Fooled By Randomness

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SURVIVAL OF THE LEAST FIT—CAN EVOLUTION BE FOOLED BY RANDOMNESS?

A case study on two rare events. On rare events and evolution. How “Darwinism” and evolution are concepts that are misunderstood in the nonbiological world. Life is not continuous. How evolution will be fooled by randomness. A prolegomenon for the problem of induction.

CARLOS THE EMERGING-MARKETS WIZARD

I used to meet Carlos at a variety of New York parties, where he would show up impeccably dressed, though a bit shy with the ladies. I used to regularly pounce on him and try to pick his brains about what he did for a living, namely buying or selling emerging-market bonds. A nice gentleman, he complied with my requests, but tensed up; for him speaking English, in spite of his fluency, seemed to require some expenditure of physical effort that made him contract his head and neck muscles (some people are not made to speak foreign languages). What are emerging-market bonds? “Emerging market” is the politically correct euphemism to define a country that is not very developed (as a skeptic, I do not impart to their “emergence”such linguistic certainty).The bonds are financial instruments issued by these foreign governments, mostly Russia, Mexico, Brazil, Argentina, and Turkey. These bonds traded for pennies when these governments were not doing well. Suddenly investors rushed into these markets in the early 1990s and pushed the envelope further and further by acquiring increasingly more exotic securities. All these countries were building hotels where United States cable news channels were available, with health clubs equipped with treadmills and large-screen television sets that made them join the global village. They all had access to the same gurus and financial entertainers. Bankers would come to invest in their bonds and the countries would use the proceeds to build nicer hotels so more investors would visit. At some point these bonds became the vogue and went from pennies to dollars; those who knew the slightest thing about them accumulated vast fortunes.

Carlos supposedly comes from a patrician Latin-American family that was heavily impoverished by the economic troubles of the 1980s, but, again, I have rarely run into anyone from a ravaged country whose family did not at some juncture own an entire province or, say, supply the Russian czar with sets of dominoes. After brilliant undergraduate studies, he went to Harvard to pursue a Ph.D. in economics, as it was the sort of thing Latin-American patricians had gotten into the habit of doing at the time (with a view to saving their economies from the evils of non-Ph.D. hands). He was a good student but could not find a decent thesis topic for his dissertation. Nor did he gain the respect of his thesis advisor, who found him unimaginative. Carlos settled for a master’s degree and a Wall Street career.

The nascent emerging-market desk of a New York bank hired Carlos in 1992. He had the right ingredients for success; he knew where on the map to find the countries that issued “Brady bonds,” dollar-denominated debt instruments issued by Less Developed Countries. He knew what Gross Domestic Product meant. He looked serious, brainy, and well-spoken, in spite of his heavy Spanish accent. He was the kind of person banks felt comfortable putting in front of their customers. What a contrast with the other traders who lacked polish!

Carlos got there right in time to see things happening in that market. When he joined the bank, the market for emerging-market debt instruments was small and traders were located in undesirable parts of trading floors. But the activity rapidly became a large, and growing, part of the bank's revenues.

He was generic among this community of emerging market traders; they are a collection of cosmopolitan patricians from across the emerging-market world that remind me of the international coffee hour at the Wharton School. I find it odd that rarely does a person specialize in the market of his or her birthplace. Mexicans based in London trade Russian securities, Iranians and Greeks specialize in Brazilian bonds, and Argentines trade Turkish securities. Unlike my experience with real traders, they are generally urbane, dress well, collect art, but are nonintellectual. They seem too conformist to be true traders. They are mostly between thirty and forty, owing to the youth of their market. You can expect many of them to hold season tickets to the Metropolitan Opera. True traders, I believe, dress sloppily, are often ugly, and exhibit the intellectual curiosity of someone who would be more interested in the information-revealing contents of the garbage can than the Cézanne painting on the wall.

Carlos thrived as a trader-economist. He had a large network of friends in the various Latin-American countries and knew exactly what took place there. He bought bonds that he found attractive, either because they paid him a good rate of interest, or because he believed that they would become more in demand in the future, therefore appreciating in price. It would be perhaps erroneous to call him a trader. A trader buys and sells (he may sell what he does not own and buy it back later, hopefully making a profit in a decline; this is called "shorting"). Carlos just bought—and he bought in size. He believed that he was paid a good risk premium to hold these bonds because there was economic value in lending to these countries. Shorting, in his opinion, made no economic sense.

