Fooled By Randomness

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THE PROBLEM OF INDUCTION

On the chromodynamics of swans. Taking Solon's warning into some philosophical territory. How Victor Niederhoffer taught me empiricism; I added deduction. Why it is not scientific to take science seriously. Soros promotes Popper. That bookstore on Eighteenth Street and Fifth Avenue. Pascal's wager.

FROM BACON TO HUME

Now we discuss this problem viewed from the broader standpoint of the philosophy of scientific knowledge. There is a problem in inference well-known as the problem of induction. It is a problem that has been haunting science for a long time, but hard science has not been as harmed by it as the social sciences, particularly economics, even more the branch of financial economics. Why? Because the randomness content compounds its effects. Nowhere is the problem of induction more relevant than in the world of trading—and nowhere has it been as ignored!

Cygnus Atratus

In his Treatise on Human Nature, the Scots philosopher David Hume posed the issue in the following way (as rephrased in the now famous black swan problem by John Stuart Mill): 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.

Hume had been irked by the fact that science in his day (the eighteenth century) had experienced a swing from scholasticism, entirely based on deductive reasoning (no emphasis on the obsdervation of the real world) to, owing to Francis Bacon, an overreaction into naive and unstructured empiricism. Bacon had argued against "spinning the cobweb of learning" with little practical result (science resembled theology). Science had shifted, thanks to Bacon, into an emphasis on empirical observation. The problem is that, without a proper method, empirical observations can lead you astray. Hume came to warn us against such knowledge, and to stress the need for some rigor in the gathering and interpretation of knowledge—what is called epistemology (from episteme, Greek for learning). Hume is the first modern epistemologist (epistemologists operating in the applied sciences are often called methodologists or philosophers of science). What I am writing here is not strictly true, for Hume said things far worse than that; he was an obsessive skeptic and never believed that a link between two items could be truly established as being causal. But we will tone him down a bit for this book.

Niederhoffer

The story of Victor Niederhoffer is both sad and interesting insofar as it shows the difficulty of merging extreme empiricism and logic in one single person—pure empiricism implies necessarily being fooled by randomness. I am bringing up his example because, in a way, similar to Francis Bacon, Victor Niederhoffer stood against the cobweb of learning of the University of Chicago and the efficient-market religion of the 1960s when they were at their worst. In contrast to the scholasticism of financial theorists, his work looked at data in search of anomalies and found some. He also figured out the uselessness of the news, as he showed that reading the newspaper did not confer a predictive advantage to its readers. He derived his knowledge of the world from past data stripped of preconceptions, commentaries, and stories. Since then, an entire industry of such operators, called statistical arbitrageurs, flourished; some of the successful ones were initially his trainees. Niederhoffer's

story illustrates how empiricism cannot be inseparable from methodology.

At the center of his modus is Niederhoffer's dogma that any "testable" statement should be tested, as our minds make plenty of empirical mistakes when relying on vague impressions. His advice is obvious, but it is rarely practiced. How many effects we take for granted might not be there? A testable statement is one that can be broken down into quantitative components and subjected to statistical examination. For instance, a conventional-wisdom, empirical style statement like

automobile accidents happen closer to home

can be tested by taking the average distance between the accident and the domicile of the driver (if, say, about 20% of accidents happen within a twelve-mile radius). However, one needs to be careful in the interpretation; a naive reader of the result would tell you that you are more likely to have an accident if you drive in your neighborhood than if you did so in remote places, which is a typical example of naive empiricism. Why? Because accidents may happen closer to home simply because people spend their time driving close to home (if people spend 20% of their time driving in a twelve-mile radius).*

But there is a more severe aspect of naive empiricism. I can use data to disprove a proposition, never to prove one. I can use history to refute a conjecture, never to affirm it. For instance, the statement

The market never goes down 20% in a given three-month period

can be tested but is completely meaningless if verified. I can quantitatively reject the proposition by finding counterexamples, but it is not possible for me to accept it simply because, in the past, the market never went down 20% in any three-month period (you cannot easily make the logical leap from "has never gone down" to "never goes down"). Samples can be greatly insufficient; markets may change; we may not know much about the market from historical information.

You can more safely use the data to reject than to confirm hypotheses. Why? Consider the following statements:

Statement A: No swan is black, because I looked at four thousand swans and found none.

Statement B: Not all swans are white.

