protection against the romanticism of utopias, since no big ideas can be generated in such an unintellectual atmosphere—it suffices to spend some time in cafés in the old section of Geneva, particularly on a Sunday afternoon, to understand that the process is highly unintellectual, devoid of any sense of the grandiose, even downright puny (there is a famous quip about how the greatest accomplishment of the Swiss was inventing the cuckoo clock while other nations produced great works—nice story except that the Swiss did not invent the cuckoo clock). But the system produces stability—boring stability—at every possible level.

Also note that the hideously glitzy scenes one encounters in Switzerland, in all of Geneva, in some parts of Zurich (the center), and particularly in the ski resorts such as Gstaadt and San Moritz are not the direct product of the country nor part of its mission, but the result of its success, as Switzerland acts as a magnet for the ugly rich and tax refugees.

Note for now that this is the last major country that is not a nation-state, but rather a collection of small municipalities left to their own devices.

BOTTOM-UP VARIATIONS

What I call bottom-up variations—or noise—is the type of political volatility that takes place within a municipality, the petty fights and frictions in the running of regular affairs. It is not scalable (or what is called *invariant* under scale transformation): in other words, if you increase the size, say, multiply the number of people in a community by a hundred, you will have markedly different dynamics. A large state does not behave at all like a gigantic municipality, much as a baby human does not resemble a smaller adult. The difference is qualitative: the increase in the number of persons in a given community alters the quality of the relationship between parties. Recall the nonlinearity description from the Prologue. If you multiply by ten the number of persons in a given entity, you do not preserve the properties: there is a transformation. Here conversations switch from the mundane—but effective—to abstract numbers, more interesting, more academic perhaps, but, alas, less effective.

A cluster of municipalities with charming provincial enmities, their own internal fights, and people out to get one another aggregates to a quite benign and stable state. Switzerland is similar to the income of the second brother, stable because of the variations and noise at the local level. Just as the income of the cab driver shows instability on a daily basis but annual stability, likewise Switzerland shows stability at the aggregate level, as the ensemble of cantons produces a solid system.

The way people handle local affairs is vastly different from the way they handle large, abstract public expenditures: we have traditionally lived in small units and tribes and managed rather well in small units.[1]

Further, biology plays a role in a municipal environment, not in a larger system. An administration is shielded from having to feel the sting of shame (with flushing in his face), a biological reaction to overspending and other failures such as killing people in Vietnam. Eye contact with one's peers changes one's behavior. But for a desk-grounded office leech, a number is a just a number. Someone you see in church Sunday morning would feel uncomfortable for his mistakes—and more responsible for them. On the

small, local scale, his body and biological response would direct him to avoid causing harm to others. On a large scale, others are abstract items; given the lack of social contact with the people concerned, the civil servant's brain leads rather than his emotions—with numbers, spreadsheets, statistics, more spreadsheets, and theories.

When I expressed this idea to my co-author Mark Blyth, he blurted out the obvious: "Stalin could not have existed in a municipality."

Small is beautiful in so many other ways. Take for now that the small (in the aggregate, that is, a collection of small units) is more antifragile than the large—in fact the large is doomed to breaking, a mathematical property we will explain later, that, sadly, seems universal as it applies to large corporations, very large mammals, and large administrations.[2]

There is another issue with the abstract state, a psychological one. We humans scorn what is not concrete. We are more easily swayed by a crying baby than by thousands of people dying elsewhere that do not make it to our living room through the TV set. The one case is a tragedy, the other a statistic. Our emotional energy is blind to probability. The media make things worse as they play on our infatuation with anecdotes, our thirst for the sensational, and they cause a great deal of unfairness that way. At the present time, one person is dying of diabetes every seven seconds, but the news can only talk about victims of hurricanes with houses flying in the air.

The problem is that by creating bureaucracies, we put civil servants in a position to make decisions based on abstract and theoretical matters, with the illusion that they will be making them in a rational, accountable way.

Also consider that lobbyists—this annoying race of lobbyists—cannot exist in a municipality or small region. The Europeans, thanks to the centralization of (some) power with the European Commission in Brussels, are quickly discovering the existence of these mutants coming to manipulate democracy for the sake of some large corporation. By influencing one single decision or regulation in Brussels, a single lobbyist gets a large bang. It is a much larger payoff (at low cost) than with municipalities, which would require armies of lobbyists trying to convince people while embedded in their communities.[3]

Consider, too, the other effect of scale: small corporations are less likely to have lobbyists.

The same bottom-up effect applies to law. The Italian political and legal philosopher Bruno Leoni has argued in favor of the robustness of judge-

based law (owing to its diversity) as compared to explicit and rigid codifications. True, the choice of a court could be a lottery—but it helps prevent large-scale mistakes.

I use the example of Switzerland to show the natural antifragility of political systems and how stability is achieved by managing noise, having a mechanism for letting it run its natural course, not by minimizing it.

Note another element of Switzerland: it is perhaps the most successful country in history, yet it has traditionally had a very low level of university education compared to the rest of the rich nations. Its system, even in banking during my days, was based on apprenticeship models, nearly vocational rather than the theoretical ones. In other words, on *techne* (crafts and know how), not *episteme* (book knowledge, know what).

AWAY FROM EXTREMISTAN

Let us now examine the technical aspects of the process, a more statistical view of the effect of human intervention on the volatility of affairs. There is a certain mathematical property to this bottom-up volatility, and to the volatility of natural systems. It generates the kind of randomness I call Mediocristan—plenty of variations that might be scary, but tend to cancel out in the aggregate (over time, or over the collection of municipalities that constitute the larger confederation or entity)—rather than the unruly one called Extremistan, in which you have mostly stability and occasionally large chaos—errors there have large consequences. One fluctuates, the other jumps. One has a lot of small variations, the other varies in lumps. Just like the income of the driver compared to that of bank employee. The two types of randomness are qualitatively distinct.

Mediocristan has a lot of variations, not a single one of which is extreme; Extremistan has few variations, but those that take place are extreme.

Another way to understand the difference: your caloric intake is from Mediocristan. If you add the calories you consume in a year, even without adjusting for your lies, not a single day will represent much of the total (say, more than 0.5 percent of the total, five thousand calories when you may consume eight hundred thousand in a year). So the exception, the rare event, plays an inconsequential role in the aggregate and the long-term. You cannot double your weight in a single day, not even a month, not possibly in a year—but you can double your net worth or lose half of it in a single moment.

By comparison, if you take the sale of novels, more than half of sales (and perhaps 90 percent of profits) tends to come from the top 0.1 percent, so the exception, the one-in-a-thousand event, is dominant there. So financial matters—and other economic matters—tend to be from Extremistan, just like history, which moves by discontinuities and jumps from one state to another.[4]

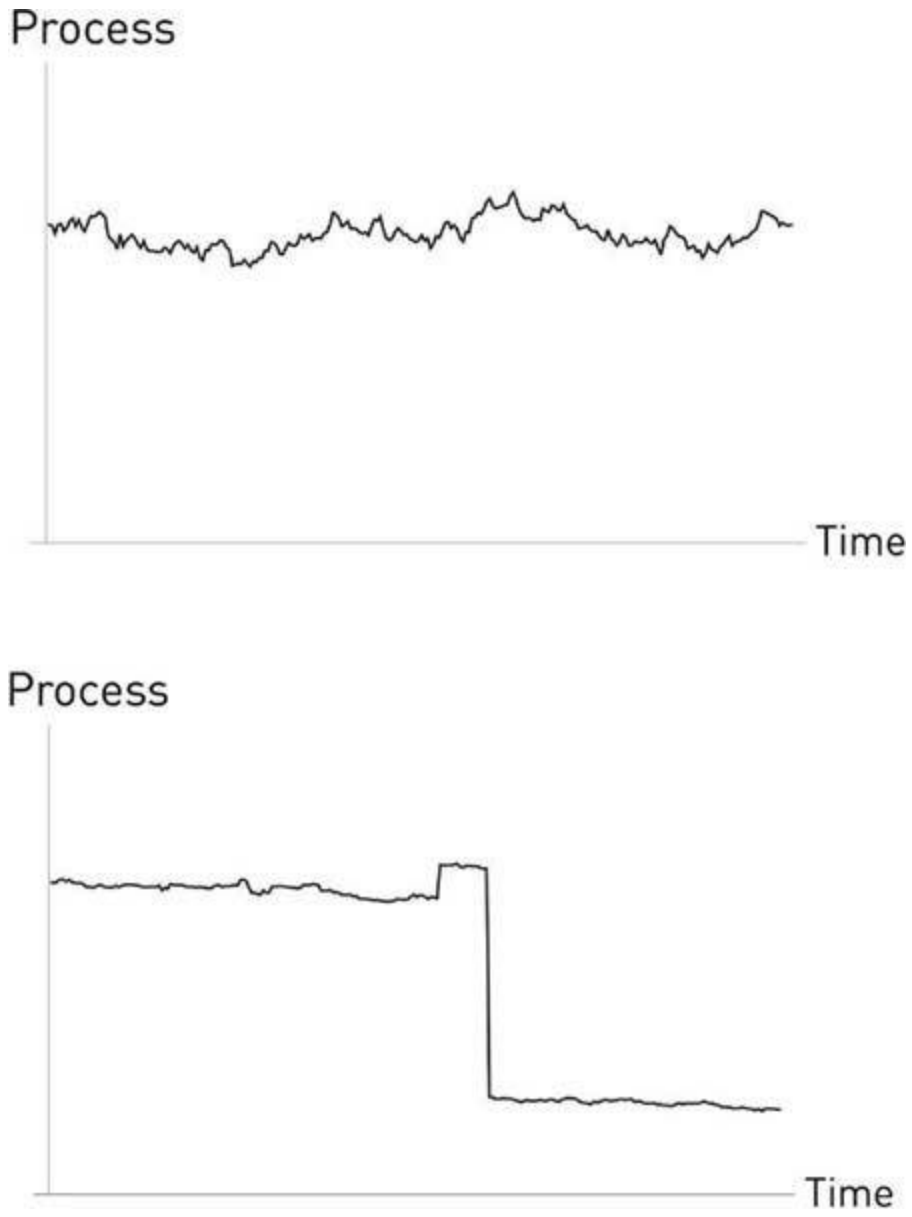

FIGURE 3. Municipal noise, distributed variations in the souks (first) compared to that of centralized or human-managed systems (second)—or, equivalently, the income of a taxi driver (first) and that of an employee (second). The second graph shows moves taking place from cascade to cascade, or Black Swan to Black Swan. Human overintervention to smooth or control processes causes a switch from one kind of system, Mediocristan, into another, Extremistan. This effect applies to all manner of systems with constrained volatility —health, politics, economics, even someone's mood with and without Prozac. Or the difference between the entrepreneur-driven Silicon Valley (first) and the banking system (second).

Figure 3 illustrates how antifragile systems are hurt when they are deprived of their natural variations (mostly thanks to naive intervention).

Beyond municipal noise, the same logic applies to: the child who, after spending time in a sterilized environment, is left out in the open; a system with dictated political stability from the top; the effects of price controls; the advantages of size for a corporation; etc. We switch from a system that produces steady but controllable volatility (Mediocristan), closer to the statistical "bell curve" (from the benign family of the Gaussian or Normal Distribution), into one that is highly unpredictable and moves mostly by jumps, called "fat tails." Fat tails—a synonym for Extremistan—mean that remote events, those in what is called the "tails," play a disproportionate role. One (first graph) is volatile; it fluctuates but does not sink. The other (second graph) sinks without significant fluctuations outside of episodes of turmoil. In the long run the second system will be far more volatile—but volatility comes in lumps. When we constrain the first system we tend to get the second outcome.

Note also that in Extremistan predictability is very low. In the second, pseudo-smooth kind of randomness, mistakes appear to be rare, but they will be large, often devastating when they occur. Actually, an argument we develop in Book IV, anything locked into planning tends to fail precisely because of these attributes—it is quite a myth that planning helps corporations: in fact we saw that the world is too random and unpredictable to base a policy on visibility of the future. What survives comes from the interplay of some fitness and environmental conditions.

