

April 22 & 29, 2002

DEPARTMENT OF FINANCE

Blowing Up

How Nassim Taleb turned the inevitability of disaster into an investment strategy

One day in 1996, a Wall Street trader named Nassim Nicholas Taleb went to see Victor Niederhoffer. Victor Niederhoffer was one of the most successful money managers in the country. He lived and worked out of a thirteen-acre compound in Fairfield County, Connecticut, and when Taleb drove up that day from his home in Larchmont he had to give his name at the gate, and then make his way down a long, curving driveway. Niederhoffer had a squash court and a tennis court and a swimming pool and a colossal, faux-alpine mansion in which virtually every square inch of space was covered with eighteenth- and nineteenth-century American folk art. In those days, he played tennis regularly with the billionaire financier George Soros. He had just written a best-selling book, "The Education of a Speculator," dedicated to his father, Artie Niederhoffer, a police officer from Coney Island. He had a huge and eclectic library and a seemingly insatiable desire for knowledge. When Niederhoffer went to Harvard as an undergraduate, he showed up for the very first squash practice and announced that he would someday be the best in that sport; and, sure enough, he soon beat the legendary Shariff Khan to win the U.S. Open squash championship. That was the kind of man Niederhoffer was. He had heard of Taleb's growing reputation in the esoteric field of options trading, and summoned him to Connecticut. Taleb was in awe.

"He didn't talk much, so I observed him," Taleb recalls. "I spent seven hours watching him trade. Everyone else in his office was in his twenties, and he was in his fifties, and he had the most energy of them all. Then, after the markets closed, he went out to hit a thousand backhands on the tennis court." Taleb is Greek-Orthodox Lebanese and his first language was French, and in his pronunciation the name Niederhoffer comes out as the slightly more exotic *Nieder hoffer*. "Here was a guy living in a mansion with thousands of books, and that was my dream as a child," Taleb went on. "He was part chevalier, part scholar. My respect for him was intense." There was just one problem, however, and it is the key to understanding the strange path that Nassim Taleb has chosen, and the position he now holds as Wall Street's principal dissident. Despite his envy and admiration, he did not want to be Victor Niederhoffer -- not then, not now, and not even for a moment in between. For when he looked around him, at the books and the tennis court and the folk art on the walls -- when he contemplated the countless millions that Niederhoffer had made over the years -- he could not escape the thought that it might all have been the result of sheer, dumb luck.

Taleb knew how heretical that thought was. Wall Street was dedicated to the principle that when it came to playing the markets there was such a thing as expertise, that skill and insight mattered in investing just as skill and insight mattered in surgery and golf and flying fighter jets. Those who had the foresight

to grasp the role that software would play in the modern world bought Microsoft in 1985, and made a fortune. Those who understood the psychology of investment bubbles sold their tech stocks at the end of 1999 and escaped the Nasdaq crash. Warren Buffett was known as the "sage of Omaha" because it seemed incontrovertible that if you started with nothing and ended up with billions then you had to be smarter than everyone else: Buffett was successful for a reason. Yet how could you know, Taleb wondered, whether that reason was responsible for someone's success, or simply a rationalization invented after the fact? George Soros seemed to be successful for a reason, too. He used to say that he followed something called "the theory of reflexivity." But then, later, Soros wrote that in most situations his theory "is so feeble that it can be safely ignored." An old trading partner of Taleb's, a man named Jean-Manuel Rozan, once spent an entire afternoon arguing about the stock market with Soros. Soros was vehemently bearish, and he had an elaborate theory to explain why, which turned out to be entirely wrong. The stock market boomed. Two years later, Rozan ran into Soros at a tennis tournament. "Do you remember our conversation?" Rozan asked. "I recall it very well," Soros replied. "I changed my mind, and made an absolute fortune." He changed his mind! The truest thing about Soros seemed to be what his son Robert had once said:

My father will sit down and give you theories to explain why he does this or that. But I remember seeing it as a kid and thinking, Jesus Christ, at least half of this is bullshit. I mean, you know the reason he changes his position on the market or whatever is because his back starts killing him. It has nothing to do with reason. He literally goes into a spasm, and it's this early warning sign.