I cannot logically make statement A, no matter how many successive white swans I may have observed in my life and may observe in the future (except, of course, if I am given the privilege of observing with certainty all available swans). It is, however, possible to make Statement B merely by finding one single counterexample. Indeed, Statement A was disproved by the discovery of Australia, as it led to the sighting of the Cygnus atratus, a swan variety that was jet black! The reader will see a hint of Popper's ideas, as there is a strong asymmetry between the two statements; and, furthermore, such asymmetry lies in the foundations of knowledge. It is also at the core of my operation as a decision maker under uncertainty.

I said that people rarely test testable statements; this may be better for those who cannot handle the consequence of the inference. The following inductive statement illustrates the problem of interpreting past data literally, without methodology or logic:

I have just completed a thorough statistical examination of the life of President Bush. For fifty-eight years, close to 21,000 observations, he did not die once. I can hence pronounce him as immortal, with a high degree of statistical significance.

Niederhoffer's publicized hiccup came from his selling naked options based on his testing and assuming that what he saw in the past was an exact generalization about what could happen in the future. He relied on the statement "The market has never done this before," so he sold puts that made a small income if the statement was true and lost hugely in the event of it turning out to be wrong. When he blew up, close to a couple of decades of performance were overshadowed by a single event that only lasted a few minutes.

Another logical flaw in this type of historical statement is that often when a large event takes place, you hear the "it never happened before," as if it needed to be absent from the event's past history for it to be a surprise. So why do we consider the worst case that took place in our own past as the worst possible case? If the past, by bringing surprises, did not resemble the past previous to it (what I call the past's past), then why should our future resemble our current past?

There is another lesson to his story, perhaps the greatest one: Niederhoffer appears to approach markets as a venue from which to derive pride, status, and wins against "opponents" (such as myself), as he would in a game with defined rules. He was a squash champion with a serious competitive streak; it is just that reality does not have the same closed and symmetric laws and regulations as games. This competitive nature got him into ferocious fighting to "win." As we saw in the last chapter, markets (and life) are not simple win/lose types of situations, as the cost of the losses can be markedly different from that of the wins. Maximizing the probability of winning does not lead to maximizing the expectation from the game when one's strategy may include skewness, i.e., a small chance of large loss and a large chance of a small win. If you engaged in a Russian roulette–type strategy with a low probability of large loss, one that bankrupts you every several years, you are likely to show up as the winner in almost all samples—except in the year when you are dead.

I remind myself never to fail to acknowledge the insights of the 1960s empiricist and his early contributions. Sadly, I learned quite a bit from Niederhoffer, mostly by contrast, and particularly from the last example: not to approach anything as a game to win, except, of course, if it is a game. Even then, I do not like the asphyxiating structure of competitive games and the diminishing aspect of deriving pride from a numerical performance. I also learned to stay away from people of a competitive nature, as they have a tendency to commoditize and reduce the world to categories, like how many papers they publish in a given year, or how they rank in the league tables. There is something nonphilosophical about investing one's pride and ego into a "my house/library/car is bigger than that of others in my category"—it is downright foolish to claim to be first in one's category all the while sitting on a time bomb.

To conclude, extreme empiricism, competitiveness, and an absence of logical structure to one's inference can be a quite explosive combination.

SIR KARL'S PROMOTING AGENT

Next I will discuss how I discovered Karl Popper via another trader, perhaps the only one I have ever truly respected. I do not know if it applies to other people, but, in spite of my being a voracious reader, I have rarely been truly affected in my behavior (in any durable manner) by anything I have read. A book can make a strong impression, but such an impression tends to wane after some newer impression replaces it in my brain (a new book). I have to discover things by myself (recall the "Stove Is Hot" section in Chapter 3). These self-discoveries last.

One exception of ideas that stuck with me are those of Sir Karl, whom I discovered (or perhaps rediscovered) through the writings of the trader and self-styled philosopher George Soros, who seemed to have organized his life by becoming a promoter of the ideas of Karl Popper. What I learned from George Soros was not quite in the way he perhaps intended us to learn from him. I disagreed with his statements when it came to economics and philosophy. First, although I admire him greatly, I agree