The Great Turkey Problem

Let me now move back from the technical jargon and graphs of Fat Tails and Extremistan to colloquial Lebanese. In Extremistan, one is prone to be fooled by the properties of the past and get the story exactly backwards. It is easy, looking at what is happening in the second graph of Figure 3, before the big jump down, to believe that the system is now safe, particularly when the system has made a progressive switch from the "scary" type of visibly volatile randomness at left to the apparently safe right. It looks like a drop in volatility—and it is not.

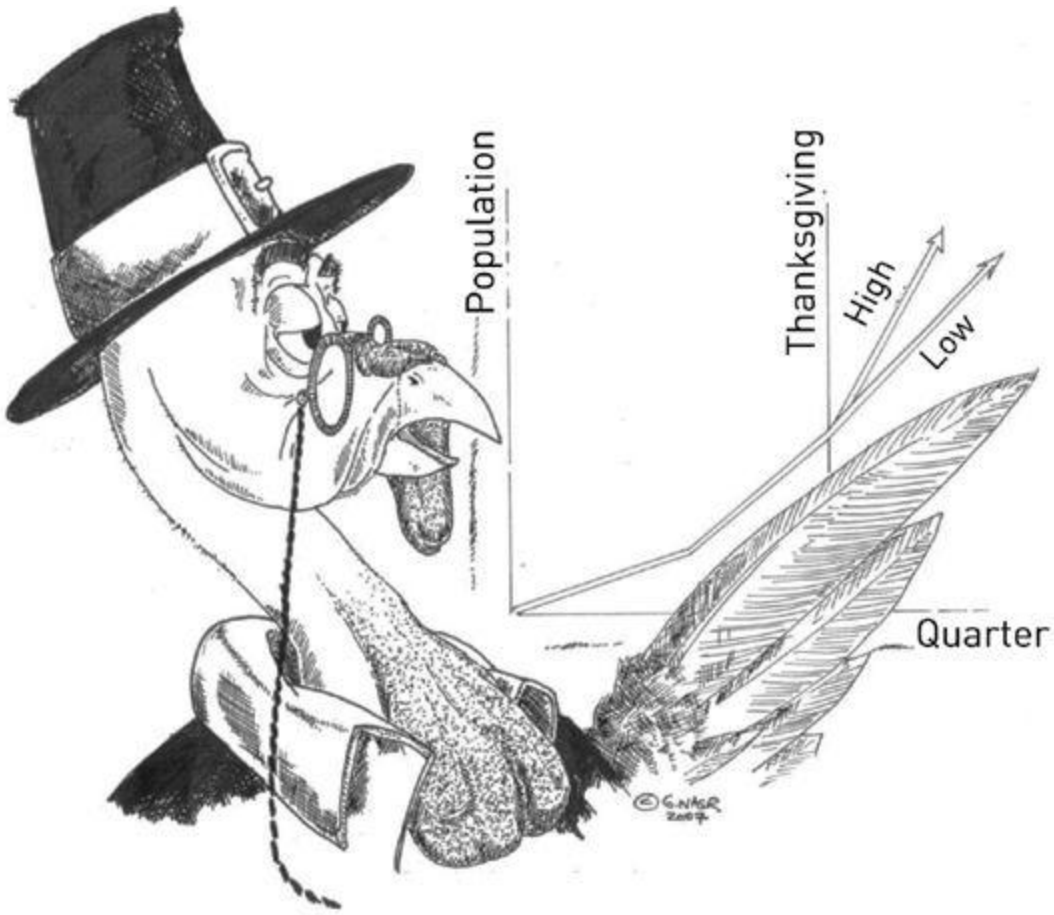

FIGURE 4. A turkey using "evidence"; unaware of Thanksgiving, it is making "rigorous" future projections based on the past. Credit: George Nasr

A turkey is fed for a thousand days by a butcher; every day confirms to its staff of analysts that butchers love turkeys "with increased statistical confidence." The butcher will keep feeding the turkey until a few days before Thanksgiving. Then comes that day when it is really not a very good idea to be a turkey. So with the butcher surprising it, the turkey will have a revision of belief—right when its confidence in the statement that *the butcher loves turkeys* is maximal and "it is very quiet" and soothingly predictable in the life of the turkey. This example builds on an adaptation of a metaphor by Bertrand Russell. The key here is that such a surprise will be a Black Swan event; but just for the turkey, not for the butcher.

We can also see from the turkey story the mother of all harmful mistakes: mistaking absence of evidence (of harm) for evidence of absence, a mistake

that we will see tends to prevail in intellectual circles and one that is grounded in the social sciences.

So our mission in life becomes simply "how not to be a turkey," or, if possible, how to be a turkey in reverse—antifragile, that is. "Not being a turkey" starts with figuring out the difference between true and manufactured stability.

The reader can easily imagine what happens when constrained, volatility-choked systems explode. We have a fitting example: the removal of the Baath Party, with the abrupt toppling of Saddam Hussein and his regime in 2003 by the United States. More than a hundred thousand persons died, and ten years later, the place is still a mess.

TWELVE THOUSAND YEARS

We started the discussion of the state with the example of Switzerland. Now let us go a little bit farther east.

The northern Levant, roughly today's northern part of Syria and Lebanon, stayed perhaps the most prosperous province in the history of mankind, over the long, very long stretch of time from the pre-pottery Neolithic until very modern history, the middle of the twentieth century. That's twelve thousand years—compared to, say, England, which has been prosperous for about five hundred years, or Scandinavia, now only prosperous for less than three hundred years. Few areas on the planet have managed to thrive with so much continuity over any protracted stretch of time, what historians call *longue durée*. Other cities came and went; Aleppo, Emesa (today Homs), and Laodicea (Lattakia) stayed relatively affluent.

The northern Levant was since ancient times dominated by traders, largely owing to its position as a central spot on the Silk Road, and by agricultural lords, as the province supplied wheat to much of the Mediterranean world, particularly Rome. The area supplied a few Roman emperors, a few Catholic popes before the schisms, and more than thirty Greek language writers and philosophers (which includes many of the heads of Plato's academy), in addition to the ancestors of the American visionary and computer entrepreneur Steve Jobs, who brought us the Apple computer, on one of which I am recopying these lines (and the iPad tablet, on which you may be reading them). We know of the autonomy of the province from the records during Roman days, as it was then managed by the local elites, a decentralized method of ruling through locals that the Ottoman retained. Cities minted their own coins.

Then two events took place. First, after the Great War, one part of the northern Levant was integrated into the newly created nation of Syria, separated from its other section, now part of Lebanon. The entire area had been until then part of the Ottoman Empire, but functioned as somewhat autonomous regions—Ottomans, like the Romans before them, let local

elites run the place so long as sufficient tax was paid, while they focused on their business of war. The Ottoman type of imperial peace, the *pax Ottomana*, like its predecessor the *pax Romana,* was good for commerce. Contracts were enforced, and that is what governments are needed for the most. In the recent nostalgic book *Levant,* Philip Mansel documents how the cities of the Eastern Mediterranean operated as city-states separated from the hinterland.

Then, a few decades into the life of Syria, the modernist Baath Party came to further enforce utopias. As soon as the Baathists centralized the place and enforced their statist laws, Aleppo and Emesa went into instant decline.

What the Baath Party did, in its "modernization" program, was to remove the archaic mess of the souks and replace them with the crisp modernism of the office building.

The effect was immediately visible: overnight the trading families moved to places such as New York and New Jersey (for the Jews), California (for the Armenians), and Beirut (for the Christians). Beirut offered a commerce-friendly atmosphere, and Lebanon was a benign, smaller, disorganized state without any real central government. Lebanon was small enough to be a municipality on its own: it was smaller than a medium-size metropolitan area.

War, Prison, or Both

But while Lebanon had all the right qualities, the state was *too* loose, and by allowing the various Palestinian factions and the Christian militias to own weapons, it caused an arms race between the communities while placidly watching the entire buildup. There was also an imbalance between communities, with the Christians trying to impose their identity on the place. Disorganized is invigorating; but the Lebanese state was one step too disorganized. It would be like allowing each of the New York mafia bosses to have a larger army than the Joint Chiefs of Staff (just imagine John Gotti with missiles). So in 1975 a raging civil war started in Lebanon.

A sentence that still shocks me when I think about it was voiced by one of my grandfather's friends, a wealthy Aleppine merchant who fled the

Baath regime. When my grandfather asked his friend during the Lebanese war why he did not go back to Aleppo, his answer was categorical: "We people of Aleppo prefer war to prison." I thought that he meant that they were going to put him in jail, but then I realized that by "prison" he meant the loss of political and economic freedoms.

Economic life, too, seems to prefer war to prison. Lebanon and Northern Syria had very similar wealth per individual (what economists call Gross Domestic Product) about a century ago—and had identical cultures, language, ethnicities, food, and even jokes. Everything was the same except for the rule of the "modernizing" Baath Party in Syria compared to the totally benign state in Lebanon. In spite of a civil war that decimated the population, causing an acute brain drain and setting wealth back by several decades, in addition to every possible form of chaos that rocked the place, today Lebanon has a considerably higher standard of living—between three and six times the wealth of Syria.

Nor did the point escape Machiavelli. Jean-Jacques Rousseau wrote, citing him: "It seemed, wrote Machiavelli, that in the midst of murders and civil wars, our republic became stronger [and] its citizens infused with virtues.… A little bit of agitation gives resources to souls and what makes the species prosper isn't peace, but freedom."

Pax Romana

The centralized nation-state is not exactly new in history. In fact, it existed in a nearly identical form in ancient Egypt. But this was an isolated event in history, and it did not survive there for long: the Egyptian high state started collapsing upon contact with the crazy unruly barbaric disorganized harassing invaders coming from Asia Minor with their assault chariots, literally a killer app.

The dynasties of ancient Egypt did not run the place like an empire but like an integrated state, which is markedly different—as we saw, it produces different types of variations. Nation-states rely on centralized bureaucracy, whereas empires, such as the Roman empire and Ottoman dynasties, have relied on local elites, in fact allowing the city-states to prosper and conserve some effective autonomy—and, what was great for peace, such autonomy

was commercial, not military. In reality, the Ottomans did these vassals and suzerains a favor by preventing them from involvement in warfare—this took away militaristic temptations and helped them thrive; regardless of how iniquitous the system seemed to be on the surface, it allowed locals to focus on commerce rather than war. It protected them from themselves. This is the argument brought by David Hume in his *History of England* in favor of small states, as large states get tempted by warfare.

Clearly neither the Romans nor the Ottomans were allowing local autonomy out of love of freedom on the part of others; they just did it for convenience. A combination of empire (for some affairs) and semi-independent regions (left alone for their own business) provides more stability than the middle: the centralized nation-state with flags and discrete borders.

But the states, even when centralized, as in Egypt or China, were, in practice, not too different from the Roman and Ottoman ones—except for the centralization of intellect with the scribes and the mandarinate system establishing a monopoly of knowledge. Some of us may remember that there were days with no Internet, no electronic monitoring of wire transfers to supervise tax receipts. And before modernity's communication networks, with the telegraph, the train, and, later, the telephone, states had to rely on messenger services. So a local provincial ruler was king for a large number of matters, even though he was not so nominally. Until recent history, the central state represented about 5 percent of the economy—compared to about ten times that share in modern Europe. And, further, governments were sufficiently distracted by war to leave economic affairs to businessmen.[5]

War or No War

Let us take a look at Europe before the creations of the nation-states of Germany and Italy (marketed as "re-unification," as if these nations had been crisp units in some romantic past). There was, until the creation of these romantic entities, a fissiparous and amorphous mass of small statelings and city-states in constant tension—but shifting alliances. In most of their history, Genoa and Venice were competing for the Eastern and

Southern Mediterranean like two hookers battling for a sidewalk. And here is something comforting about statelings at war: mediocrity cannot handle more than one enemy, so war here turns into an alliance there. Tension was always present somewhere but without large consequences, like precipitation in the British Isles; mild rain and no floods are vastly more manageable than the opposite: long droughts followed by intense rainfall. In other words, Mediocristan.