For Taleb, then, the question why someone was a success in the financial marketplace was vexing. Taleb could do the arithmetic in his head. Suppose that there were ten thousand investment managers out there, which is not an outlandish number, and that every year half of them, entirely by chance, made money and half of them, entirely by chance, lost money. And suppose that every year the losers were tossed out, and the game replayed with those who remained. At the end of five years, there would be three hundred and thirteen people who had made money in every one of those years, and after ten years there would be nine people who had made money every single year in a row, all out of pure luck. Niederhoffer, like Buffett and Soros, was a brilliant man. He had a Ph.D. in economics from the University of Chicago. He had pioneered the idea that through close mathematical analysis of patterns in the market an investor could identify profitable anomalies. But who was to say that he wasn't one of those lucky nine? And who was to say that in the eleventh year Niederhoffer would be one of the unlucky ones, who suddenly lost it all, who suddenly, as they say on Wall Street, "blew up"?

Taleb remembered his childhood in Lebanon and watching his country turn, as he puts it, from "paradise to hell" in six months. His family once owned vast tracts of land in northern Lebanon. All of that was gone. He remembered his grandfather, the former Deputy Prime Minister of Lebanon and the son of a Deputy Prime Minister of Lebanon and a man of great personal dignity, living out his days in a dowdy apartment in Athens. That was the problem with a world in which there was so much uncertainty about why things ended up the way they did: you never knew whether one day your luck would turn and it would all be

washed away.

So here is what Taleb took from Niederhoffer. He saw that Niederhoffer was a serious athlete, and he decided that he would be, too. He would bicycle to work and exercise in the gym. Niederhoffer was a staunch empiricist, who turned to Taleb that day in Connecticut and said to him sternly, "Everything that can be tested must be tested," and so when Taleb started his own hedge fund, a few years later, he called it Empirica. But that is where it stopped. Nassim Taleb decided that he could not pursue an investment strategy that had any chance of blowing up.

Nassim Taleb is a tall, muscular man in his early forties, with a salt-and-pepper beard and a balding head. His eyebrows are heavy and his nose is long. His skin has the olive hue of the Levant. He is a man of moods, and when his world turns dark the eyebrows come together and the eyes narrow and it is as if he were giving off an electrical charge. It is said, by some of his friends, that he looks like Salman Rushdie, although at his office his staff have pinned to the bulletin board a photograph of a mullah they swear is Taleb's long-lost twin, while Taleb himself maintains, wholly implausibly, that he resembles Sean Connery. He lives in a four-bedroom Tudor with twenty-six Russian Orthodox icons, nineteen Roman heads, and four thousand books, and he rises at dawn to spend an hour writing. He is the author of two books, the first a technical and highly regarded work on derivatives, and the second a treatise entitled "Fooled by Randomness," which was published last year and is to conventional Wall Street wisdom approximately what Martin Luther's ninety-five theses were to the Catholic Church. Some afternoons, he drives into the city and attends a philosophy lecture at City University. During the school year, in the evenings, he teaches a graduate course in finance at New York University, after which he can often be found at the bar at Odeon Café in Tribeca, holding forth, say, on the finer points of stochastic volatility or his veneration of the Greek poet C. P. Cavafy.

Taleb runs Empirica Capital out of an anonymous, concrete office park somewhere in the woods outside Greenwich, Connecticut. His offices consist, principally, of a trading floor about the size of a Manhattan studio apartment. Taleb sits in one corner, in front of a laptop, surrounded by the rest of his team -- Mark Spitznagel, the chief trader, another trader named Danny Tosto, a programmer named Winn Martin, and a graduate student named Pallop Angsupun. Mark Spitznagel is perhaps thirty. Win, Danny, and Pallop look as if they belonged in high school. The room has an overstuffed bookshelf in one corner, and a television muted and tuned to CNBC. There are two ancient Greek heads, one next to Taleb's computer and the other, somewhat bafflingly, on the floor, next to the door, as if it were being set out for the trash. There is almost nothing on the walls, except for a slightly battered poster for an exhibition of Greek artifacts, the snapshot of the mullah, and a small pen-and-ink drawing of the patron saint of Empirica Capital, the philosopher Karl Popper.