Within the bank Carlos was the emerging-markets reference. He could produce the latest economic figures at the drop of a hat. He had frequent lunches with the chairman. In his opinion, trading was economics, little else. It had worked so well for him. He got promotion after promotion, until he became the head trader of the emerging-market desk at the institution. Starting in 1995, Carlos did exponentially well in his new function, getting an expansion of his capital on a steady basis (i.e., the bank allocated a larger portion of its funds to his operation)—so fast that he was incapable of using up the new risk limits.

The Good Years

The reason Carlos had good years was not just because he bought emerging-market bonds and their value went up over the period. It was mostly because he also bought dips. He accumulated when prices experienced a momentary panic. The year 1997 would have been bad had he not added to his position after the dip in October that accompanied the false stock market crash that took place then. Overcoming these small reversals of fortune made him feel invincible. He could do no wrong. He believed that the economic intuition he was endowed with allowed him to make good trading decisions. After a market dip he would verify the fundamentals, and, if they remained sound, he would buy more of the security and lighten up as the market recovered. Looking back at the emerging-market bonds between the time Carlos started his involvement with these markets and his last bonus check in December 1997, one sees an upward sloping line, with occasional blips, such as the Mexican devaluation of 1995, followed by an extended rally. One can also see some occasional dips that turned out to be "excellent buying opportunities."

It was the summer of 1998 that undid Carlos—that last dip did not translate into a rally. His track record up to that point included just one bad quarter—but bad it was. He had earned for his bank close to $80 million cumulatively in his previous years. He lost $300 million in just one summer. What happened? When the market started dipping in June, his friendly sources informed him that the sell-off was merely the result of a "liquidation" by a New Jersey hedge fund run by a former Wharton professor. That fund specialized in mortgage securities and had just received instructions to wind down the overall inventory.

The inventory included some Russian bonds, mostly because yield hogs, as these funds are known, engage in the activity of building a “diversified” portfolio of high-yielding securities.

Averaging Down

When the market started falling, he accumulated more Russian bonds, at an average of around $52. That was Carlos’ trait, average down. The problems, he deemed, had nothing to do with Russia, and it was not some New Jersey fund run by some mad scientist that was going to decide the fate of Russia. “Read my lips: It’s a li-qui-dation!” he yelled at those who questioned his buying.

By the end of June, his trading revenues for 1998 had dropped from up $60 million to up $20 million. That made him angry. But he calculated that should the market rise back to the pre–New Jersey sell-off, then he would be up $100 million. That was unavoidable, he asserted. These bonds, he said, would never, ever trade below $48. He was risking so little, to possibly make so much.

Then came July. The market dropped a bit more. The benchmark Russian bond was now at $43. His positions were underwater, but he increased his stakes. By now he was down $30 million for the year. His bosses were starting to become nervous, but he kept telling them that, after all, Russia would not go under. He repeated the cliché that it was too big to fail. He estimated that bailing them out would cost so little and would benefit the world economy so much that it did not make sense to liquidate his inventory now. “This is the time to buy, not to sell,” he said repeatedly. “These bonds are trading very close to their possible default value.” In other words, should Russia go into default, and run out of dollars to pay the interest on its debt, these bonds would hardly budge. Where did he get this idea? From discussions with other traders and emerging-market economists (or trader-economist hybrids). Carlos put about half his net worth, then $5 million, in the Russia Principal Bond. “I will retire on these profits,” he told the stockbroker who executed the trade.

Lines in the Sand

The market kept going through the lines in the sand. By early August, they were trading in the thirties. By the middle of August, they were in the twenties. And he was taking no action. He felt that the price on the screen was quite irrelevant in his business of buying “value.”

Signs of battle fatigue were starting to show in his behavior. Carlos was getting jumpy and losing some of his composure. He yelled at someone in a meeting: “Stop losses are for schmucks! I am not going to buy high and sell low!” During his string of successes he had learned to put down and berate traders of the non-emerging-market variety. “Had we gotten out in October 1997 after our heavy loss we would not have had those excellent 1997 results,” he was also known to repeat. He also told management: “These bonds trade at very depressed levels. Those who can invest now in these markets would realize wonderful returns.” Every morning, Carlos spent an hour discussing the situation with market economists around the globe. They all seemed to present a similar story: This sell-off is overdone.