Then of course the contagious creation of nation-states in the late nineteenth century led to what we saw with the two world wars and their sequels: more than sixty million (and possibly eighty million) victims. The difference between war and *no war* became huge, with marked discontinuity. This is no different from a switch to "winner take all" effects in industry, the domination of rare events. A collection of statelings is similar to the restaurant business we discussed earlier: volatile, but you never have a generalized restaurant crisis—unlike, say, the banking business. Why? Because it is composed of a lot of independent and competing small units that do not individually threaten the system and make it jump from one state to another. Randomness is distributed rather than concentrated.

Some people have fallen for the naive turkey-style belief that the world is getting safer and safer, and of course they naively attribute it to the holy "state" (though bottom-up Switzerland has about the lowest rate of violence of any place on the planet). It is exactly like saying that nuclear bombs are safer because they explode less often. The world is subjected to fewer and fewer acts of violence, while wars have the potential to be more criminal. We were very close to the mother of all catastrophes in the 1960s when the United States was about to pull the nuclear trigger on the Soviet Union. Very close. When we look at risks in Extremistan, we don't look at evidence (evidence comes too late), we look at potential damage: never has the world been more prone to more damage; never.[6] It is hard to explain to naive data-driven people that risk is in the future, not in the past.

The messy multi-ethnic empire, the so-called Austro-Hungarian Empire, vanished after the great war, along with its Ottoman neighbor and rival (and, to a large extent, sibling—don't tell them), to be replaced with crisp, clean nation-states. The Ottoman Empire with its messy nationalities—or, rather, what was left of it—became the state of Turkey, modeled after Switzerland, with nobody noticing the inconsistency. Vienna became

trapped in Austria, with whom it shared very little outside the formal language. Imagine moving New York City to central Texas and still calling it New York. Stefan Zweig, the Viennese Jewish novelist, then considered the most influential author in the world, expressed his pain in the poignant memoir *The World of Yesterday*. Vienna joined the league of multicultural cities such as Alexandria, Smyrna, Aleppo, Prague, Thessaloniki, Constantinople (now Istanbul), and Trieste, now squeezed into the Procrustean bed of the nation-state, with its citizens left in the grip of intergenerational nostalgia. Unable to handle the loss and integrate elsewhere, Zweig later committed suicide in Brazil. I first read his account as I was put in a similar situation of physical and cultural exile when my Levantine Christian world was shattered by the Lebanese war, and I wondered whether he might have stayed alive had he gone to New York instead.

[1] I bypass here the economic argument as to whether autonomous city-states were invigorated with economic energy (as Henri Pirenne or Max Weber advocated, in a sort of romantic way); my (mathematical) point is that a collection of small units with semi-independent variations produces vastly different risk characteristics than a single large unit.

[2] It is quite distressing to hear debates about political systems that make comparisons between countries when the size of the entities is not the same—say, comparing Singapore to Malaysia. The size of the unit may matter more than the system.

[3] Thankfully, the European Union is legally protected from overcentralization thanks to the principle of subsidiarity: things should be handled by the smallest possible unit that can manage them with efficacy. The idea was inherited from the Catholic Church: philosophically, a unit doesn't need to be very large (the state) nor very small (the individual), but somewhere in between. This is a powerful philosophical statement, particularly in light of both the transfers of fragility we saw in Chapter 4 and the notion that size fragilizes, much on which later.

[4] When randomness gets distributed across a large number of small units, along with small recurrent political disorder, we get the first type, the benign Mediocristan. When randomness concentrates, we get the second type, the sneaky Extremistan.

[5] Note that people invoke an expression, "Balkanization," about the mess created by fragmented states, as if fragmentation was a bad thing, and as if there was an alternative in the Balkans—but nobody uses "Helvetization" to describe its successes.

[6] A more rigorous reading of the data—with appropriate adjustment for the unseen—shows that a war that would decimate the planet would be completely consistent with the statistics, and would not even be an "outlier." As we will see, Ben Bernanke was similarly fooled with his *Great Moderation,* a turkey problem; one can be confused by the properties of any process with compressed volatility from the top. Some people, like Steven Pinker, misread the nature of the statistical process and hold such a thesis, similar to the "great moderation" in finance.

CHAPTER 6

Tell Them I Love (Some) Randomness

Maxwell in Extremistan—Complicated mechanisms to feed a donkey—Virgil said to do it, and do it now

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The point of the previous chapter was that the risk properties of the first brother (the fragile bank employee) are vastly different from those of the second one (the comparatively antifragile artisan taxi driver). Likewise, the risk characteristic of a centralized system is different from that of a messy municipally-led confederation. The second type is stable in the long run *because* of *some* dose of volatility.

A scientific argument showing how tight controls backfire and cause blowups was made by James Clerk Maxwell of electromagnetic theory fame. "Governors" are contraptions meant to control the speed of steam engines by compensating for abrupt variations. They aimed at stabilizing the engines, and they apparently did, but they paradoxically sometimes brought about capricious behavior and crashes. Light control works; close control leads to overreaction, sometimes causing the machinery to break into pieces. In a famous paper "On Governors," published in 1867, Maxwell modeled the behavior and showed mathematically that tightly controlling the speed of engines leads to instability.

It is remarkable how Maxwell's neat mathematical derivations and the dangers of tight control can be generalized across domains and help debunk pseudo-stabilization and hidden long-term fragility.[1] In the markets, fixing prices, or, equivalently, eliminating speculators, the so-called "noise traders"—and the moderate volatility that they bring—provide an illusion of stability, with periods of calm punctuated with large jumps. Because players are unused to volatility, the slightest price variation will then be attributed to insider information, or to changes in the state of the system, and will cause panics. When a currency never varies, a slight, very slight move makes people believe that the world is ending. Injecting some confusion stabilizes the system.

Indeed, confusing people a little bit is beneficial—it is good for you and good for them. For an application of the point in daily life, imagine someone extremely punctual and predictable who comes home at exactly six o'clock every day for fifteen years. You can use his arrival to set your watch. The fellow will cause his family anxiety if he is barely a few minutes late. Someone with a slightly more volatile—hence unpredictable—schedule, with, say, a half-hour variation, won't do so.

Variations also act as purges. Small forest fires periodically cleanse the system of the most flammable material, so this does not have the opportunity to accumulate. Systematically preventing forest fires from taking place "to be safe" makes the big one much worse. For similar reasons, stability is not good for the economy: firms become very weak during long periods of steady prosperity devoid of setbacks, and hidden vulnerabilities accumulate silently under the surface—so delaying crises is not a very good idea. Likewise, absence of fluctuations in the market causes hidden risks to accumulate with impunity. The longer one goes without a market trauma, the worse the damage when commotion occurs.

This adverse effect of stability is straightforward to model scientifically, but when I became a trader, I was told of a heuristic used by veterans, and only old seasoned veterans: when a market reaches a "new low," that is, drops to a level not seen in a long time, there is "a lot of blood" to come, with people rushing to the exit. Some people unused to losing shekels will be experiencing a large loss and will incur distress. If such a low market level has not been seen in years, say two years, it will be called "a two-year low" and will cause more damage than a one-year low. Tellingly, they call it a "cleanup," getting the "weak hands" out of the way. A "weak hand" is clearly someone who is fragile but doesn't know it and is lulled by a false sense of security. When many such weak hands rush to the door, they collectively cause crashes. A volatile market doesn't let people go such a long time without a "cleanup" of risks, thereby preventing such market collapses.

Fluctuat nec mergitur (fluctuates, or floats, but does not sink) goes the Latin saying.

HUNGRY DONKEYS

So far we have argued that preventing randomness in an antifragile system is not always a good idea. Let us now look at the situation in which *adding* randomness has been a standard operating method, as the needed fuel for an antifragile system permanently hungry for it.

A donkey equally famished and thirsty caught at an equal distance between food and water would unavoidably die of hunger or thirst. But he can be saved thanks to a random nudge one way or the other. This metaphor is named Buridan's Donkey, after the medieval philosopher Jean de Buridan, who—among other, very complicated things—introduced the thought experiment. When some systems are stuck in a dangerous impasse, randomness and only randomness can unlock them and set them free. You can see here that absence of randomness equals guaranteed death.

The idea of injecting random noise into a system to improve its functioning has been applied across fields. By a mechanism called *stochastic resonance,* adding random noise to the background makes you hear the sounds (say, music) with more accuracy. We saw earlier that the psychological effect of overcompensation helps us get signals in the midst of noise; here it is not psychological but a physical property of the system. Weak SOS signals, too weak to get picked up by remote receptors, can become audible in the presence of background noise and random interference. By adding to the signal, random hiss allows it to rise sufficiently above the threshold of detection to become audible—nothing in that situation does better than randomness, which comes for free.

Consider the method of annealing in metallurgy, a technique used to make metal stronger and more homogeneous. It involves the heating and controlled cooling of a material, to increase the size of the crystals and reduce their defects. Just as with Buridan's donkey, the heat causes the atoms to become unstuck from their initial positions and wander randomly through states of higher energy; the cooling gives them more chances of finding new, better configurations.

As a child I was exposed to a version of this annealing effect by watching my father, who was a man of habits, tap a wooden barometer every day upon coming home. He would gently strike the barometer, then get a reading for his homemade weather forecast. The stress on the barometer got the needle unstuck and allowed it to find its true equilibrium position. That's a local brand of antifragility. Inspired by the metallurgical technique, mathematicians use a method of computer simulation called *simulated annealing* to bring more general optimal solutions to problems and situations, solutions that only randomness can deliver.

Randomness works well in search—sometimes better than humans. Nathan Myhrvold brought to my attention a controversial 1975 paper published in *Science* showing that random drilling was superior to whatever search method was being employed at the time.

And, ironically, the so-called chaotic systems, those experiencing a brand of variations called *chaos,* can be stabilized by adding randomness to them. I watched an eerie demonstration of the effects, presented by a doctoral student who first got balls to jump chaotically on a table in response to steady vibrations on the surface. These steady shocks made the balls jump in a jumbled and inelegant manner. Then, as by magic, he moved a switch and the jumps became orderly and smooth. The magic is that such change of regime, from chaos to order, did not take place by removing chaos, but by adding random, completely random but low-intensity shocks. I came out of the beautiful experiment with so much enthusiasm that I wanted to inform strangers on the street, "I love randomness!"

Political Annealing

It has been hard to explain to real people that stressors and uncertainty have their role in life—so you can imagine what it would be like to explain it to politicians. Yet this is where a certain dose of randomness is needed the most.

I was once shown the script of a film based on a parable of a city completely ruled by randomness—very Borgesian. At set intervals, the ruler randomly assigns to the denizens a new role in the city. Say the butcher would now become a baker, and the baker a prisoner, etc. At the end, people

end up rebelling against the ruler, asking for stability as their inalienable right.

I immediately thought that perhaps the opposite parable should be written: instead of having the rulers randomize the jobs of citizens, we should have citizens randomize the jobs of rulers, naming them by raffles and removing them at random as well. That is similar to simulated annealing—and it happens to be no less effective. It turned out that the ancients—again, those ancients!—were aware of it: the members of the Athenian assemblies were chosen by lot, a method meant to protect the system from degeneracy. Luckily, this effect has been investigated with modern political systems. In a computer simulation, Alessandro Pluchino and his colleagues showed how adding a certain number of randomly selected politicians to the process can improve the functioning of the parliamentary system.

Or sometimes the system benefits from a different type of stressors. For Voltaire, the best form of government was the one tempered with political assassination. Regicide is sort of the equivalent of tapping on the barometer to make it work better. That, too, creates some often-needed reshuffling, and one that would never have been done voluntarily. The void created at the top allows the annealing effect, causing the new leader to emerge. The secular drop in premature deaths in society has deprived us of a naturalistic managerial turnover. Murder is the standard procedure for succession in the mafia (the last publicized annealing was when John Gotti murdered his predecessor in front of a New York steakhouse to become the capo of the family). Outside the mafia, bosses and board members now stay longer, a fact that impedes many domains: CEOs, tenured academics, politicians, journalists—and we need to offset this condition with random lotteries.