On a recent spring morning, the staff of Empirica were concerned with solving a thorny problem, having to do with the square root of n , where n is a given number of random set of observations, and what relation n might have to a speculator's confidence in his estimations. Taleb was up at a whiteboard by the

door, his marker squeaking furiously as he scribbled possible solutions. Spitznagel and Pallop looked on intently. Spitznagel is blond and from the Midwest and does yoga: in contrast to Taleb, he exudes a certain laconic levelheadedness. In a bar, Taleb would pick a fight. Spitznagel would break it up. Pallop is of Thai extraction and is doing a Ph.D. in financial mathematics at Princeton. He has longish black hair, and a slightly quizzical air. "Pallop is very lazy," Taleb will remark, to no one in particular, several times over the course of the day, although this is said with such affection that it suggests that "laziness," in the Talebian nomenclature, is a synonym for genius. Pallop's computer was untouched and he often turned his chair around, so that he faced completely away from his desk. He was reading a book by the cognitive psychologists Amos Tversky and Daniel Kahneman, whose arguments, he said a bit disappointedly, were "not really quantifiable." The three argued back and forth about the solution. It appeared that Taleb might be wrong, but before the matter could be resolved the markets opened. Taleb returned to his desk and began to bicker with Spitznagel about what exactly would be put on the company boom box. Spitznagel plays the piano and the French horn and has appointed himself the Empirica d.j. He wanted to play Mahler, and Taleb does not like Mahler. "Mahler is not good for volatility," Taleb complained. "Bach is good. St. Matthew's Passion!" Taleb gestured toward Spitznagel, who was wearing a gray woollen turtleneck. "Look at him. He wants to be like von Karajan, like someone who wants to live in a castle. Technically superior to the rest of us. No chitchatting. Top skier. That's Mark!" As Spitznagel rolled his eyes, a man whom Taleb refers to, somewhat mysteriously, as Dr. Wu wandered in. Dr. Wu works for another hedge fund, down the hall, and is said to be brilliant. He is thin and squints through black-rimmed glasses. He was asked his opinion on the square root of n but declined to answer. "Dr. Wu comes here for intellectual kicks and to borrow books and to talk music with Mark," Taleb explained after their visitor had drifted away. He added darkly, "Dr. Wu is a Mahlerian."

Empirica follows a very particular investment strategy. It trades options, which is to say that it deals not in stocks and bonds but with bets on stocks and bonds. Imagine, for example, that General Motors stock is trading at fifty dollars, and imagine that you are a major investor on Wall Street. An options trader comes up to you with a proposition. What if, within the next three months, he decides to sell you a share of G.M. at forty-five dollars? How much would you charge for agreeing to buy it at that price? You would look at the history of G.M. and see that in a three-month period it has rarely dropped ten per cent, and obviously the trader is only going to make you buy his G.M. at forty-five dollars if the stock drops below that point. So you say you'll make that promise, or sell that option, for a relatively small fee, say, a dime. You are betting on the high probability that G.M. stock will stay relatively calm over the next three months, and if you are right you'll pocket the dime as pure profit. The trader, on the other hand, is betting on the unlikely event that G.M. stock will drop a lot, and if that happens his profits are potentially huge. If the trader bought a million options from you at a dime each and G.M. drops to thirty-five dollars, he'll buy a million shares at thirty-five dollars and turn around and force you to buy them at forty-five dollars, making himself suddenly very rich and you substantially poorer.

That particular transaction is called, in the argot of Wall Street, an "out-of-the-money option." But an option can be configured in a vast number of ways. You could sell the trader a G.M. option at thirty dollars, or, if you wanted to bet against G.M. stock going up, you could sell a G.M. option at sixty dollars. You could sell or buy options on bonds, on the S. & P. index, on foreign currencies or on mortgages, or on the relationship among any number of financial instruments of your choice; you can bet on the market booming, or the market crashing, or the market staying the same. Options allow investors to gamble heavily and turn one dollar into ten. They also allow investors to hedge their risk. The reason your pension fund may not be wiped out in the next crash is that it has protected itself by buying options. What drives the options game is the notion that the risks represented by all of these bets can be quantified; that by looking at the past behavior of G.M. you can figure out the exact chance of G.M. hitting forty-five dollars in the next three months, and whether at a dollar that option is a good or a bad investment. The process is a lot like the way insurance companies analyze actuarial statistics in order to figure out how much to charge for a life-insurance premium, and to make those calculations every investment bank has, on staff, a team of Ph.D.s, physicists from Russia, applied mathematicians from China, computer scientists from India. On Wall Street, those Ph.D.s are called "quants."

Nassim Taleb and his team at Empirica are quants. But they reject the quant orthodoxy, because they don't believe that things like the stock market behave in the way that physical phenomena like mortality statistics do. Physical events, whether death rates or poker games, are the predictable function of a limited and stable set of factors, and tend to follow what statisticians call a "normal distribution," a bell curve. But do the ups and downs of the market follow a bell curve? The economist Eugene Fama once studied stock prices and pointed out that if they followed a normal distribution you'd expect a really big jump, what he specified as a movement five standard deviations from the mean, once every seven thousand years. In fact, jumps of that magnitude happen in the stock market every three or four years, because investors don't behave with any kind of statistical orderliness. They change their mind. They do stupid things. They copy each other. They panic. Fama concluded that if you charted the ups and downs of the stock market the graph would have a "fat tail," meaning that at the upper and lower ends of the distribution there would be many more outlying events than statisticians used to modelling the physical world would have imagined.