Carlos’ desk experienced losses in other emerging markets as well. He also lost money in the domestic Russian Ruble Bond market. His losses were mounting, but he kept telling his management rumors about very large losses among other banks—larger than his. He felt justified to show that “he fared well relative to the industry.”This is a symptom of systemic troubles;it shows that there was an entire community of traders who were conducting the exact same activity. Such statements, that other traders had also gotten into trouble, are self-incriminating. A trader’s mental construction should direct him to do precisely what other people do not do.

Toward the end of August, the bellwether Russia Principal Bonds were trading below $10. Carlos’ net worth was reduced by almost half. He was dismissed. So was his boss, the head of trading. The president of the bank was demoted to a “newly created position.” Board members could not understand

why the bank had so much exposure to a government that was not paying its own employees—which, disturbingly, included armed soldiers. This was one of the small points that emerging-market economists around the globe, from talking to each other so much, forgot to take into account. Veteran trader Marty O'Connell calls this the firehouse effect. He had observed that firemen with much downtime who talk to each other for too long come to agree on many things that an outside, impartial observer would find ludicrous (they develop political ideas that are very similar). Psychologists give it a fancier name, but my friend Marty has no training in behavioral sciences.

The nerdy types at the International Monetary Fund had been taken for a ride by the Russian government, which cheated on its account. Let us remember that economists are evaluated on how intelligent they sound, not on a scientific measure of their knowledge of reality. However, the price of the bonds was not fooled. It knew more than the economists, more than the Carloses of the emerging-market departments.

Louie, a veteran trader on the neighboring desk who suffered much humiliation by these rich emerging-market traders, was there, vindicated. Louie was then a fifty-two-year-old Brooklyn-born-and-raised trader who over three decades survived every single conceivable market cycle. He calmly looked at Carlos being escorted by a security guard to the door like a captured soldier taken to the arena. He muttered in his Brooklyn accent: "Economics Schmeconomics. It is all market dynamics."

Carlos is now out of the market. The possibility that history may prove him right (at some point in the future) has nothing to do with the fact that he is a bad trader. He has all of the traits of a thoughtful gentleman, and would be an ideal son-in-law. But he has most of the attributes of the bad trader. And, at any point in time, the richest traders are often the worst traders. This, I will call the cross-sectional problem: At a given time in the market, the most successful traders are likely to be those that are best fit to the latest cycle. This does not happen too often with dentists or pianists—because these professions are more immune to randomness.

JOHN THE HIGH-YIELD TRADER

We met John, Nero's neighbor, in Chapter 1. At the age of thirty-five he had been on Wall Street as a corporate high-yield bonds trader for seven years, since his graduation from Pace University's Lubin School of Business. He rose to head up a team of ten traders in record time—thanks to a jump between two similar Wall Street firms that afforded him a generous profit-sharing contract. The contract allowed him to be paid 20% of his profits, as they stood at the end of each calendar year. In addition, he was allowed to invest his own personal money in his trades—a great privilege.

John is not someone who can be termed as principally intelligent, but he was believed to be endowed with a good measure of business sense. He was said to be "pragmatic" and "professional." He gave the impression that he was born a businessperson, never saying anything remotely unusual or out of place. He remained calm in most circumstances, rarely betraying any form of emotion. Even his occasional cursing (this is Wall Street!) was so much in context that it sounded, well, professional.

John dressed impeccably. This was in part due to his monthly trips to London where his unit had a satellite supervising European high-yield activities. He wore a Savile Row tailored dark business suit, with a Ferragamo tie—enough to convey the impression that he was the epitome of the successful Wall Street professional. Each time Nero ran into him he came away feeling poorly dressed.

John's desk engaged principally in an activity called "high-yield" trading, which consisted in acquiring "cheap" bonds that yielded, say, 10%, while the borrowing rate for his institution was 5.5%. It netted a 4.5% revenue, also called interest rate differential—which seemed small except that he could leverage himself and multiply such profit by the leverage factor. He did this in various countries, borrowing at the

local rate and investing in “risky” assets. It was easy for him to amass over $3 billion dollars in face value of such trade across a variety of continents. He hedged the interest rate exposure by selling U.S., U.K., French, and other government bond futures, thus limiting his bet to the differential between the two instruments. He felt protected by this hedging strategy—cocooned (or so he thought) against those nasty fluctuations in the world’s global interest rates.