Unfortunately, you cannot randomize a political party out of existence. What is plaguing us in the United States is not the two-party system, but being stuck with the *same* two parties. Parties don't have organic built-in expiration dates.

Finally the ancients perfected the method of random draw in more or less difficult situations—and integrated it into divinations. These draws were really meant to pick a random exit without having to make a decision, so one would not have to live with the burden of the consequences later. You went with what the gods told you to do, so you would not have to second-guess yourself later. One of the methods, called *sortes virgilianae* (fate as

decided by the epic poet Virgil), involved opening Virgil's *Aeneid* at random and interpreting the line that presented itself as direction for the course of action. You should use such method for every sticky business decision. I will repeat until I get hoarse: the ancients evolved hidden and sophisticated ways and tricks to exploit randomness. For instance, I actually practice such randomizing heuristic in restaurants. Given the lengthening and complication of menus, subjecting me to what psychologists call the *tyranny of choice,* with the stinging feeling after my decision that I should have ordered something else, I blindly and systematically duplicate the selection by the most overweight male at the table; and when no such person is present, I randomly pick from the menu without reading the name of the item, under the peace of mind that Baal made the choice for me.

THAT TIME BOMB CALLED STABILITY

We saw that absence of fire lets highly flammable material accumulate. People are shocked and outraged when I tell them that absence of political instability, even war, lets explosive material and tendencies accumulate under the surface.

The Second Step: Do (Small) Wars Save Lives?

The anti-Enlightenment political philosopher Joseph de Maistre remarked that conflicts strengthen countries. This is highly debatable—war is not a good thing, and, as the victim of a brutal civil war, I can attest to its horrors. But what I find interesting—and elegant—in his reasoning is his pointing out the mistake of analyzing losses from a given event and ignoring the rest of the story. It is also interesting that people tend to grasp the opposite more easily, that is, spot the error of analyzing immediate gains without taking into account the long-term side effects. For we look at casualties as losses without taking into account the second step, what happens later—unlike gardeners, who understand rather well that pruning trees strengthens them.

Likewise peace—some kind of forced, constrained, non-natural peace—may be costly in lives: just consider the great complacency that led to the Great War after almost a century of relative peace in Europe, coupled with the rise of the heavily armed nation-state.

Again, we all love peace and we all love economic and emotional stability—but do not want to be suckers in the long term. We seek vaccination at every new school year (injecting ourselves with a bit of harm to build immunity) but fail to transfer the mechanism to political and economic domains.

What to Tell the Foreign Policy Makers

To summarize, the problem with artificially suppressed volatility is not just that the system tends to become extremely fragile; it is that, at the same time, it exhibits no *visible* risks. Also remember that volatility is information. In fact, these systems tend to be too calm and exhibit minimal variability as silent risks accumulate beneath the surface. Although the stated intention of political leaders and economic policy makers is to stabilize the system by inhibiting fluctuations, the result tends to be the opposite. These artificially constrained systems become prone to Black Swans. Such environments eventually experience massive blowups, of the type seen in Figure 3, catching everyone off guard and undoing years of stability or, in almost all cases, ending up far worse than they were in their initial volatile state. Indeed, the longer it takes for the blowup to occur, the worse the resulting harm to both economic and political systems.

Seeking stability by achieving stability (and forgetting the second step) has been a great sucker game for economic and foreign policies. The list is depressingly long. Take rotten governments like the one in Egypt before the riots of 2011, supported by the United States for four decades in order "to avoid chaos," with the side effect of a coterie of privileged pillagers using superpowers as a backstop—identical to bankers using their "too big to fail" status to scam taxpayers and pay themselves high bonuses.

Saudi Arabia is the country that at present worries and offends me the most; it is a standard case of top-down stability enforced by a superpower at the expense of every single possible moral and ethical metric—and, of course, at the expense of stability itself.

So a place "allied" to the United States is a total monarchy, devoid of a constitution. But that is not what is morally shocking. A group of between seven and fifteen thousand members of the royal family runs the place, leading a lavish, hedonistic lifestyle in open contradiction with the purist ideas that got them there. Look at the contradiction: the stern desert tribes whose legitimacy is derived from Amish-like austerity can, thanks to a superpower, turn to hedonistic uninhibited pleasure seeking—the king openly travels for pleasure with a retinue that fills four Jumbo jets. Quite a departure from his ancestors. The family members amassed a fortune now largely in Western safes. Without the United States, the country would have had its revolution, a regional breakup, some turmoil, then perhaps—by now

—some stability. But preventing noise makes the problem worse in the long run.

Clearly the "alliance" between the Saudi royal family and the United States was meant to provide stability. What stability? How long can one confuse the system? Actually "how long" is irrelevant: this stability is similar to a loan one has to eventually pay back. And there are ethical issues I leave to Chapter 24, particularly casuistry, when someone finds a justification "for the sake of" to violate an otherwise inflexible moral rule.[2] Few people are aware of the fact that the bitterness of Iranians toward the United States comes from the fact that the United States—a democracy—installed a monarch, the repressive Shah of Iran, who pillaged the place but gave the United States the "stability" of access to the Persian Gulf. The theocratic regime in Iran today is largely the result of such repression. We need to learn to think in second steps, chains of consequences, and side effects.

More worrisome, U.S. policy toward the Middle East has historically, and especially since September 11, 2001, been unduly focused on the repression of any and all political fluctuations in the name of preventing "Islamic fundamentalism"—a trope that almost every regime has used. Aside from the fact that killing Islamists compounds their numbers, the West and its autocratic Arab allies have strengthened Islamic fundamentalists by forcing them underground.

Time for American policy makers to understand that the more they intervene in other countries for the sake of stability, the more they bring instability (except for emergency-room-style cases). Or perhaps time to reduce the role of policy makers in policy affairs.

One of life's packages: no stability without volatility.

WHAT DO WE CALL HERE MODERNITY?

My definition of modernity is humans' large-scale domination of the environment, the systematic smoothing of the world's jaggedness, and the stifling of volatility and stressors.

Modernity corresponds to the systematic extraction of humans from their randomness-laden ecology—physical and social, even epistemological. Modernity is not just the postmedieval, postagrarian, and postfeudal historical period as defined in sociology textbooks. It is rather the spirit of an age marked by rationalization (naive rationalism), the idea that society is understandable, hence must be designed, by humans. With it was born statistical theory, hence the beastly bell curve. So was linear science. So was the notion of "efficiency"—or optimization.

Modernity is a Procrustean bed, good or bad—a reduction of humans to what appears to be efficient and useful. Some aspects of it work: Procrustean beds are not all negative reductions. Some may be beneficial, though these are rare.

Consider the life of the lion in the comfort and predictability of the Bronx Zoo (with Sunday afternoon visitors flocking to look at him in a combination of curiosity, awe, and pity) compared to that of his cousins in freedom. We, at some point, had free-range humans and free-range children before the advent of the golden period of the soccer mom.

We are moving into a phase of modernity marked by the lobbyist, the very, very limited liability corporation, the MBA, sucker problems, secularization (or rather reinvention of new sacred values like flags to replace altars), the tax man, fear of the boss, spending the weekend in interesting places and the workweek in a putatively less interesting one, the separation of "work" and "leisure" (though the two would look identical to someone from a wiser era), the retirement plan, argumentative intellectuals who would disagree with this definition of modernity, literal thinking, inductive inference, philosophy of science, the invention of social science, smooth surfaces, and egocentric architects. Violence is transferred from

individuals to states. So is financial indiscipline. At the center of all this is the denial of antifragility.

There is a dependence on narratives, an intellectualization of actions and ventures. Public enterprises and functionaries—even employees of large corporations—can only do things that seem to fit some narrative, unlike businesses that can just follow profits, with or without a good-sounding story. Remember that you need a name for the color blue when you build a narrative, but not in action—the thinker lacking a word for "blue" is handicapped; not the doer. (I've had a hard time conveying to intellectuals the *intellectual* superiority of practice.)

Modernity widened the difference between the sensational and the relevant—in a natural environment the sensational is, well, sensational for a reason; today we depend on the press for such essentially human things as gossip and anecdotes and we care about the private lives of people in very remote places.

Indeed, in the past, when we were not fully aware of antifragility and self-organization and spontaneous healing, we managed to respect these properties by constructing beliefs that served the purpose of managing and surviving uncertainty. We imparted improvements to the agency of god(s). We may have denied that things can take care of themselves without some agency. But it was the gods that were the agents, not Harvard-educated captains of the ship.

So the emergence of the nation-state falls squarely into this pro-gression —the transfer of agency to mere humans. The story of the nation-state is that of the concentration and magnification of human errors. Modernity starts with the state monopoly on violence, and ends with the state's monopoly on fiscal irresponsibility.

We will discuss next two central elements at the core of modernity. Primo, in Chapter 7, naive interventionism, with the costs associated with fixing things that one should leave alone. Secundo, in Chapter 8 and as a transition to Book III, this idea of replacing God and the gods running future events with something even more religiously fundamentalist: the unconditional belief in the idea of scientific prediction regardless of the domain, the aim to squeeze the future into numerical reductions whether reliable or

unreliable. For we have managed to transfer religious belief into gullibility for whatever can masquerade as science.

[1] The financier George Cooper has revived the argument in *The Origin of Financial Crises*—the argument is so crisp that an old trader friend, Peter Nielsen, has distributed it to every person he knows.

[2] Note these double standards on the part of Western governments. As a Christian, parts of Saudi Arabia are off-limits to me, as I would violate the purity of the place. But no public part of the United States or Western Europe is off-limits to Saudi citizens.

CHAPTER 7

Naive Intervention

A tonsillectomy to kill time—Never do today what can be left to tomorrow—Let's predict revolutions after they happen—Lessons in blackjack

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Consider this need to "do something" through an illustrative example. In the 1930s, 389 children were presented to New York City doctors; 174 of them were recommended tonsillectomies. The remaining 215 children were again presented to doctors, and 99 were said to need the surgery. When the remaining 116 children were shown to yet a third set of doctors, 52 were recommended the surgery. Note that there is morbidity in 2 to 4 percent of the cases (today, not then, as the risks of surgery were very bad at the time) and that a death occurs in about every 15,000 such operations and you get an idea about the break-even point between medical gains and detriment.

This story allows us to witness probabilistic homicide at work. Every child who undergoes an unnecessary operation has a shortening of her life expectancy. This example not only gives us an idea of harm done by those who intervene, but, worse, it illustrates the lack of awareness of the need to look for a break-even point between benefits and harm.

Let us call this urge to help "naive interventionism." Next we examine its costs.

INTERVENTION AND IATROGENICS

In the case of tonsillectomies, the harm to the children undergoing unnecessary treatment is coupled with the trumpeted gain for *some* others. The name for such net loss, the (usually hidden or delayed) damage from treatment in excess of the benefits, is *iatrogenics,* literally, "caused by the healer," *iatros* being a healer in Greek. We will posit in Chapter 21 that every time you visit a doctor and get a treatment, you incur risks of such medical harm, which should be analyzed the way we analyze other trade-offs: probabilistic benefits minus probabilistic costs.

For a classic example of iatrogenics, consider the death of George Washington in December 1799: we have enough evidence that his doctors greatly helped, or at least hastened, his death, thanks to the then standard treatment that included bloodletting (between five and nine pounds of blood).

Now these risks of harm by the healer can be so overlooked that, depending on how you account for it, until penicillin, medicine had a largely negative balance sheet—going to the doctor increased your chance of death. But it is quite telling that medical iatrogenics seems to have increased over time, along with knowledge, to peak sometime late in the nineteenth century. Thank you, modernity: it was "scientific progress," the birth of the clinic and its substitution for home remedies, that caused death rates to shoot up, mostly from what was then called "hospital fever"—Leibniz had called these hospitals *seminaria mortis,* seedbeds of death. The evidence of increase in death rates is about as strong as they come, since all the victims were now gathered in one place: people were dying in these institutions who would have survived outside them. The famously mistreated Austro-Hungarian doctor Ignaz Semmelweis had observed that more women died giving birth in hospitals than giving birth on the street. He called the establishment doctors a bunch of criminals—which they were: the doctors who kept killing patients could not accept his facts or act on them since he "had no theory" for his observations. Semmelweis entered a state of depression, helpless to stop what he saw as murders, disgusted at

the attitude of the establishment. He ended up in an asylum, where he died, ironically, from the same hospital fever he had been warning against.