In the summer of 1997, Taleb predicted that hedge funds like Long Term Capital Management were headed for trouble, because they did not understand this notion of fat tails. Just a year later, L.T.C.M. sold an extraordinary number of options, because its computer models told it that the markets ought to be calming down. And what happened? The Russian government defaulted on its bonds; the markets went crazy; and in a matter of weeks L.T.C.M. was finished. Spitznagel, Taleb's head trader, says that he recently heard one of the former top executives of L.T.C.M. give a lecture in which he defended the gamble that the fund had made. "What he said was, Look, when I drive home every night in the fall I see all these leaves scattered around the base of the trees,?" Spitznagel recounts. "There is a statistical distribution that governs the way they

fall, and I can be pretty accurate in figuring out what that distribution is going to be. But one day I came home and the leaves were in little piles. Does that falsify my theory that there are statistical rules governing how leaves fall? No. It was a man-made event." In other words, the Russians, by defaulting on their bonds, did something that they were not supposed to do, a once-in-a-lifetime, rule-breaking event. But this, to Taleb, is just the point: in the markets, unlike in the physical universe, the rules of the game can be changed. Central banks can decide to default on government-backed securities.

One of Taleb's earliest Wall Street mentors was a short-tempered Frenchman named Jean-Patrice, who dressed like a peacock and had an almost neurotic obsession with risk. Jean-Patrice would call Taleb from Regine's at three in the morning, or take a meeting in a Paris nightclub, sipping champagne and surrounded by scantily clad women, and once Jean-Patrice asked Taleb what would happen to his positions if a plane crashed into his building. Taleb was young then and brushed him aside. It seemed absurd. But nothing, Taleb soon realized, is absurd. Taleb likes to quote David Hume: "No amount of observations of white swans can allow the inference that all swans are white, but the observation of a single black swan is sufficient to refute that conclusion." Because L.T.C.M. had never seen a black swan in Russia, it thought no Russian black swans existed. Taleb, by contrast, has constructed a trading philosophy predicated entirely on the existence of black swans. on the possibility of some random, unexpected event sweeping the markets. He never sells options, then. He only buys them. He's never the one who can lose a great deal of money if G.M. stock suddenly plunges. Nor does he ever bet on the market moving in one direction or another. That would require Taleb to assume that he understands the market, and he doesn't. He hasn't Warren Buffett's confidence. So he buys options on both sides, on the possibility of the market moving both up and down. And he doesn't bet on minor fluctuations in the market. Why bother? If everyone else is vastly underestimating the possibility of rare events, then an option on G.M. at, say, forty dollars is going to be undervalued. So Taleb buys out-of-the-money options by the truckload. He buys them for hundreds of different stocks, and if they expire before he gets to use them he simply buys more. Taleb doesn't even invest in stocks, not for Empirica and not for his own personal account. Buying a stock, unlike buying an option, is a gamble that the future will represent an improved version of the past. And who knows whether that will be true? So all of Taleb's personal wealth, and the hundreds of millions that Empirica has in reserve, is in Treasury bills. Few on Wall Street have taken the practice of buying options to such extremes. But if anything completely out of the ordinary happens to the stock market, if some random event sends a jolt through all of Wall Street and pushes G.M. to, say, twenty dollars, Nassim Taleb will not end up in a dowdy apartment in Athens. He will be rich.

Not long ago, Taleb went to a dinner in a French restaurant just north of Wall Street. The people at the dinner were all quants: men with bulging pockets and open-collared shirts and the serene and slightly detached air of those who daydream in numbers. Taleb sat at the end of the table, drinking pastis and discussing French literature. There was a chess grand master at the table, with a shock of white hair, who had once been one of Anatoly Karpov's teachers, and another man who over the course of his career had worked, in order, at

Stanford University, Exxon, Los Alamos National Laboratory, Morgan Stanley, and a boutique French investment bank. They talked about mathematics and chess and fretted about one of their party who had not yet arrived and who had the reputation, as one of the quants worriedly said, of "not being able to find the bathroom." When the check came, it was given to a man who worked in risk management at a big Wall Street bank, and he stared at it for a long time, with a slight mixture of perplexity and amusement, as if he could not remember what it was like to deal with a mathematical problem of such banality. The men at the table were in a business that was formally about mathematics but was really about epistemology, because to sell or to buy an option requires each party to confront the question of what it is he truly knows. Taleb buys options because he is certain that, at root, he knows nothing, or, more precisely, that other people believe they know more than they do. But there were plenty of people around that table who sold options, who thought that if you were smart enough to set the price of the option properly you could win so many of those one-dollar bets on General Motors that, even if the stock ever did dip below forty-five dollars, you'd still come out far ahead. They believe that the world is a place where, at the end of the day, leaves fall more or less in a predictable pattern.