The Quant Who Knew Computers and Equations

John was assisted by Henry, a foreign quant whose English was incomprehensible, but who was believed to be at least equally competent in risk-management methods. John knew no math; he relied on Henry. “His brains and my business sense,” he was wont to say. Henry supplied him with risk assessments concerning the overall portfolio. Whenever John felt worried, he would ask Henry for another freshly updated report. Henry was a graduate student in Operations Research when John hired him. His specialty was a field called Computational Finance, which, as its name indicates, seems to focus solely on running computer programs overnight. Henry’s income went from $50,000 to $600,000 in three years.

Most of the profit John generated for the institution was not attributable to the interest rate differential between the instruments described above. It came from the changes in the value of the securities John held, mostly because many other traders were acquiring them to imitate John’s trading strategy (thus causing the price of these assets to rise). The interest rate differential was getting closer to what John believed was “fair value.” John believed that the methods he used to calculate “fair value” were sound. He was backed by an entire department that helped him analyze and determine which bonds were attractive and offered capital appreciation potential. It was normal for him to be earning these large profits over time.

John made steady income for his employers, perhaps even better than steady. Every year the revenues he generated almost doubled as compared to the previous year. During his last year, his income experienced a quantum leap as he saw the capital allocated to his trades swell beyond his wildest expectations. His bonus check was for $10 million (pretax, which would generate close to a $5 million total tax bill). John’s personal net worth reached $1 million at the age of thirty-two. By the age of thirty-five it had exceeded $16 million. Most of it came from the accumulation of bonuses—but a sizeable share came from profits on his personal portfolio. Of the $16 million, about $14 million he insisted in keeping invested in his business. They allowed him, thanks to the leverage (i.e., use of borrowed money), to keep a portfolio of $50 million involved in his trades, with $36 million borrowed from the bank. The effect of the leverage is that a small loss would be compounded and would wipe him out.

It took only a few days for the $14 million to turn into thin air—and for John to lose his job at the same time. As with Carlos, it all happened during the summer of 1998, with the meltdown of high-yield bond values. Markets went into a volatile phase during which nearly everything he had invested in went against him at the same time. His hedges no longer worked out. He was mad at Henry for not having figured out that these events could happen. Perhaps there was a bug in the program.

His reaction to the first losses was, characteristically, to ignore the market. “One would go crazy if one were to listen to the mood swings of the market,” he said. What he meant by that statement was that the “noise” was mean reverting, and would likely be offset by “noise” in the opposite direction. That was the translation in plain English of what Henry explained to him. But the “noise” kept adding up in the same direction.

As in a biblical cycle, it took seven years to make John a hero and just seven days to make him a failure. John is now a pariah; he is out of a job and his telephone calls are not returned. Many of his friends were in the same situation. How? With all that information available to him, his perfect track

record (and therefore, in his eyes, an above-average intelligence and skill-set), and the benefit of sophisticated mathematics, how could he have failed? Is it perhaps possible that he forgot about the shadowy figure of randomness?

It took a long time for John to figure out what had happened, owing to the rapidity with which the events unfolded and his state of shellshock. The dip in the market was not very large. It was just that his leverage was enormous. What was more shocking for him was that all their calculations gave the event a probability of 1 in 1,000,000,000,000,000,000,000,000 years. Henry called that a “ten sigma” event. The fact that Henry doubled the odds did not seem to matter. It made the probability 2 in 1,000,000,000,000,000,000,000,000 years.

When will John recover from the ordeal? Probably never. The reason is not because John lost money. Losing money is something good traders are accustomed to. It is because he blew up; he lost more than he planned to lose. His personal confidence was wiped out. But there is another reason why John may never recover. The reason is that John was never skilled in the first place. He is one of those people who happened to be there when it all happened. He may have looked the part but there are plenty of people who look the part.

Following the incident, John regarded himself “ruined”; yet his net worth is still close to $1 million, which could be the envy of more than 99.9% of the inhabitants of our planet. Yet there is a difference between a wealth level reached from above and a wealth reached from below. The road from $16 million to $1 million is not as pleasant as the one from 0 to $1 million. In addition, John is full of shame; he still worries about running into old friends on the street.

His employer should perhaps be most unhappy with the overall outcome. John pulled some money out of the episode, the $1 million he had saved. He should be thankful that the episode did not cost him anything—except the emotional drain. His net worth did not become negative. That was not the case for his last employer. John had earned for the employers, New York investment banks, around $250 million in the course of the seven years. He lost more than $600 million for his last employer in barely a few days.