Semmelweis's story is sad: a man who was punished, humiliated, and even killed for shouting the truth in order to save others. The worst punishment was his state of helplessness in the face of risks and unfairness. But the story is also a happy one—the truth came out eventually, and his mission ended up paying off, with some delay. And the final lesson is that one should not expect laurels for bringing the truth.

Medicine is comparatively the good news, perhaps the only good news, in the field of iatrogenics. We see the problem there because things are starting to be brought under control today; it is now just what we call the cost of doing business, although medical error still currently kills between three times (as accepted by doctors) and ten times as many people as car accidents in the United States. It is generally accepted that harm from doctors—not including risks from hospital germs—accounts for more deaths than any single cancer. The methodology used by the medical establishment for decision making is still innocent of proper risk-management principles, but medicine is getting better. We have to worry about the incitation to overtreatment on the part of pharmaceutical companies, lobbies, and special interest groups and the production of harm that is not immediately salient and not accounted for as an "error." Pharma plays the game of concealed and distributed iatrogenics, and it has been growing. It is easy to assess iatrogenics when the surgeon amputates the wrong leg or operates on the wrong kidney, or when the patient dies of a drug reaction. But when you medicate a child for an imagined or invented psychiatric disease, say, ADHD or depression, instead of letting him out of the cage, the long-term harm is largely unaccounted for. Iatrogenics is compounded by the "agency problem" or "principal-agent problem," which emerges when one party (the agent) has personal interests that are divorced from those of the one using his services (the principal). An agency problem, for instance, is present with the stockbroker and medical doctor, whose ultimate interest is their own checking account, not your financial and medical health, respectively, and who give you advice that is geared to benefit themselves. Or with politicians working on their career.

First, Do No Harm

Medicine has known about iatrogenics since at least the fourth century before our era—*primum non nocere* ("first do no harm") is a first principle attributed to Hippocrates and integrated in the so-called Hippocratic Oath taken by every medical doctor on his commencement day. It just took medicine about twenty-four centuries to properly execute the brilliant idea. In spite of the recitations of *non nocere* through the ages, the term "iatrogenics" only appeared in frequent use very, very late, a few decades ago—after so much damage had been done. I for myself did not know the exact word until the writer Bryan Appleyard introduced me to it (I had used "harmful unintended side effects"). So let us leave medicine (to return to it in a dozen chapters or so), and apply this idea born in medicine to other domains of life. Since no intervention implies no iatrogenics, the source of harm lies in the denial of antifragility, and to the impression that we humans are so necessary to making things function.

Enforcing consciousness of generalized iatrogenics is a tall order. The very notion of iatrogenics is quite absent from the discourse outside medicine (which, to repeat, has been a rather slow learner). But just as with the color blue, having a word for something helps spread awareness of it. We will push the idea of iatrogenics into political science, economics, urban planning, education, and more domains. Not one of the consultants and academics in these fields with whom I tried discussing it knew what I was talking about—or thought that they could possibly be the source of any damage. In fact, when you approach the players with such skepticism, they tend to say that you are "against scientific progress."

But the concept can be found in some religious texts. The Koran mentions "those who are wrongful while thinking of themselves that they are righteous."

To sum up, anything in which there is naive interventionism, nay, even just intervention, will have iatrogenics.

The Opposite of Iatrogenics

While we now have a word for causing harm while trying to help, we don't have a designation for the opposite situation, that of someone who ends up

helping while trying to cause harm. Just remember that attacking the antifragile will backfire. For instance, hackers make systems stronger. Or as in the case of Ayn Rand, obsessive and intense critics help a book spread.

Incompetence is double-sided. In the Mel Brooks movie *The Producers,* two New York theater fellows get in trouble by finding success instead of the intended failure. They had sold the same shares to multiple investors in a Broadway play, reasoning that should the play fail, they would keep the excess funds—their scheme would not be discovered if the investors got no return on their money. The problem was that they tried so hard to have a bad play—called *Springtime for Hitler*—and they were so bad at it that it turned out to be a huge hit. Uninhibited by their common prejudices, they managed to produce interesting work. I also saw similar irony in trading: a fellow was so upset with his year-end bonus that he started making huge bets with his employer's portfolio—and ended up making them considerable sums of money, more than if he had tried to do so on purpose.

Perhaps the idea behind capitalism is an inverse-iatrogenic effect, the unintended-but-not-so-unintended consequences: the system facilitates the conversion of selfish aims (or, to be correct, not necessarily benevolent ones) at the individual level into beneficial results for the collective.

Iatrogenics in High Places

Two areas have been particularly infected with absence of awareness of iatrogenics: socioeconomic life and (as we just saw in the story of Semmelweis) the human body, matters in which we have historically combined a low degree of competence with a high rate of intervention and a disrespect for spontaneous operation and healing—let alone growth and improvement.

As we saw in Chapter 3, there is a distinction between organisms (biological or nonbiological) and machines. People with an engineering-oriented mind will tend to look at everything around as an engineering problem. This is a very good thing in engineering, but when dealing with cats, it is a much better idea to hire veterinarians than circuits engineers—or even better, let your animal heal by itself.

Table 3 provides a glimpse of these attempts to "improve matters" across domains and their effects. Note the obvious: in all cases they correspond to the denial of antifragility.

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TABLE 3 • FRAGILIZING INTERVENTIONISM AND ITS EFFECTS ACROSS DISCIPLINES

FIELD	*EXAMPLE OF INTERVENTIONISM*	*IATROGENICS/ COSTS*
Medicine, Health	Overtreatment	Fragility
	Steady feeding, thermal stability, etc.—denying the human body randomness	Medical error
	Pharmaceutical addition, not subtraction	Sicker (but longer-living) humans, richer pharma, antibiotic-resistant bacteria
Ecology	Micromanaging forest fires	Worsening total risks—larger "big ones"
Politics	Central planning	Informational opacity
	U.S. supporting rotten regimes "for the sake of stability"	Chaos after a revolution
Economics	"No More Boom and Bust" (Greenspan (US), Labor (UK)), Great Moderation (Bernanke)	Fragility
	State interventionism	Deeper crises when they happen
	Optimization	Support for established, state-friendly corporations; stifling of entrepreneurs
	Illusion of pricing rare events, value-at-risk methodologies, illusion of economies of scale, ignorance of second-order effects	Vulnerability, pseudo-efficiency
		Big-time blowups
Business	Positive advice (charlatans), focus on return not risk (what to avoid)	Richer charlatans, bankrupt businesses

Urbanism	City planning	Urban blight, inner cities, depressions, crime
Forecasting	Forecasting in Black Swan Domain (Fourth Quadrant) in spite of the horrible track record	Hidden risks (people take more risks when supplied with a forecast)
Literature	Copy editors trying to change your text	Blander, more *New York Times*–style commoditized writing
Parenting	Soccer mom (or pop): removing every random element from children's lives	Touristification of children's minds
Education	The entire concept is grounded in interventionism	Ludification—transformation of children's brains
Technology	Neomania	Fragility, alienation, nerdification
Media	High-frequency sterile information	Disruption of the noise/signal filtering mechanism Interventionism

Can a Whale Fly Like an Eagle?

Social scientists and economists have no built-in consciousness of iatrogenics, and of course no name for it—when I decided to teach a class on model error in economics and finance, nobody took me or the idea seriously, and the few who did tried to block me, asking for "a theory" (as in Semmelweis's story) and not realizing that it was precisely the errors of theory that I was addressing and cataloguing, as well as the very idea of using a theory without considering the impact of the possible errors from theory.

For a theory is a very dangerous thing to have.

And of course one can rigorously do science without it. What scientists call phenomenology is the observation of an empirical regularity without a visible theory for it. In the Triad, I put theories in the fragile category,

phenomenology in the robust one. Theories are superfragile; they come and go, then come and go, then come and go again; phenomenologies stay, and I can't believe people don't realize that phenomenology is "robust" and usable, and theories, while overhyped, are unreliable for decision making—outside physics.

Physics is privileged; it is the exception, which makes its imitation by other disciplines similar to attempts to make a whale fly like an eagle. Errors in physics get smaller from theory to theory—so saying "Newton was wrong" is attention grabbing, good for lurid science journalism, but ultimately mendacious; it would be far more honest to say "Newton's theory is imprecise in some specific cases." Predictions made by Newtonian mechanics are of astonishing precision except for items traveling close to the speed of light, something you don't expect to do on your next vacation. We also read nonsense-with-headlines to the effect that Einstein was "wrong" about that speed of light—and the tools used to prove him wrong are of such complication and such precision that they've demonstrated how inconsequential such a point will be for you and me in the near and far future.

On the other hand, social science seems to diverge from theory to theory. During the cold war, the University of Chicago was promoting laissez-faire theories, while the University of Moscow taught the exact opposite—but their respective physics departments were in convergence, if not total agreement. This is the reason I put social science theories in the left column of the Triad, as something superfragile for real-world decisions and unusable for risk analyses. The very designation "theory" is even upsetting. In social science we should call these constructs "chimeras" rather than theories.

We will have to construct a methodology to deal with these defects. We cannot afford to wait an additional twenty-four centuries. Unlike with medicine, where iatrogenics is distributed across the population (hence with Mediocristan effects), because of concentration of power, social science and policy iatrogenics can blow us up (hence, Extremistan).

Not Doing Nothing

A main source of the economic crisis that started in 2007 lies in the iatrogenics of the attempt by Überfragilista Alan Greenspan—certainly the top economic iatrogenist of all time—to iron out the "boom-bust cycle" which caused risks to go hide under the carpet and accumulate there until they blew up the economy. The most depressing part of the Greenspan story is that the fellow was a libertarian and seemingly convinced of the idea of leaving systems to their own devices; people can fool themselves endlessly. The same naive interventionism was also applied by the U.K. government of Fragilista Gordon Brown, a student of the Enlightenment whose overt grand mission was to "eliminate" the business cycle. Fragilista Prime Minister Brown, a master iatrogenist though not nearly in the same league as Greenspan, is now trying to lecture the world on "ethics" and "sustainable" finance—but his policy of centralizing information technology (leading to massive cost overruns and delays in implementation) instead of having decentralized small units has proven difficult to reverse. Indeed, the U.K. health service was operating under the principle that a pin falling somewhere in some remote hospital should be heard in Whitehall (the street in London where the government buildings are centralized). The technical argument about the dangers of concentration is provided in Chapter 18.

These attempts to eliminate the business cycle lead to the mother of all fragilities. Just as a little bit of fire here and there gets rid of the flammable material in a forest, a little bit of harm here and there in an economy weeds out the vulnerable firms early enough to allow them to "fail early" (so they can start again) and minimize the long-term damage to the system.

An ethical problem arises when someone is put in charge. Greenspan's actions were harmful, but even if he knew that, it would have taken a bit of heroic courage to justify inaction in a democracy where the incentive is to always promise a better outcome than the other guy, regardless of the actual, delayed cost.

Ingenuous interventionism is very pervasive across professions. Just as with the tonsillectomy, if you supply a typical copy editor with a text, he will propose a certain number of edits, say about five changes per page. Now accept his "corrections" and give this text to another copy editor who tends to have the same average rate of intervention (editors vary in interventionism), and you will see that he will suggest an equivalent

number of edits, sometimes reversing changes made by the previous editor. Find a third editor, same.

Incidentally, those who do too much somewhere do too little elsewhere—and editing provides a quite fitting example. Over my writing career I've noticed that those who overedit tend to miss the real typos (and vice versa). I once pulled an op-ed from *The Washington Post* owing to the abundance of completely unnecessary edits, as if every word had been replaced by a synonym from the thesaurus. I gave the article to the *Financial Times* instead. The editor there made one single correction: 1989 became 1990. *The Washington Post* had tried so hard that they missed the only relevant mistake. As we will see, interventionism depletes mental and economic resources; it is rarely available when it is needed the most. (Beware what you wish for: small government might in the end be more effective at whatever it needs to do. Reduction in size and scope may make it even more intrusive than large government.)