The distinction between these two sides is the divide that emerged between Taleb and Niederhoffer all those years ago in Connecticut. Niederhoffer's hero is the nineteenth-century scientist Francis Galton. Niederhoffer called his eldest daughter Galt, and there is a full-length portrait of Galton in his library. Galton was a statistician and a social scientist (and a geneticist and a meteorologist), and if he was your hero you believed that by marshalling empirical evidence, by aggregating data points, you could learn whatever it was you needed to know. Taleb's hero, on the other hand, is Karl Popper, who said that you could not know with any certainty that a proposition was true; you could only know that it was not true. Taleb makes much of what he learned from Niederhoffer, but Niederhoffer insists that his example was wasted on Taleb. "In one of his cases, Rumpole of the Bailey talked about being tried by the bishop who doesn't believe in God," Niederhoffer says. "Nassim is the empiricist who doesn't believe in empiricism." What is it that you claim to learn from experience, if you believe that experience cannot be trusted? Today, Niederhoffer makes a lot of his money selling options, and more often than not the person who he sells those options to is Nassim Taleb. If one of them is up a dollar one day, in other words, that dollar is likely to have come from the other. The teacher and pupil have become predator and prey.

Years ago, Nassim Taleb worked at the investment bank First Boston, and one of the things that puzzled him was what he saw as the mindless industry of the trading floor. A trader was supposed to come in every morning and buy and sell things, and on the basis of how much money he made buying and selling he was given a bonus. If he went too many weeks without showing a profit, his peers would start to look at him funny, and if he went too many months without showing a profit he would be gone. The traders were often well educated, and wore Savile Row suits and Ferragamo ties. They dove into the markets with a frantic urgency. They read the Wall Street Journal closely and gathered around the television to catch breaking news. "The Fed did this, the Prime Minister of

Spain did that," Taleb recalls. "The Italian Finance Minister says there will be no competitive devaluation, this number is higher than expected, Abby Cohen just said this." It was a scene that Taleb did not understand.

"He was always so conceptual about what he was doing," says Howard Savery, who was Taleb's assistant at the French bank Indosuez in the nineteen-eighties. "He used to drive our floor trader (his name was Tim) crazy. Floor traders are used to precision: "Sell a hundred futures at eighty-seven." Nassim would pick up the phone and say, "Tim, sell some." And Tim would say, "How many?" And he would say, "Oh, a social amount." It was like saying, "I don't have a number in mind, I just know I want to sell." There would be these heated arguments in French, screaming arguments. Then everyone would go out to dinner and have fun. Nassim and his group had this attitude that we're not interested in knowing what the new trade number is. When everyone else was leaning over their desks, listening closely to the latest figures, Nassim would make a big scene of walking out of the room."

At Empirica, then, there are no Wall Street Journals to be found. There is very little active trading, because the options that the fund owns are selected by computer. Most of those options will be useful only if the market does something dramatic, and, of course, on most days the market doesn't. So the job of Taleb and his team is to wait and to think. They analyze the company's trading policies, back-test various strategies, and construct ever-more sophisticated computer models of options pricing. Danny, in the corner, occasionally types things into the computer. Pallop looks dreamily off into the distance. Spitznagel takes calls from traders, and toggles back and forth between screens on his computer. Taleb answers e-mails and calls one of the firm's brokers in Chicago, affecting, as he does, the kind of Brooklyn accent that people from Brooklyn would have if they were actually from northern Lebanon: "Howyoudoin?" It is closer to a classroom than to a trading floor.

"Pallop, did you introspect?" Taleb calls out as he wanders back in from lunch. Pallop is asked what his Ph.D. is about. "Pretty much this," he says, waving a languid hand around the room.

"It looks like we will have to write it for him," Taleb chimes in, "because Pollop is very lazy."