The Traits They Shared

The reader needs to be warned that not all of the emerging-market and high-yield traders talk and behave like Carlos and John. Only the most successful ones, alas, or perhaps those who were the most successful during the 1992–1998 bull cycle.

At their age, both John and Carlos still have the chance to make a career. It would be wise for them to look outside of their current profession. The odds are that they will not survive the incident. Why? Because by discussing the situation with each of them, one can rapidly see that they share the traits of the acute successful randomness fool who, in addition, operates in the most random of environments. What is more worrisome is that their bosses and employers shared the same trait. They, too, are permanently out of the market. We will see throughout this book what characterizes the trait. Again, there may not be a clear definition for it, but you can recognize it when you see it. No matter what John and Carlos do, they will remain fools of randomness.

A REVIEW OF MARKET FOOLS

OF RANDOMNESS CONSTANTS

Most of the traits partake of the same Table P.1 right column–left column confusion; how they are fooled by randomness. Below is a brief outline of them:

An overestimation of the accuracy of their beliefs in some measure, either economic (Carlos) or statistical (John). They never considered that the fact that trading on economic variables has worked in the past may have been merely coincidental, or, perhaps even worse, that economic analysis was fit to past events to mask the random element in it. Consider that of all the possible economic theories available, one can find a plausible one that explains the past, or a portion of it. Carlos entered the market at a time when it worked, but he never tested for periods when markets did the opposite of sound economic analysis. There were periods when economics failed traders, and others when it helped them.

The U.S. dollar was overpriced (i.e., the foreign currencies were undervalued) in the early 1980s. Traders who used their economic intuitions and bought foreign currencies were wiped out. But later those who did so got rich (members of the first crop were bust). It is random! Likewise, those who shorted Japanese stocks in the late 1980s suffered the same fate—few survived to recoup their losses during the collapse of the 1990s. Toward the end of the last century there was a group of operators called “macro” traders who dropped like flies, with, for instance, “legendary”(rather, lucky) investor Julian Robertson closing shop in 2000 after having been a star until then. Our discussion of survivorship bias will enlighten us further, but, clearly, there is nothing less rigorous than their seemingly rigorous use of economic analyses to trade.

A tendency to get married to positions. There is a saying that bad traders divorce their spouse sooner than abandon their positions. Loyalty to ideas is not a good thing for traders, scientists—or anyone.

The tendency to change their story. They become investors “for the long haul” when they are losing money, switching back and forth between traders and investors to fit recent reversals of fortune. The difference between a trader and an investor lies in the duration of the bet, and the corresponding size. There is absolutely nothing wrong with investing “for the long haul,” provided one does not mix it with short-term trading—it is just that many people become long-term investors after they lose money, postponing their decision to sell as part of their denial.

No precise game plan ahead of time as to what to do in the event of losses. They simply were not aware of such a possibility. Both bought more bonds after the market declined sharply, but not in response to a predetermined plan.

Absence of critical thinking expressed in absence of revision of their stance with “stop losses.” Middlebrow traders do not like selling when it is “even better value.” They did not consider that perhaps their method of determining value is wrong, rather than the market failing to accommodate their measure of value. They may be right, but, perhaps, some allowance for the possibility of their methods being flawed was not made. For all his flaws, we will see that Soros seems rarely to examine an unfavorable outcome without testing his own framework of analysis.

Denial. When the losses occurred there was no clear acceptance of what had happened. The price on the screen lost its reality in favor of some abstract “value.” In classic denial mode, the usual “this is only the result of liquidation, distress sales” was proffered. They continuously ignored the message from reality.

How could traders who made every single mistake in the book become so successful? Because of a simple principle concerning randomness. This is one manifestation of the survivorship bias. We tend to think that traders were successful because they are good. Perhaps we have turned the causality on its head; we consider them good just because they make money. One can make money in the financial markets totally out of randomness.

Both Carlos and John belong to the class of people who benefited from a market cycle. It was not merely because they were involved in the right markets. It was because they had a bent in their style

that closely fitted the properties of the rallies experienced in their market during the episode. They were dip buyers. That happened, in hindsight, to be the trait that was the most desirable between 1992 and the summer of 1998 in the specific markets in which the two men specialized. Most of those who happened to have that specific trait, over the course of that segment of history, dominated the market. Their score was higher and they replaced people who, perhaps, were better traders.