with professional thinkers that Soros' forte is not in philosophical speculation. Yet he considers himself a philosopher—which makes him endearing in more than one way. Take his first book, The Alchemy of Finance. On the one hand, he seems to discuss ideas of scientific explanation by throwing in big names like "deductive-nomological," something always suspicious as it is reminiscent of postmodern writers who play philosophers and scientists by using complicated references. On the other hand, he does not show much grasp of the concepts. For instance, he conducts what he calls a "trading experiment," and uses the success of the trade to imply that the theory behind it is valid. This is ludicrous: I could roll the dice to prove my religious beliefs and show the favorable outcome as evidence that my ideas are right. The fact that Soros' speculative portfolio turned a profit proves very little of anything. One cannot infer much from a single experiment in a random environment—an experiment needs a repeatability showing some causal component. Second, Soros indicts wholesale the science of economics, which may be very justified but he did not do his homework. For instance, he writes that the category of people he lumps as "economists" believe that things converge to equilibrium, when that only applies to some cases of neoclassical economics. There are plenty of economic theories that believe that departure from a price level can cause further divergence and cause cascading feedback loops. There has been considerable research to that effect in, say, game theory (the works of Harsanyi and Nash) or information economics (the works of Stiglitz, Akerlof, and Spence). Lumping all economics in one basket shows a bit of unfairness and lack of rigor.

But in spite of some of the nonsense in his writing, probably aimed at convincing himself that he was not just a trader, or because of it, I succumbed to the charm of this Hungarian man who like me is ashamed of being a trader and prefers his trading to be a minor extension of his intellectual life even if there is not much scholarship in his essays. Having never been impressed by people with money (and I have met plenty of those throughout my life), I did not look at any of them as remotely a role model for me. Perhaps the opposite effect holds, as I am generally repelled by the wealthy, generally because of the attitude of epic heroism that usually accompanies rapid enrichment. Soros was the only one who seemed to share my values. He wanted to be taken seriously as a Middle European professor who happened to have gotten rich owing to the validity of his ideas (it was only by failing to gain acceptance by other intellectuals that he would try to gain alpha status through his money, sort of like a seducer who, after trying hard, would end up using such an appendage as the red Ferrari to seduce the girl). In addition, although Soros did not deliver anything meaningful in his writings, he knew how to handle randomness, by keeping a critical open mind and changing his opinions with minimal shame (which carries the side effect of making him treat people like napkins). He walked around calling himself fallible, but was so potent because he knew it while others had loftier ideas about themselves. He understood Popper. Do not judge him by his writings: He lived a Popperian life.

As an aside, Popper was not new to me. I had briefly heard of Karl Popper when I was in my teens and early twenties, as part of a motivated education in Europe and the United States. But I did not understand his ideas as presented then, nor did I think it would be important (like metaphysics) for anything in life. I was at the age when one felt like one needed to read everything, which prevented one from making contemplative stops. Such hurry made it hard to detect that there was something important in Popper. It was either my conditioning by the intellectual-chic culture at the time (too much Plato, too many Marxists, too much Hegel, too many pseudoscientific intellectuals), the educational system (too many conjectures propounded as truth), or the fact that I was too young and was reading too much then to make a bridge to reality.

Popper* then slipped out of my mind without hanging on a single brain cell—there was nothing in the baggage of a boy without experience to let it stick. Besides, having started trading, I entered an anti-intellectual phase; I needed to make a nonrandom buck to secure my newly lost future and wealth that had just evaporated with the Lebanese war (until then I was living with the desire to become a comfortable man of leisure like almost everyone in my family over the past two centuries). I suddenly felt financially insecure and feared becoming an employee of some firm that would turn me into a corporate slave with "work ethics" (whenever I hear work ethics I interpret inefficient mediocrity). I

needed the backing of my bank account so I could buy time to think and enjoy life. The last thing I needed was immediate philosophizing and work at the local McDonald's. Philosophy, to me, became something rhetorical people did when they had plenty of time on their hands; it was an activity reserved for those who were not well versed in quantitative methods and other productive things. It was a pastime that should be limited to late hours, in bars around the campuses, when one had a few drinks and a light schedule—provided one forgot the garrulous episode as early as the next day. Too much of it can get a man in trouble, perhaps turn one into a Marxist ideologue. Popper was not to reemerge until I secured my career as a trader.

Location, Location

It is said that people generally remember the time and geographic condition where they were swept with a governing idea. The religious poet and diplomat Paul Claudel remembers the exact spot of his conversion (or reconversion) to Catholicism in the Cathedral Notre-Dame of Paris, near a precise column. Thus I remember exactly the spot at Barnes and Noble on Eighteenth Street and Fifth Avenue where in 1987, inspired by Soros, I read fifty pages of The Open Society and feverishly bought all the Popper titles I could get my hands on lest they run out of stock. It was in a sparsely lit side-room that had a distinctive smell of mildew. I remember vividly the thoughts that rushed through my head like a revelation.