Non-Naive Interventionism

Let me warn against misinterpreting the message here. The argument is not against the notion of intervention; in fact I showed above that I am equally worried about underintervention when it is truly necessary. I am just warning against *naive* intervention and lack of awareness and acceptance of harm done by it.

It is certain that the message will be misinterpreted, for a while. When I wrote *Fooled by Randomness,* which argues—a relative of this message—that we have a tendency to underestimate the role of randomness in human affairs, summarized as "it is more random than you think," the message in the media became "it's all random" or "it's all dumb luck," an illustration of the Procrustean bed that changes by reducing. During a radio interview, when I tried explaining to the journalist the nuance and the difference between the two statements I was told that I was "too complicated"; so I simply walked out of the studio, leaving them in the lurch. The depressing part is that those people who were committing such mistakes were educated journalists entrusted to represent the world to us lay persons. Here, all I am saying is that we need to avoid being blind to the natural antifragility of

systems, their ability to take care of themselves, and fight our tendency to harm and fragilize them by not giving them a chance to do so.

As we saw with the overzealous editor, over-intervention comes with under-intervention. Indeed, as in medicine, we tend to over-intervene in areas with minimal benefits (and large risks) while under-intervening in areas in which intervention is necessary, like emergencies. So the message here is in favor of staunch intervention in some areas, such as ecology or to limit the economic distortions and moral hazard caused by large corporations.

What should we control? As a rule, intervening to limit size (of companies, airports, or sources of pollution), concentration, and speed are beneficial in reducing Black Swan risks. These actions may be devoid of iatrogenics—but it is hard to get governments to limit the size of government. For instance, it has been argued since the 1970s that limiting speed on the highway (and enforcing it) leads to an extremely effective increase in safety. This can be plausible because risks of accidents increase disproportionally (that is, *nonlinearly*) with speed, and humans are not ancestrally equipped with such intuition. Someone recklessly driving a huge vehicle on the highway is endangering your safety and needs to be stopped before he hits your convertible Mini—or put in a situation in which he is the one exiting the gene pool, not you. Speed is from modernity, and I am always suspicious of hidden fragilities coming from the post-natural—we will further show a technical proof in Chapters 18 and 19.

But I also buy the opposite argument that regulating street signs does not seem to reduce risks; drivers become more placid. Experiments show that alertness is weakened when one relinquishes control to the system (again, lack of overcompensation). Motorists need the stressors and tension coming from the feeling of danger to feed their attention and risk controls, rather than some external regulator—fewer pedestrians die jaywalking than using regulated crossings. Some libertarians use the example of Drachten, a town in the Netherlands, in which a dream experiment was conducted. All street signs were removed. The deregulation led to an increase in safety, confirming the antifragility of attention at work, how it is whetted by a sense of danger and responsibility. As a result, many German and Dutch towns have reduced the number of street signs. We saw a version of the Drachten effect in Chapter 2 in the discussion of the automation of planes, which produces the exact opposite effect than what is intended by making

pilots lose alertness. But one needs to be careful not to overgeneralize the Drachten effect, as it does not imply the effectiveness of removing all rules from society. As I said earlier, speed on the highway responds to a different dynamic and its risks are different.

Alas, it has been hard for me to fit these ideas about fragility and antifragility within the current U.S. political discourse—that beastly two-fossil system. Most of the time, the Democratic side of the U.S. spectrum favors hyper-intervention, unconditional regulation, and large government, while the Republican side loves large corporations, unconditional deregulation, and militarism—both are the same to me here. They are even more the same when it comes to debt, as both sides have tended to encourage indebtedness on the part of citizens, corporations, and government (which brings fragility and kills antifragility). I believe that both markets and governments are unintelligent when it comes to Black Swan events—though, again, not Mother Nature, thanks to her construction, or more ancient types of markets (like the souks), unlike the ones we have now.

Let me simplify my take on intervention. To me it is mostly about having a systematic protocol to determine when to intervene and when to leave systems alone. And we may need to intervene to control the iatrogenics of modernity—particularly the large-scale harm to the environment and the concentration of potential (though not yet manifested) damage, the kind of thing we only notice when it is too late. The ideas advanced here are not political, but risk-management based. I do not have a political affiliation or allegiance to a specific party; rather, I am introducing the idea of harm and fragility into the vocabulary so we can formulate appropriate policies to ensure we don’t end up blowing up the planet and ourselves.

IN PRAISE OF PROCRASTINATION—THE FABIAN KIND

There is an element of deceit associated with interventionism, accelerating in a professionalized society. It's much easier to sell "Look what I did for you" than "Look what I avoided for you." Of course a bonus system based on "performance" exacerbates the problem. I've looked in history for heroes who became heroes for what they did *not* do, but it is hard to observe *nonaction;* I could not easily find any. The doctor who refrains from operating on a back (a very expensive surgery), instead giving it a chance to heal itself, will not be rewarded and judged as favorably as the doctor who makes the surgery look indispensable, then brings relief to the patient while exposing him to operating risks, while accruing great financial rewards to himself. The latter will be driving the pink Rolls-Royce. The corporate manager who avoids a loss will not often be rewarded. The true hero in the Black Swan world is someone who prevents a calamity and, naturally, because the calamity did not take place, does not get recognition —or a bonus—for it. I will be taking the concept deeper in Book VII, on ethics, about the unfairness of a bonus system and how such unfairness is magnified by complexity.

However, as always, the elders seem to have far more wisdom than we moderns—and much, much simpler wisdom; the Romans revered someone who, at the least, resisted and delayed intervention. One general, Fabius Maximus was nicknamed Cunctator, "the Procrastinator." He drove Hannibal, who had an obvious military superiority, crazy by avoiding and delaying engagement. And it is quite fitting to consider Hannibal's militarism as a form of interventionism (à la George W. Bush, except that Hannibal was actually in battle himself, not in the comfort of an office) and compare it to the Cunctator's wisdom.

A very intelligent group of revolutionary fellows in the United Kingdom created a political movement called the Fabian Society, named after the Cunctator, based on opportunistically delaying the revolution. The society included George Bernard Shaw, H. G. Wells, Leonard and Virginia Woolf,

Ramsay MacDonald, and even Bertrand Russell for a moment. In retrospect, it turned out to be a very effective strategy, not so much as a way to achieve their objectives, but rather to accommodate the fact that these objectives are moving targets. Procrastination turned out to be a way to let events take their course and give the activists the chance to change their minds before committing to irreversible policies. And of course members *did* change their minds after seeing the failures and horrors of Stalinism and similar regimes.

There is a Latin expression *festina lente,* "make haste slowly." The Romans were not the only ancients to respect the act of voluntary omission. The Chinese thinker Lao Tzu coined the doctrine of *wu-wei,* "passive achievement."

Few understand that procrastination is our natural defense, letting things take care of themselves and exercise their antifragility; it results from some ecological or naturalistic wisdom, and is not always bad—at an existential level, it is my body rebelling against its entrapment. It is my soul fighting the Procrustean bed of modernity. Granted, in the modern world, my tax return is not going to take care of itself—but by delaying a non-vital visit to a doctor, or deferring the writing of a passage until my body tells me that I am ready for it, I may be using a very potent naturalistic filter. I write only if I feel like it and only on a subject I feel like writing about—and the reader is no fool. So I use procrastination as a message from my inner self and my deep evolutionary past to resist interventionism in my writing. Yet some psychologists and behavioral economists seem to think that procrastination is a *disease* to be remedied and cured.[1]

Given that procrastination has not been sufficiently pathologized yet, some associate it with the condition of *akrasia* discussed in Plato, a form of lack of self-control or weakness of will; others with *aboulia,* lack of will. And pharmaceutical companies might one day come up with a pill for it.

The benefits of procrastination apply similarly to medical procedures: we saw that procrastination protects you from error as it gives nature a chance to do its job, given the inconvenient fact that nature is less error-prone than scientists. Psychologists and economists who study "irrationality" do not realize that humans may have an instinct to procrastinate only when no life is in danger. I do not procrastinate when I see a lion entering my bedroom or fire in my neighbor's library. I do not procrastinate after a severe injury. I do so with unnatural duties and procedures. I once procrastinated and kept

delaying a spinal cord operation as a response to a back injury—and was completely cured of the back problem after a hiking vacation in the Alps, followed by weight-lifting sessions. These psychologists and economists want me to kill my naturalistic instinct (the inner b****t detector) that allowed me to delay the elective operation and minimize the risks—an insult to the antifragility of our bodies. Since procrastination is a message from our natural willpower via low motivation, the cure is changing the environment, or one's profession, by selecting one in which one does not have to fight one's impulses. Few can grasp the logical consequence that, instead, one should lead a life in which procrastination is good, as a naturalistic-risk-based form of decision making.

Actually I select the writing of the passages of this book by means of procrastination. If I defer writing a section, it must be eliminated. This is simple ethics: Why should I try to fool people by writing about a subject for which I feel no natural drive?[2]

Using my ecological reasoning, someone who procrastinates is not irrational; it is his environment that is irrational. And the psychologist or economist calling him irrational is the one who is beyond irrational.

In fact we humans are very bad at filtering information, particularly short-term information, and procrastination can be a way for us to filter better, to resist the consequences of jumping on information, as we discuss next.

This idea of "naturalistic" has led to confusion. Philosophers refer to an error called the *naturalistic fallacy,* implying that what is natural is not necessarily morally right—something I subscribe to, as we saw in Chapter 4 in the discussion of the problem of applying Darwinian selection to modern society and the need to protect those who fail, something counter to nature. (The problem is that some people misuse the naturalistic fallacy outside the moral domain and misapply it to this idea of reliance on naturalistic instinct when one is in doubt.) However one slices it, it is not a fallacy when it comes to risk considerations. Time is the best test of fragility—it encompasses high doses of disorder—and nature is the only system that has been stamped "robust" by time. But some philosophasters fail to understand the primacy of risk and survival over philosophizing, and those should eventually exit the gene pool—true philosophers would agree with my

statement. There is a worse fallacy: people making the opposite mistake and considering that *what is naturalistic is a fallacy*.

NEUROTICISM IN INDUSTRIAL PROPORTIONS

Imagine someone of the type we call neurotic in common parlance. He is wiry, looks contorted, and speaks with an uneven voice. His neck moves around when he tries to express himself. When he has a small pimple, his first reaction is to assume that it is cancerous, that the cancer is of the lethal type, and that it has already spread to his lymph nodes. His hypochondria is not limited to the medical department: he incurs a small setback in business and reacts as if bankruptcy were both near and certain. In the office, he is tuned to every single possible detail, systematically transforming every molehill into a mountain. The last thing you want in life is to be stuck in traffic with him on your way to an important appointment. The verb "overreact" was designed with him in mind: he does not have reactions, just overreactions.

Compare him to someone imperturbable, with the ability to be calm under fire that is considered necessary to become a leader, military commander, or mafia godfather. Usually unruffled and immune to small information, he can impress you with his self-control in difficult circumstances. For a sample of a composed, calm, and pondered voice, listen to interviews with "Sammy the Bull," Salvatore Gravano, who was involved in the murder of nineteen people (all competing mobsters). He speaks with minimal effort, as if what he is discussing is "not a big deal." This second type sometimes reacts when necessary; in the rare situations when he is angry, unlike with the neurotic fellow, everyone knows it and takes it seriously.

The supply of information to which we are exposed thanks to modernity is transforming humans from the equable second fellow into the neurotic first one. For the purpose of our discussion, the second fellow only reacts to real information, the first largely to noise. The difference between the two fellows will show us the difference between *noise* and *signal.* Noise is what you are supposed to ignore, signal what you need to heed.