What Empirica has done is to invert the traditional psychology of investing. You and I, if we invest conventionally in the market, have a fairly large chance of making a small amount of money in a given day from dividends or interest or the general upward trend of the market. We have almost no chance of making a large amount of money in one day, and there is a very small, but real, possibility that if the market collapses we could blow up. We accept that distribution of risks because, for fundamental reasons, it feels right. In the book that Pallop was reading by Kahneman and Tversky, for example, there is a description of a simple experiment, where a group of people were told to imagine that they had three hundred dollars. They were then given a choice between (a) receiving another hundred dollars or (b) tossing a coin, where if they won they got two hundred dollars and if they lost they got nothing. Most of us, it turns out, prefer (a) to (b). But then Kahneman and Tversky did a second

experiment. They told people to imagine that they had five hundred dollars, and then asked them if they would rather (c) give up a hundred dollars or (d) toss a coin and pay two hundred dollars if they lost and nothing at all if they won. Most of us now prefer (d) to (c). What is interesting about those four choices is that, from a probabilistic standpoint, they are identical. They all yield an expected outcome of four hundred dollars. Nonetheless, we have strong preferences among them. Why? Because we're more willing to gamble when it comes to losses, but are risk averse when it comes to our gains. That's why we like small daily winnings in the stock market, even if that requires that we risk losing everything in a crash.

At Empirica, by contrast, every day brings a small but real possibility that they'll make a huge amount of money in a day; no chance that they'll blow up; and a very large possibility that they'll lose a small amount of money. All those dollar, and fifty-cent, and nickel options that Empirica has accumulated, few of which will ever be used, soon begin to add up. By looking at a particular column on the computer screens showing Empirica's positions, anyone at the firm can tell you precisely how much money Empirica has lost or made so far that day. At 11:30 A.M., for instance, they had recovered just twenty-eight percent of the money they had spent that day on options. By 12:30, they had recovered forty per cent, meaning that the day was not yet half over and Empirica was already in the red to the tune of several hundred thousand dollars. The day before that, it had made back eighty-five per cent of its money; the day before that, forty-eight per cent; the day before that, sixty-five per cent; and the day before that also sixty-five per cent; and, in fact-with a few notable exceptions, like the few days when the market reopened after September 11th -- Empirica has done nothing but lose money since last April. "We cannot blow up, we can only bleed to death," Taleb says, and bleeding to death, absorbing the pain of steady losses, is precisely what human beings are hardwired to avoid. "Say you've got a guy who is long on Russian bonds," Savery says. "He's making money every day. One day, lightning strikes and he loses five times what he made. Still, on three hundred and sixty-four out of three hundred and sixty-five days he was very happily making money. It's much harder to be the other guy, the guy losing money three hundred and sixty-four days out of three hundred and sixty-five, because you start questioning yourself. Am I ever going to make it back? Am I really right? What if it takes ten years? Will I even be sane ten years from now?" What the normal trader gets from his daily winnings is feedback, the pleasing illusion of progress. At Empirica, there is no feedback. "It's like you're playing the piano for ten years and you still can't play chopsticks," Spitznagel says, "and the only thing you have to keep you going is the belief that one day you'll wake up and play like Rachmaninoff." Was it easy knowing that Niederhoffer -- who represented everything they thought was wrong -- was out there getting rich while they were bleeding away? Of course it wasn't. If you watched Taleb closely that day, you could see the little ways in which the steady drip of losses takes a toll. He glanced a bit too much at the Bloomberg. He leaned forward a bit too often to see the daily loss count. He succumbs to an array of superstitious tics. If the going is good, he parks in the same space every day; he turned against Mahler because he associates Mahler with the last year's long dry spell. "Nassim says all the time that he needs me there, and I believe him," Spitznagel says. He is there to remind Taleb that there is a point

to waiting, to help Taleb resist the very human impulse to abandon everything and stanch the pain of losing. "Mark is my cop," Taleb says. So is Pallop: he is there to remind Taleb that Empirica has the intellectual edge.

"The key is not having the ideas but having the recipe to deal with your ideas," Taleb says. "We don't need moralizing. We need a set of tricks." His trick is a protocol that stipulates precisely what has to be done in every situation. "We built the protocol, and the reason we did was to tell the guys, Don't listen to me, listen to the protocol. Now, I have the right to change the protocol, but there is a protocol to changing the protocol. We have to be hard on ourselves to do what we do. The bias we see in Niederhoffer we see in ourselves." At the quant dinner, Taleb devoured his roll, and as the busboy came around with more rolls Taleb shouted out "No, no!" and blocked his plate. It was a never-ending struggle, this battle between head and heart. When the waiter came around with wine, he hastily covered the glass with his hand. When the time came to order, he asked for steak frites -- without the frites, please! -- and then immediately tried to hedge his choice by negotiating with the person next to him for a fraction of his frites.