Popper turned out to be exactly the opposite of what I initially thought about "philosophers"; he was the epitome of no nonsense. By then I had been an option trader for a couple of years and I felt angry that I was being taken for a total ride by the academic researchers in finance, particularly since I was deriving my income from the failure of their models. I had already started talking to finance academics as part of my involvement with derivatives and I had trouble getting through to them some basic points about financial markets (they believed in their models a little too much). There was all along lurking in my mind the idea that these researchers had missed a point, but I did not quite know what it was. It was not what they knew, it was how they knew it, that was the subject of my annoyance.

Popper's Answer

Popper came up with a major answer to the problem of induction (to me he came up with the answer). No man has influenced the way scientists do science more than Sir Karl—in spite of the fact that many of his fellow professional philosophers find him quite naive (to his credit, in my opinion). Popper's idea is that science is not to be taken as seriously as it sounds (Popper when meeting Einstein did not take him as the demigod he thought he was). There are only two types of theories:

1. Theories that are known to be wrong, as they were tested and adequately rejected (he calls them falsified).

2. Theories that have not yet been known to be wrong, not falsified yet, but are exposed to be proved wrong.

Why is a theory never right? Because we will never know if all the swans are white (Popper borrowed the Kantian idea of the flaws in our mechanisms of perception). The testing mechanism may be faulty. However, the statement that there is a black swan is possible to make. A theory cannot be verified. To paraphrase baseball coach Yogi Berra again, past data has a lot of good in it, but it is the bad side that is bad. It can only be provisionally accepted. A theory that falls outside of these two categories is not a theory. A theory that does not present a set of conditions under which it would be considered wrong would be termed charlatanism—it-would be impossible to reject otherwise. Why? Because the astrologist can always find a reason to fit the past event, by saying that Mars was probably in line but not too much so (likewise to me a trader who does not have a point that would make him change his mind is not a trader). Indeed the difference between Newtonian physics, which was falsified by

Einstein's relativity, and astrology lies in the following irony. Newtonian physics is scientific because it allowed us to falsify it, as we know that it is wrong, while astrology is not because it does not offer conditions under which we could reject it. Astrology cannot be disproved, owing to the auxiliary hypotheses that come into play. Such point lies at the basis of the demarcation between science and nonsense (called "the problem of demarcation").

More practically to me, Popper had many problems with statistics and statisticians. He refused to blindly accept the notion that knowledge can always increase with incremental information—which is the foundation of statistical inference. It may in some instances, but we do not know which ones. Many insightful people, such as John Maynard Keynes, independently reached the same conclusions. Sir Karl's detractors believe that favorably repeating the same experiment again and again should lead to an increased comfort with the notion that "it works." I came to understand Popper's position better once I saw the first rare event ravaging a trading room. Sir Karl feared that some type of knowledge did not increase with information—but which type we could not ascertain. The reason I feel that he is important for us traders is because to him the matter of knowledge and discovery is not so much in dealing with what we know as in dealing with what we do not know. His famous quote:

These are men with bold ideas, but highly critical of their own ideas; they try to find whether their ideas are right by trying first to find whether they are not perhaps wrong. They work with bold conjectures and severe attempts at refuting their own conjectures.

"These" are scientists. But they could be anything.

Putting the master in context, Popper was rebelling against the growth of science. Popper intellectually came to the world with the dramatic shifts in philosophy as attempts were made to shift it from the verbal and rhetorical to the scientific and rigorous, as we saw with the presentation of the Vienna Circle in Chapter 4. These people were sometimes called the logical positivists, after the movement called positivism pioneered in France in the nineteenth century by Auguste Comte, where positivism meant scientification of things (literally everything under the sun). It was the equivalent of bringing the industrial revolution into the soft sciences. Without dwelling on positivism, I have to note that Popper is the antidote to positivism. To him, verification is not possible. Verificationism is more dangerous than anything else. Taken to the extreme, Popper's ideas appear naive and primitive—but they work. Note that his detractors call him a naive falsificationist.

I am an exceedingly naive falsificationist. Why? Because I can survive being one. My extreme and obsessive Popperism is carried out as follows. I speculate in all of my activities on theories that represent some vision of the world, but with the following stipulation: No rare event should harm me. In fact, I would like all conceivable rare events to help me. My idea of science diverges with that of the people around me walking around calling themselves scientists. Science is mere speculation, mere formulation of conjecture.