Indeed, we have loosely mentioned "noise" earlier in the book; time to be precise about it. In science, noise is a generalization beyond the actual sound to describe random information that is totally useless for any purpose, and that you need to clean up to make sense of what you are listening to. Consider, for example, elements in an encrypted message that have absolutely no meaning, just randomized letters to confuse the spies, or the hiss you hear on a telephone line that you try to ignore in order to focus on the voice of your interlocutor.

And this personal or intellectual inability to distinguish noise from signal is behind overintervention.

A Legal Way to Kill People

If you want to accelerate someone's death, give him a personal doctor. I don't mean provide him with a bad doctor: just pay for him to choose his own. Any doctor will do.

This may be the only possible way to murder someone while staying squarely within the law. We can see from the tonsillectomy story that access to data increases intervention, causing us to behave like the neurotic fellow. Rory Sutherland signaled to me that someone with a personal doctor on staff should be particularly vulnerable to naive interventionism, hence iatrogenics; doctors need to justify their salaries and prove to themselves that they have a modicum of work ethic, something that "doing nothing" doesn't satisfy. Indeed, Michael Jackson's personal doctor has been sued for something equivalent to overintervention-to-stifle-antifragility (but it will take the law courts a while to become directly familiar with the concept). Did you ever wonder why heads of state and very rich people with access to all this medical care die just as easily as regular persons? Well, it looks like this is *because* of overmedication and excessive medical care.

Likewise, those in corporations or in policy making (like Fragilista Greenspan) who are endowed with a sophisticated data-gathering department and are therefore getting a lot of "timely" statistics are capable of overreacting and mistaking noise for information—Greenspan kept an eye on such fluctuations as the sales of vacuum cleaners in Cleveland to, as

they say, “get a precise idea about where the economy is going,” and of course he micromanaged us into chaos.

In business and economic decision making, reliance on data causes severe side effects—data is now plentiful thanks to connectivity, and the proportion of spuriousness in the data increases as one gets more immersed in it. A very rarely discussed property of data: it is toxic in large quantities —even in moderate quantities.

The previous two chapters showed how you can use and take advantage of noise and randomness; but noise and randomness can also use and take advantage of you, particularly when totally unnatural, as with the data you get on the Web or through the media.

The more frequently you look at data, the more noise you are disproportionally likely to get (rather than the valuable part, called the signal); hence the higher the noise-to-signal ratio. And there is a confusion which is not psychological at all, but inherent in the data itself. Say you look at information on a yearly basis, for stock prices, or the fertilizer sales of your father-in-law’s factory, or inflation numbers in Vladivostok. Assume further that for what you are observing, at a yearly frequency, the ratio of signal to noise is about one to one (half noise, half signal)—this means that about half the changes are real improvements or degradations, the other half come from randomness. This ratio is what you get from yearly observations. But if you look at the very same data on a daily basis, the composition would change to 95 percent noise, 5 percent signal. And if you observe data on an hourly basis, as people immersed in the news and market price variations do, the split becomes 99.5 percent noise to 0.5 percent signal. That is two hundred times more noise than signal—which is why anyone who listens to news (except when very, very significant events take place) is one step below sucker.

Consider the iatrogenics of newspapers. They need to fill their pages every day with a set of news items—particularly those news items also dealt with by other newspapers. But to do things right, they ought to learn to keep silent in the absence of news of significance. Newspapers should be of two-line length on some days, two hundred pages on others—in proportion with the intensity of the signal. But of course they want to make money and need to sell us junk food. And junk food is iatrogenic.

There is a biological dimension to this story. I have been repeating that in a natural environment, a stressor is information. Too much information

would thus be too much stress, exceeding the threshold of antifragility. In medicine, we are discovering the healing powers of fasting, as the avoidance of the hormonal rushes that come with the ingestion of food. Hormones convey information to the different parts of our system, and too much of them confuses our biology. Here again, as with news received at too high a frequency, too much information becomes harmful—daily news and sugar confuse our system in the same manner. And in Chapter 24 (on ethics) I will show how too much data (particularly when it is sterile) causes statistics to be completely meaningless.

Now let's add the psychological to this: we are not made to understand the point, so we overreact emotionally to noise. The best solution is to *only* look at very large changes in data or conditions, never at small ones.

Just as we are not likely to mistake a bear for a stone (but likely to mistake a stone for a bear), it is almost impossible for someone rational, with a clear, uninfected mind, someone who is not drowning in data, to mistake a vital signal, one that matters for his survival, for noise—unless he is overanxious, oversensitive, and neurotic, hence distracted and confused by other messages. Significant signals have a way to reach you. In the tonsillectomies story, the best filter would have been to only consider the children who were very ill, those with periodically recurring throat inflammation.

Media-Driven Neuroticism

There is so much noise coming from the media's glorification of the anecdote. Thanks to this, we are living more and more in virtual reality, separated from the real world, a little bit more every day while realizing it less and less. Consider that every day, 6,200 persons die in the United States, many of preventable causes. But the media only report the most anecdotal and sensational cases (hurricanes, freak accidents, small plane crashes), giving us a more and more distorted map of real risks. In an ancestral environment, the anecdote, the "interesting," is information; today, no longer. Likewise, by presenting us with explanations and theories, the media induce an illusion of understanding the world.

And the understanding of events (and risks) on the part of members of the press is so retrospective that they would put the security checks after the plane ride, or what the ancients call *post bellum auxilium,* sending troops after the battle. Owing to domain dependence, we forget the need to check our map of the world against reality. So we are living in a more and more fragile world, while thinking it is more and more understandable.

To conclude, the best way to mitigate interventionism is to ration the supply of information, as naturalistically as possible. This is hard to accept in the age of the Internet. It has been very hard for me to explain that the more data you get, the less you know what's going on, and the more iatrogenics you will cause. People are still under the illusion that "science" means more data.

THE STATE CAN HELP—WHEN INCOMPETENT

The famine in China that killed 30 million people between 1959 and 1961 can enlighten us about the effect of the state "trying hard." Xin Meng, Nancy Qian, and Pierre Yared examined its variations *between* areas, looking into how the famine was distributed. They discovered that famine was more severe in areas with higher food production in the period before the famine began, meaning that it was government policy of food distribution that was behind much of the problem, owing to the inflexibility in the procurement system. And indeed, a larger than expected share of famine over the past century has occured in economies with central planning.

But often it is the state's incompetence that can help save us from the grip of statism and modernity—inverse iatrogenics. The insightful author Dmitri Orlov showed how calamities were avoided after the breakdown of the Soviet state because food production was inefficient and full of unintentional redundancies, which ended up working in favor of stability. Stalin played with agriculture, causing his share of famine. But he and his successors never managed to get agriculture to become "efficient," that is, centralized and optimized as it is today in America, so every town had the staples growing around it. This was costlier, as they did not get the benefits of specialization, but this local lack of specialization allowed people to have access to all varieties of food in spite of the severe breakdown of the institutions. In the United States, we burn twelve calories in transportation for every calorie of nutrition; in Soviet Russia, it was one to one. One can imagine what could happen to the United States (or Europe) in the event of food disruptions. Further, because of the inefficiency of housing in the Soviet state, people had been living in close quarters for three generations, and had tight bonds that ensured—as in the Lebanese war—that they stayed close to each other and lent to each other. People had real links, unlike in social networks, and fed their hungry friends, expecting that some friend

(most likely another one) would help them should they get in dire circumstances.

And the top-down state is not necessarily the one that has the reputation of being so.

France Is Messier than You Think

Next we will debunk the narrative that France works well because it is a Cartesian rationalizing-rationalist top-down state. As with the Russians, the French were lucky that it was for a long time a failed aim.

I spent the past two decades wondering why France, as a country managed in a top-down manner by an oversized state, could fare so well in so many fields. It is the country of Jean-Baptiste Colbert, after all, the grand dreamer of a state that infiltrates everything. Indeed the current culture is ultra-interventionist, sort of "if it ain't broke, fix it." For things work—somewhat—in France, often better than elsewhere; so can France be used as evidence that central bureaucracies that repress municipal mess are favorable for growth, happiness, good science and literature, excellent weather, diversified flora with Mediterranean varieties, tall mountains, excellent transportation, attractive women, and good cuisine? Until I discovered, reading Graham Robb's *The Discovery of France,* a major fact that led me to see the place with completely new eyes and search the literature for a revision of the story of the country.

The story was actually staring us in the face: the nation-state in France was largely nominal, in spite of attempts by Louis XIV, Napoleon, and the national education program of Jules Ferry to own the place. France in 1863 did not speak French (only one in five persons could), but rather a variety of languages and dialects (a surprising fact: the Nobel Prize in Literature in 1904 went to the Frenchman Frédéric Mistral, who wrote in Provençal, a language of southern France no longer spoken). The lack of linguistic integration—like the variety in cheese (of which there are about four hundred different types)—expresses the difficulties in centralizing the country. There was nothing ethnic or linguistic to bind the place—it was just the property of a king and a weak aristocracy. Roads were horrible and most of the country was inaccessible to travelers. Tax collection was a

dangerous profession, requiring tenacity and sagacity. Indeed, the country was progressively "discovered" by Paris, in many cases after its colonies in North Africa and elsewhere. In a thick and captivating book, *La rebellion française,* the historian Jean Nicolas shows how the culture of rioting was extremely sophisticated—historically, it counts as the true French national sport.

Paris itself was barely controlled by France—no more than the Rio slums called *favelas* are currently ruled by the Brazilian central state. Louis XIV, the Sun King, had moved the government to Versailles to escape the Parisian crowd. Paris only became controllable after Haussmann in the 1860s removed the tenements and narrow streets to make large avenues that allowed for police to control the crowds. Effectively France was still Paris and "the desert," as Paris didn't care much about the rest of France. The country was only centralized after long programs and "Five Year Plans" of roads, rail systems, public schools, and the spread of television—a Napoleonic dream of integration that, begun by De Gaulle after the war, was only completed during the reign of Valéry Giscard d'Estaing in the late 1970s, at which point the decentralization started taking place.[3] France might have benefited from its two decades or so under a large centralized state—but the argument could equally be that it benefited from the happy condition that the large state spurred growth and did not overstay its welcome.

Sweden and the Large State

Aside from France, I was baffled by the puzzle of Sweden and other Nordic states, which are often offered as paragons of the large state "that works"—the government represents a large portion of the total economy. How could we have the happiest nation in the world, Denmark (assuming happiness is both measurable and desirable), and a monstrously large state? Is it that these countries are all smaller than the New York metropolitan area? Until my coauthor, the political scientist Mark Blyth, showed me that there, too, was a false narrative: it was almost the same story as in Switzerland (but with a worse climate and no good ski resorts). The state exists as a tax collector, but the money is spent in the communes themselves, directed by

the communes—for, say, skills training locally determined as deemed necessary by the community themselves, to respond to private demand for workers. The economic elites have more freedom than in most other democracies—this is far from the statism one can assume from the outside.

Further, illustrating a case of gaining from disorder, Sweden and other Nordic countries experienced a severe recession at the end of the cold war, around 1990, to which they responded admirably with a policy of fiscal toughness, thus effectively shielding them from the severe financial crisis that took place about two decades later.

CATALYST-AS-CAUSE CONFUSION

When constrained systems, those hungry for natural disorder, collapse, as they are eventually bound to, since they are fragile, failure is never seen as the result of fragility. Rather, such failure is interpreted as the product of poor forecasting. As with a crumbling sand pile, it would be unintelligent to attribute the collapse of a fragile bridge to the last truck that crossed it, and even more foolish to try to predict in advance which truck might bring it down. Yet it is done all too often.

In 2011, U.S. president Barack Obama blamed an intelligence failure for the government's not foreseeing the revolution in Egypt that took place that spring (just as former U.S. president Jimmy Carter blamed an intelligence failure for his administration's not foreseeing the 1979 Islamic Revolution in Iran), missing the point that it is the suppressed risk in the statistical "tails" that matters—not the failure to see the last grain of sand. One analogy to economics: after the inception of the financial crisis in 2007–2008, many people thought that predicting the subprime meltdown (which seemed in their mind to have triggered it) would have helped. It would not have, for Baal's sake, since it was a symptom of the crisis, not its underlying cause. Likewise, Obama's blaming "bad intelligence" for his administration's failure to predict the uprising that took place in Egypt is symptomatic of both the misunderstanding of complex systems and the bad policies involved. And superpowers are plain turkeys in that story.