The psychologist Walter Mischel has done a series of experiments where he puts a young child in a room and places two cookies in front of him, one small and one large. The child is told that if he wants the small cookie he need only ring a bell and the experimenter will come back into the room and give it to him. If he wants the better treat, though, he has to wait until the experimenter returns on his own, which might be anytime in the next twenty minutes. Mischel has videotapes of six-year-olds, sitting in the room by themselves, staring at the cookies, trying to persuade themselves to wait. One girl starts to sing to herself. She whispers what seems to be the instructions -- that she can have the big cookie if she can only wait. She closes her eyes. Then she turns her back on the cookies. Another little boy swings his legs violently back and forth, and then picks up the bell and examines it, trying to do anything but think about the cookie he could get by ringing it. The tapes document the beginnings of discipline and self-control -- the techniques we learn to keep our impulses in check -- and to watch all the children desperately distracting themselves is to experience the shock of recognition: that's Nassim Taleb!

There is something else as well that helps to explain Taleb's resolve -- more than the tics and the systems and the self-denying ordinances. It happened a year or so before he went to see Niederhoffer. Taleb had been working as a trader at the Chicago Mercantile Exchange, and developed a persistently hoarse throat. At first, he thought nothing of it: a hoarse throat was an occupational hazard of spending every day in the pit. Finally, when he moved back to New York, he went to see a doctor, in one of those Upper East Side prewar buildings with a glamorous façade. Taleb sat in the office, staring out at the plain brick of the courtyard, reading the medical diplomas on the wall over and over, waiting and waiting for the verdict. The doctor returned and spoke in a low, grave voice: "I got the pathology report. It's not as bad as it sounds ?" But, of course, it was: he had throat cancer. Taleb's mind shut down. He left the office. It was raining outside. He walked and walked and ended up at a medical library. There he read frantically about his disease, the rainwater forming a puddle under his feet. It made no sense. Throat cancer was the disease of someone who has

spent a lifetime smoking heavily. But Taleb was young, and he barely smoked at all. His risk of getting throat cancer was something like one in a hundred thousand, almost unimaginably small. He was a black swan! The cancer is now beaten, but the memory of it is also Taleb's secret, because once you have been a black swan -- not just seen one, but lived and faced death as one -- it becomes easier to imagine another on the horizon.

As the day came to an end, Taleb and his team turned their attention once again to the problem of the square root of n . Taleb was back at the whiteboard. Spitznagel was looking on. Pallop was idly peeling a banana. Outside, the sun was beginning to settle behind the trees. "You do a conversion to p_1 and p_2 ," Taleb said. His marker was once again squeaking across the whiteboard. "We say we have a Gaussian distribution, and you have the market switching from a low-volume regime to a high-volume. P_{21} . P_{22} . You have your igon value." He frowned and stared at his handiwork. The markets were now closed. Empirica had lost money, which meant that somewhere off in the woods of Connecticut Niederhoffer had no doubt made money. That hurt, but if you steeled yourself, and thought about the problem at hand, and kept in mind that someday the market would do something utterly unexpected because in the world we live in something utterly unexpected always happens, then the hurt was not so bad. Taleb eyed his equations on the whiteboard, and arched an eyebrow. It was a very difficult problem. "Where is Dr. Wu? Should we call in Dr. Wu?"

A year after Nassim Taleb came to visit him, Victor Niederhoffer blew up. He sold a very large number of options on the S. & P. index, taking millions of dollars from other traders in exchange for promising to buy a basket of stocks from them at current prices, if the market ever fell. It was an unhedged bet, or what was called on Wall Street a "naked put," meaning that he bet everyone on one outcome: he bet in favor of the large probability of making a small amount of money, and against the small probability of losing a large amount of money--and he lost. On October 27, 1997, the market plummeted eight per cent, and all of the many, many people who had bought those options from Niederhoffer came calling all at once, demanding that he buy back their stocks at pre-crash prices. He ran through a hundred and thirty million dollars -- his cash reserves, his savings, his other stocks -- and when his broker came and asked for still more he didn't have it. In a day, one of the most successful hedge funds in America was wiped out. Niederhoffer had to shut down his firm. He had to mortgage his house. He had to borrow money from his children. He had to call Sotheby's and sell his prized silver collection -- the massive nineteenth-century Brazilian "sculptural group of victory" made for the Visconde De Figueirdeio, the massive silver bowl designed in 1887 by Tiffany & Company for the James Gordon Bennet Cup yacht race, and on and on. He stayed away from the auction. He couldn't bear to watch.