Open Society

Popper's falsificationism is intimately connected to the notion of an open society. An open society is one in which no permanent truth is held to exist; this would allow counter-ideas to emerge. Karl Popper shared ideas with his friend, the low-key economist von Hayek, who endorsed capitalism as a state in which prices can disseminate information that bureaucratic socialism would choke. Both notions of falsificationism and open society are, counterintuitively, connected to those of a rigorous method for handling randomness in my day job as a trader. Clearly, an open mind is a necessity when dealing with randomness. Popper believed that any idea of Utopia is necessarily closed owing to the fact that it chokes its own refutations. The simple notion of a good model for society that cannot be left open for falsification is totalitarian. I learned from Popper, in addition to the difference between an open and a closed society, that between an open and a closed mind.

Nobody Is Perfect

I have some sobering information about Popper the man. Witnesses of his private life find him rather un-Popperian. The philosopher and Oxford don Bryan Magee who befriended him for close to three decades depicts him as unworldly (except in his youth) and narrowly focused on his work. He spent the last fifty years of his long career (Popper lived ninety-two years) closed to the outside world, insulated from outside distractions and stimulation. Popper also engaged in giving people "firm sounding advice about their career or their private life, though he had little understanding of either. All this, of course, was in direct contravention of his professed (and indeed genuine) beliefs, and practices, in philosophy."

He was not much better in his youth. Members of the Vienna Circle tried to avoid him, not because of his divergent ideas but because he was a social problem. "He was brilliant, but self-focused, both insecure and arrogant, irascible and self-righteous. He was a terrible listener and bent on winning arguments at all costs. He had no understanding of group dynamics and no ability to negotiate them."

I will refrain from commonplace discourse about the divorce between those who have ideas and those who carry them in practice, except to bring out the interesting behavioral problem; we like to emit logical and rational ideas but we do not necessarily enjoy this execution. Strange as it sounds, this point has only been discovered very recently (we will see that we are not genetically fit to be rational and act rationally; we are merely fit for the maximum probability of transmitting our genes in some given unsophisticated environment). Also, strange as it sounds, George Soros, obsessively self-critical, seems to be more Popperian than Popper in his professional behavior.

Induction and Memory

Memory in humans is a large machine to make inductive inferences. Think of memories: What is easier to remember, a collection of random facts glued together, or a story, something that offers a series of logical links? Causality is easier to commit to memory. Our brain would have less work to do in order to retain the information. The size is smaller. What is induction exactly? Induction is going from plenty of particulars to the general. It is very handy, as the general takes much less room in one's memory than a collection of particulars. The effect of such compression is the reduction in the degree of detected randomness.

Pascal's Wager

I conclude with the exposition of my own method of dealing with the problem of induction. The philosopher Pascal proclaimed that the optimal strategy for humans is to believe in the existence of God. For if God exists, then the believer would be rewarded. If he does not exist, the believer would have nothing to lose. Accordingly, we need to accept the asymmetry in knowledge; there are situations in which using statistics and econometrics can be useful. But I do not want my life to depend on it.

Like Pascal, I will therefore state the following argument. If the science of statistics can benefit me in anything, I will use it. If it poses a threat, then I will not. I want to take the best of what the past can give me without its dangers. Accordingly, I will use statistics and inductive methods to make aggressive bets, but I will not use them to manage my risks and exposure. Surprisingly, all the surviving traders I know seem to have done the same. They trade on ideas based on some observation (that includes past history) but, like the Popperian scientists, they make sure that the costs of being wrong are limited (and their probability is not derived from past data). Unlike Carlos and John, they know before getting involved in the trading strategy which events would prove their conjecture wrong and allow for it (recall that Carlos and John used past history both to make their bets and to measure their risk). They would then terminate their trade. This is called a stop loss, a predetermined exit point, a protection from the black swan. I find it rarely practiced.

THANK YOU, SOLON

Finally, I have to confess that upon finishing my writing of Part I, that writing about the genius of Solon's insight has carried an extreme effect on both my thinking and my private life. The composition of Part I made me even more confident in my withdrawal from the media and my distancing myself from other members of the business community, mostly other investors and traders for whom I am developing more and more contempt. I believe that I cannot have power over myself as I have an ingrained desire to integrate among people and cultures and would end up resembling them; by withdrawing myself entirely I can have a better control of my fate. I am currently enjoying a thrill of the classics I have not felt since childhood. I am now thinking of the next step: to recreate a low-information, more deterministic ancient time, say in the nineteenth century, all the while benefiting from some of the technical gains (such as the Monte Carlo engine), all of the medical breakthroughs, and all the gains of social justice of our age. I would then have the best of everything. This is called evolution.