NAIVE EVOLUTIONARY THEORIES

The stories of Carlos and John illustrate how bad traders have a short- and medium-term survival advantage over good traders. Next we take the argument to a higher level of generality. One must be either blind or foolish to reject the theories of Darwinian self-selection. However, the simplicity of the concept has drawn segments of amateurs (as well as a few professional scientists) into blindly believing in continuous and infallible Darwinism in all fields, which includes economics.

The biologist Jacques Monod bemoaned a couple of decades ago that everyone believes himself an expert on evolution (the same can be said about the financial markets); things have gotten worse. Many amateurs believe that plants and animals reproduce on a one-way route toward perfection. Translating the idea in social terms, they believe that companies and organizations are, thanks to competition (and the discipline of the quarterly report), irreversibly heading toward betterment. The strongest will survive; the weakest will become extinct. As to investors and traders, they believe that by letting them compete, the best will prosper and the worst will go learn a new craft (like pumping gas or, sometimes, dentistry).

Things are not as simple as that. We will ignore the basic misuse of Darwinian ideas in the fact that organizations do not reproduce like living members of nature—Darwinian ideas are about reproductive fitness, not about survival. The problem comes, as everything else in this book, from randomness. Zoologists found that once randomness is injected into a system, the results can be quite surprising: What seems to be an evolution may be merely a diversion, and possibly regression. For instance, Steven Jay Gould (who was accused of being more of a popularizer than a genuine scientist) found ample evidence of what he calls “genetic noise,” or “negative mutations,” thus incurring the wrath of some of his colleagues (he took the idea a little too far). An academic debate ensued, plotting Gould against colleagues like Dawkins who were considered by their peers as better trained in the mathematics of randomness. Negative mutations are traits that survive in spite of being worse, from the reproductive fitness standpoint, than the ones they replaced. However, they cannot be expected to last more than a few generations (under what is called temporal aggregation).

Furthermore, things can get even more surprising when randomness changes in shape, as with regime switches. A regime switch corresponds to situations when all of the attributes of a system change to the point of its becoming unrecognizable to the observer. Darwinian fitness applies to species developing over a very long time, not observed over a short term—time aggregation eliminates much of the effects of randomness; things (I read noise) balance out over the long run, as people say.

Owing to the abrupt rare events, we do not live in a world where things “converge” continuously toward betterment. Nor do things in life move continuously at all. The belief in continuity was ingrained in our scientific culture until the early twentieth century. It was said that nature does not make jumps; people quote this in well-sounding Latin: Natura non facit saltus. It is generally attributed to the eighteenth-century botanist Linnaeus who obviously got it all wrong. It was also used by Leibniz as a justification for calculus, as he believed that things are continuous no matter the resolution at which we look at them. Like many well-sounding “make sense” types of statements (such dynamics made perfect intellectual sense), it turned out to be entirely wrong, as it was denied by quantum mechanics. We discovered that, in the very small, particles jump (discretely) between states; they do not slide between them.

Can Evolution Be Fooled by Randomness?

We end this chapter with the following thought. Recall that someone with only casual knowledge about the problems of randomness would believe that an animal is at the maximum fitness for the conditions of its time. This is not what evolution means; on average, animals will be fit, but not every single one of them, and not at all times. Just as an animal could have survived because its sample path was lucky, the “best” operators in a given business can come from a subset of operators who survived because of overfitness to a sample path—a sample path that was free of the evolutionary rare event. One vicious attribute is that the longer these animals can go without encountering the rare event, the more vulnerable they will be to it. We said that should one extend time to infinity, then, by ergodicity, that event will happen with certainty—the species will be wiped out! For evolution means fitness to one and only one time series, not the average of all the possible environments.

By some viciousness of the structure of randomness, a profitable person like John, someone who is a pure loser in the long run and correspondingly unfit for survival, presents a high degree of eligibility in the short run and has the propensity to multiply his genes. Recall the hormonal effect on posture and its signaling effect to other potential mates. His success (or pseudosuccess owing to its fragility) will show in his features as a beacon. An innocent potential mate will be fooled into thinking (unconditionally) that he has a superior genetic makeup, until the following rare event. Solon seems to have gotten the point; but try to explain the problem to a naive business Darwinist—or your rich neighbor across the street.