Obama's mistake illustrates the illusion of local causal chains—that is, confusing catalysts for causes and assuming that one can know which catalyst will produce which effect. The final episode of the upheaval in Egypt was unpredictable for all observers, especially those involved. As such, blaming the CIA or some other intelligence agency is as injudicious as funding it to forecast such events. Governments are wasting billions of dollars on attempting to predict events that are produced by interdependent systems and are therefore not statistically understandable at the individual level.

Most explanations that are offered for episodes of turmoil follow the catalysts-as-causes confusion. Take the "Arab Spring" of 2011. The riots in Tunisia and Egypt were initially attributed to rising commodity prices, not to stifling and unpopular dictatorships. But Bahrain and Libya were wealthy countries that could afford to import grain and other commodities. Further, we had had considerably higher commodity prices a few years earlier without any uprising at all. Again, the focus is wrong even if the logic is comforting. It is the system and its fragility, not events, that must be studied—what physicists call "percolation theory," in which the properties of the randomness of the terrain are studied, rather than those of a single element of the terrain.

As Mark Abdollahian of Sentia Group, one of the contractors who sell predictive analytics to the U.S. government (those that failed to warn), noted regarding Egypt, policy makers should "think of this like Las Vegas. In blackjack, if you can do four percent better than the average, you're making real money." But the analogy is spurious—pretty much everything I stand against. There is no "four percent better" on Egypt. This was not just money wasted but the construction of a false confidence based on an erroneous focus. It is telling that the intelligence analysts made the same mistake as the risk-management systems that failed to predict the economic crisis—and offered the exact same excuses when they failed. Political and economic "tail events" are unpredictable, and their probabilities are not scientifically measurable. No matter how many dollars are spent on research, predicting revolutions is not the same as counting cards; humans will never be able to turn politics and economics into the tractable randomness of blackjack.

[1] Psychologists document the opposite of interventionism, calling it the *status quo bias*. But it seems that the two can coexist, interventionism and procrastination, in one's profession (where one is supposed to do something) and in one's personal life (the opposite). It depends on the domain. So it is a sociological and economic problem, one linked to norms and incentives (though doctors in the tonsillectomy study did not have direct incentives), rather than a mental property.

[2] A friend who writes books remarked that painters like painting but authors like "having written." I suggested he stop writing, for his sake and the sake of his readers.

[3] Another discovery—the control of that most organic, most disorderly of things, language. France, through the institution of the French academy, has an official stamp on what can and cannot be considered proper French and written by a pupil in a document or in a letter to the local mayor complaining about the noisy garbage pickup schedules. The result is obvious: a convoluted, difficult, and narrow formal vocabulary compared to English—but an expanded spoken French misdefined as

“slang” that is just as rich as English. There are even writers like Céline or Dard who write in parallel literary vocabulary mixed with exquisitely precise and rich slang, a unique brand of colloquial-literary style.

CHAPTER 8

Prediction as a Child of Modernity

Never shout in French—Ms. Bré gains in respect—Black Swan territory

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In the fall of 2009, I found myself in Korea with a collection of suit-and-tie-wearing hotshots. On a panel sat one Takatoshi Kato, then the deputy managing director of a powerful international institution. Before the panel discussion, he gave us a rapid PowerPoint presentation showing his and his department's economic projections for 2010, 2011, 2012, 2013, and 2014.

These were the days before I decided to climb up the mountain, speak slowly and in a priestly tone, and try shaming people rather than insulting them. Listening to Kato's presentation, I could not control myself and flew into a rage in front of two thousand Koreans—I was so angry that I almost started shouting in French, forgetting that I was in Korea. I ran to the podium and told the audience that the next time someone in a suit and tie gave them projections for some dates in the future, they should ask him to show what he had projected in the past—in this case, what he had been forecasting for 2008 and 2009 (the crisis years) two to five years earlier, in 2004, 2005, 2006, and 2007. They would then verify that Highly Venerable Kato-san and his colleagues are, to put it mildly, not very good at this predictionizing business. And it is not just Mr. Kato: our track record in figuring out significant rare events in politics and economics is not close to zero; it is *zero*. I improvised, on the spot, my solution. We can't put all false predictors in jail; we can't stop people from asking for predictions; we can't tell people not to hire the next person who makes promises about the future. "All I want is to live in a world in which predictions such as those by Mr. Kato do not harm you. And such a world has unique attributes: robustness."

The idea of proposing the Triad was born there and then as an answer to my frustration: Fragility-Robustness-Antifragility as a replacement for predictive methods.

Ms. Bré Has Competitors

What was getting me in that state of anger was my realization that forecasting was not neutral. It is all in the iatrogenics. Forecasting can be downright injurious to risk-takers—no different from giving people snake oil medicine in place of cancer treatment, or bleeding, as in the story of George Washington. And there was evidence. Danny Kahneman—rightfully—kept admonishing me for my fits of anger and outbursts at respectable members of the establishment (respectable for now), unbecoming of the wise member of the intelligentsia I was supposed to have become. Yet he stoked my frustration and sense of outrage the most by showing me the evidence of iatrogenics. There are ample empirical findings to the effect that providing someone with a random numerical forecast increases his risk taking, even if the person *knows* the projections are random.

All I hear is complaints about forecasters, when the next step is obvious yet rarely taken: avoidance of iatrogenics from forecasting. We understand childproofing, but not forecaster-hubris-proofing.

The Predictive

What makes life simple is that the robust and antifragile don't have to have as accurate a comprehension of the world as the fragile—and they do not need forecasting. To see how redundancy is a nonpredictive, or rather a less predictive, mode of action, let us use the argument of Chapter 2: if you have extra cash in the bank (in addition to stockpiles of tradable goods such as cans of Spam and hummus and gold bars in the basement), you don't need to know with precision which event will cause potential difficulties.[1] It could be a war, a revolution, an earthquake, a recession, an epidemic, a terrorist attack, the secession of the state of New Jersey, anything—you do not need to predict much, unlike those who are in the opposite situation, namely, in debt. Those, because of their fragility, need to predict with more, a lot more, accuracy.

Plus or Minus Bad Teeth

You can control fragility a lot more than you think. So let us refine in three points:

> (i) Since detecting (anti)fragility—or, actually, smelling it, as Fat Tony will show us in the next few chapters—is easier, much easier, than prediction and understanding the dynamics of events, the entire mission reduces to the central principle of what to do to minimize harm (and maximize gain) from forecasting errors, that is, to have things that don't fall apart, or even benefit, when we make a mistake.
>
> (ii) We do not want to change the world for now (leave that to the Soviet-Harvard utopists and other fragilistas); we should first make things more robust to defects and forecast errors, or even exploit these errors, making lemonade out of the lemons.
>
> (iii) As for the lemonade, it looks as if history is in the business of making it out of lemons; antifragility is necessarily how things move forward under the mother of all stressors, called time.

Further, after the occurrence of an event, we need to switch the blame from the inability to see an event coming (say a tsunami, an Arabo-Semitic spring or similar riots, an earthquake, a war, or a financial crisis) to the failure to understand (anti)fragility, namely, "why did we build something so fragile to these types of events?" Not seeing a tsunami or an economic event coming is excusable; building something fragile to them is not.

Also, as to the naive type of utopianism, that is, blindness to history, we cannot afford to rely on the rationalistic elimination of greed and other human defects that fragilize society. Humanity has been trying to do so for thousands of years and humans remain the same, plus or minus bad teeth, so the last thing we need is even more dangerous moralizers (those who look in a permanent state of gastrointestinal distress). Rather, the more intelligent (and practical) action is to make the world greed-proof, or even hopefully make society benefit from the greed and other perceived defects of the human race.

In spite of their bad press, some people in the nuclear industry seem to be among the rare ones to have gotten the point and taken it to its logical

consequence. In the wake of the Fukushima disaster, instead of predicting failure and the probabilities of disaster, these intelligent nuclear firms are now aware that they should instead focus on *exposure to failure*—making the prediction or nonprediction of failure quite irrelevant. This approach leads to building small enough reactors and embedding them deep enough in the ground with enough layers of protection around them that a failure would not affect us much should it happen—costly, but still better than nothing.

Another illustration, this time in economics, is the Swedish government's focus on total fiscal responsibility after their budget troubles in 1991—it makes them much less dependent on economic forecasts. This allowed them to shrug off later crises.[2]

The Idea of Becoming a Non-Turkey

It is obvious to anyone before drinking time that we can put a man, a family, a village with a mini town hall on the moon, and predict the trajectory of planets or the most minute effect in quantum physics, yet governments with equally sophisticated models cannot forecast revolutions, crises, budget deficits, climate change. Or even the closing prices of the stock market a few hours from now.

There are two different domains, one in which we can predict (to some extent), the other—the Black Swan domain—in which we should only let turkeys and turkified people operate. And the demarcation is as visible (to non-turkeys) as the one between the cat and the washing machine.

Social, economic, and cultural life lie in the Black Swan domain, physical life much less so. Further, the idea is to separate domains into those in which these Black Swans are both unpredictable and consequential, and those in which rare events are of no serious concern, either because they are predictable or because they are inconsequential.

I mentioned in the Prologue that randomness in the Black Swan domain is intractable. I will repeat it till I get hoarse. The limit is mathematical, period, and there is no way around it on this planet. What is nonmeasurable and nonpredictable will remain nonmeasurable and nonpredictable, no matter how many PhDs with Russian and Indian names you put on the job

—and no matter how much hate mail I get. There is, in the Black Swan zone, a limit to knowledge that can never be reached, no matter how sophisticated statistical and risk management science ever gets.

The involvement of this author has not been so much in asserting this impossibility to ever know anything about these matters—the general skeptical problem has been raised throughout history by a long tradition of philosophers, including Sextus Empiricus, Algazel, Hume, and many more skeptics and skeptical empiricists—as in formalizing and modernizing as a background and footnote to my anti-turkey argument. So my work is about *where* one should be skeptical, and where one should not be so. In other words, focus on getting out of the f*** Fourth Quadrant—the Fourth Quadrant is the scientific name I gave to the Black Swan domain, the one in which we have a high exposure to rare, "tail" events *and* these events are incomputable.[3]

Now, what is worse, because of modernity, the share of Extremistan is increasing. Winner-take-all effects are worsening: success for an author, a company, an idea, a musician, an athlete is planetary, or nothing. These worsen predictability since almost everything in socioeconomic life now is dominated by Black Swans. Our sophistication continuously puts us ahead of ourselves, creating things we are less and less capable of understanding.

No More Black Swans

Meanwhile, over the past few years, the world has also gone the other way, upon the discovery of the Black Swan idea. Opportunists are now into predicting, predictioning, and predictionizing Black Swans with even more complicated models coming from chaos-complexity-catastrophe-fractal theory. Yet, again, the answer is simple: *less is more;* move the discourse to (anti)fragility.

[1] From my experiences of the Lebanese war and a couple of storms with power outages in Westchester County, New York, I suggest stocking up on novels, as we tend to underestimate the boredom of these long hours waiting for the trouble to dissipate. And books, being robust, are immune to power outages.

[2] A related idea is expressed in a (perhaps apocryphal) statement by the financier Warren Buffett that he tries to invest in businesses that are "so wonderful that an idiot can run them. Because sooner or later, one will."

[3] A technical footnote (to skip): What are the Quadrants? Combining exposures and types of randomness we get four combinations: Mediocristan randomness, low exposure to extreme events (First Quadrant); Mediocristan randomness, high exposure to extreme events (Second Quadrant); Extremistan randomness, low exposure to extreme events (Third Quadrant); Extremistan randomness, high exposure to extreme events (Fourth Quadrant). The first three quadrants are ones in which knowledge or lack of it bring inconsequential errors. "Robustification" is the modification of exposures to make a switch from the fourth to the third quadrant.