"It was one of the worst things that has ever happened to me in my life, right up there with the death of those closest to me," Niederhoffer said recently. It was a Saturday in March, and he was in the library of his enormous house. Two weary-looking dogs wandered in and out. He is a tall man, an athlete, thick through the upper body and trunk, with a long, imposing face and baleful, hooded eyes. He was shoeless. One collar on his shirt was twisted inward, and he looked away as he talked. "I let down my friends. I lost my business. I was a

major money manager. Now I pretty much have had to start from ground zero." He paused. "Five years have passed. The beaver builds a dam. The river washes it away, so he tries to build a better foundation, and I think I have. But I'm always mindful of the possibility of more failures." In the distance, there was a knock on the door. It was a man named Milton Bond, an artist who had come to present Niederhoffer with a painting he had done of Moby Dick ramming the Pequod. It was in the folk-art style that Niederhoffer likes so much, and he went to meet Bond in the foyer, kneeling down in front of the painting as Bond unwrapped it. Niederhoffer has other paintings of the Pequod in his house, and paintings of the Essex, the ship on which Melville's story was based. In his office, on a prominent wall, is a painting of the Titanic. They were, he said, his way of staying humble. "One of the reasons I've paid lots of attention to the Essex is that it turns out that the captain of the Essex, as soon as he got back to Nantucket, was given another job," Niederhoffer said. "They thought he did a good job in getting back after the ship was rammed. The captain was asked, 'How could people give you another ship?' And he said, 'I guess on the theory that lightning doesn't strike twice.' It was a fairly random thing. But then he was given the other ship, and that one foundered, too. Got stuck in the ice. At that time, he was a lost man. He wouldn't even let them save him. They had to forcibly remove him from the ship. He spent the rest of his life as a janitor in Nantucket. He became what on Wall Street they call a ghost." Niederhoffer was back in his study now, his lanky body stretched out, his feet up on the table, his eyes a little rheumy. "You see? I can't afford to fail a second time. Then I'll be a total washout. That's the significance of the Pequod."

A month or so before he blew up, Taleb had dinner with Niederhoffer at a restaurant in Westport, and Niederhoffer told him that he had been selling naked puts. You can imagine the two of them across the table from each other, Niederhoffer explaining that his bet was an acceptable risk, that the odds of the market going down so heavily that he would be wiped out were minuscule, and Taleb listening and shaking his head, and thinking about black swans. "I was depressed when I left him," Taleb said. "Here is a guy who goes out and hits a thousand backhands. He plays chess like his life depends on it. Here is a guy who, whatever he wants to do when he wakes up in the morning, he ends up better than anyone else. Whatever he wakes up in the morning and decides to do, he did better than anyone else. I was talking to my hero . . ." This was the reason Taleb didn't want to be Niederhoffer when Niederhoffer was at his height -- the reason he didn't want the silver and the house and the tennis matches with George Soros. He could see all too clearly where it all might end up. In his mind's eye, he could envision Niederhoffer borrowing money from his children, and selling off his silver, and talking in a hollow voice about letting down his friends, and Taleb did not know if he had the strength to live with that possibility. Unlike Niederhoffer, Taleb never thought he was invincible. You couldn't if you had watched your homeland blow up, and had been the one person in a hundred thousand who gets throat cancer, and so for Taleb there was never any alternative to the painful process of insuring himself against catastrophe.

This kind of caution does not seem heroic, of course. It seems like the joyless prudence of the accountant and the Sunday-school teacher. The truth is that we

are drawn to the Niederhoffers of this world because we are all, at heart, like Niederhoffer: we associate the willingness to risk great failure -- and the ability to climb back from catastrophe--with courage. But in this we are wrong. That is the lesson of Taleb and Niederhoffer, and also the lesson of our volatile times. There is more courage and heroism in defying the human impulse, in taking the purposeful and painful steps to prepare for the unimaginable.

Last fall, Niederhoffer sold a large number of options, betting that the markets would be quiet, and they were, until out of nowhere two planes crashed into the World Trade Center. "I was exposed. It was nip and tuck." Niederhoffer shook his head, because there was no way to have anticipated September 11th. "That was a totally unexpected event."

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