Chapter 12

Mind over Matter

Painfully Aware

> *Consider a turkey that is fed every day. Every single feeding will firm up the bird's belief that it is the general rule of life to be fed every day by friendly members of the human race "looking out for its best interests," as a politician would say. On the afternoon of the Wednesday before Thanksgiving, something unexpected will happen to the turkey. It will incur a revision of belief.*
>
> —*Nassim Taleb,* The Black Swan

I've had several old mercury fillings replaced and two root canals done over the past decade, all of which have been performed without anesthetic of any kind. No, I'm not a masochist, but rather a hyperrealist; one who enjoys an honest risk/reward analysis and welcomes a serious mental challenge. There are four things I always hated about visiting the dentist: (1) sound of the drill, (2) shrapnel that threatens to slide down my throat while my mouth is wedged open, (3) multiple, painful Novocain shots in the gums, and (4) numbness that leaves me drooling and unable to eat or talk normally for hours after the office visit is over. The first two can't be solved and the last two are actually self-inflicted. I've found that even with Novocain getting cavities drilled out and fillings put in is a

AlphaBrain: How a Group of Iconoclasts Are Using Cognitive Science to Advance the Business of Alpha Generation, First Edition. Stephen Duneier.

painful endeavor. Ultimately, the question is whether the combination of Novocain shots + lingering numbness + reduced procedure pain produces a more pleasant cumulative experience than no shots + no numbness + heightened procedure pain. Since no one I know including the dentists and endodontists themselves had ever attempted to do without it, I had no idea just how painful it would be. I was therefore missing a key piece of the equation. After the dentist (and every assistant in the practice) attempted to talk me out of it, I elected to forge ahead and answer that question for myself. I won't lie, it is painful. And root canal, a surgical procedure performed directly on the tooth's nerve, is even more so.

I've elected to do without the anesthetic numerous times now (and they still try to talk me out of it every time), so clearly I believe the cumulative experience sans Novocain is preferable. However, it's not that straightforward. You see, the pain comes in shocking jolts that seem to pierce your very being, and it does so without any forewarning. It means you sit on edge as the dentist drills and drills, until suddenly, it feels as though someone has driven a needle into your tooth with a sledgehammer. There's one additional element to consider though. You cannot move when the pain comes, otherwise that high speed drill could do some serious tangential damage. No matter how startling or painful that shock is, there must be no externally visible expression of my internal experience. Therein lies the greatest mental challenge I've ever faced. It's important to note that I don't clench my fists, hold my breath or tighten up in any way. I also don't zone out or ignore the pain, otherwise I might be startled by the inevitable shock, causing my body to lurch. In fact, I zero in on the pain, seeing it for what it really is; a signal being delivered from the nerve ending to my brain. I contemplate its purpose, which is to warn my mind that there is a problem in the tooth that requires attention. Because it is already receiving that attention, the pain is simply an artifact.

Some people refer to what I put myself through as "torture," but I disagree. Although the intensity of the experience may be similar, what makes pain torturous is not knowing when or even if it will end. In my case, the instant the instrument is removed from the nerve, the pain disappears. The dentists and endodontists always remark afterward how nice it would be if every patient could go without anesthetic because

I am able to provide real time feedback on the effectiveness of the procedure. I can feel when a crown isn't fitted properly or if the nerve hasn't been properly deadened. In other words, there is a tangible benefit to remaining lucid and objective throughout even the most painful moments.

The reason I share all of this with you is that it serves as a powerful metaphor for my investment style versus the norm. Losses are painful for everyone. According to the research, losses hurt twice as much as a commensurate gain feels good. However, losses are also an inevitable part of the job and how you deal with them says a lot about your ability to generate long-term returns. Most portfolio managers hold longs or shorts in outright positions, using "tight stops" to protect the downside. The problem is, even after the tight stop is hit, they often have no qualms about reentering the same trade upon a similar setup or "better" entry levels, with yet another tight stop. Every time the stop loss is triggered, a loss is realized. Whatever risk allocation they initially make to that view/idea is somewhat disingenuous, because it must be multiplied by the number of times they will ultimately attempt to express it. I'd rather acknowledge the possibility of being wrong on the view up front; structuring a position that remains alive until something has fundamentally changed and the view itself is proven wrong. If I am proven wrong, I'd prefer the pain to be of a finite duration. To me, the idea of repeated tight stops being triggered would be torturous.

A colleague once remarked that we all need time-outs when losses are experienced because they are painful and can keep you from seeing things clearly. Clearly we do not all respond to pain in the same way. Some require a Novocain shot for a deep teeth cleaning whereas some can lucidly work through even the most excruciating pain without any lingering affects. Learning how to manage and diminish the pain of losses should be a primary goal of every risk taker.

Fooled by Stability

Between 1971 and 2002, Philippe Petit performed 35 major high-wire performances. The most well known of these occurred in 1974, when he traversed the 138 feet between the roofs of New York's Twin Towers.

For 45 minutes, he walked, laid down, danced, and knelt down along an inch thick cable strung nearly a quarter mile above the crowds below. Port Authority Police Officer Charles Daniels later described the scene to reporters: "He was bouncing up and down … His feet were actually leaving the wire," and yet he had no safety net or harness binding him to it.

However, Petit, like most high-wire performers, did take certain safety precautions. Most notably, he and his crew installed stabilizer cables, known as guy lines, to keep the main wire from swaying too much. In addition, in order to increase his control over his torque, Petit carried a weighted balancing pole, which allowed him to counterbalance the occasional powerful wind gust. Ultimately, the goal of all of his precautions was to reduce sway, the side-to-side motions as he walked back and forth across the wire.

In the end, Petit successfully made eight passes across the wire that day. If we took the distance he covered walking up and back across that wire (return) and divided it by the side-to-side distance covered (risk), we would come to the conclusion that he accomplished a great deal relative to the risk taken. Of course, the side-to-side motion actually experienced reflected neither the sway potential nor the dramatic difference in outcome should that sway have been increased even a fraction of an inch more.

Naturally, if Petit had done the walk without a balancing pole you would perceive the feat to be inherently more risky, and you'd be correct. However, if there was no wind and the stabilizer cables had done their job, the side-to-side distance he would have actually experienced that day would likely be exactly the same as it was with it. Therefore, using this equation, his return relative to risk taken would incorrectly appear to have been unchanged.

What if Petit had swapped the balancing pole for a safety harness that tethered him to the wire or a safety net installed just below the wire, thereby increasing the dangerous sway while dramatically reducing the potential for calamity? Based on the previous equation, his return on risk taken would have gone down, since the return was unchanged, whereas the perceived risk would have gone up because his side-to-side distance would have increased. This equation has no way to account for the true change in risk.

Why am I talking about high-wire walking? I often hear allocators, and even PMs and CIOs refer to the Sharpe ratio as a measure of returns relative to risk taken, but it is as misguided as using the preceding formula to measure a high-wire walker's return on risk taken – and for the exact same reasons. Realized P&L volatility, especially short-term volatility, does not provide an accurate measure of risk taken. It is fraught with hindsight bias, a lack of appreciation for the dynamics of risk and even the different types of risk that exist. Just as anyone who would use the preceding equation in assessing the risk/reward of a high wire act would be viewed by most readers as naive (and potentially dangerous), so too would I characterize anyone who would use the Sharpe ratio as a way to measure returns relative to risk taken. In fact, you could equate its use in the analysis of a PM or fund to that of the turkey in its assessment of its human feeder. If you are one of the Sharpe (or Sortino) advocates, the only question is, when will you experience a "revision of belief"?

The 20/80 Rule

I was a mediocre student growing up. Every report card had the same comments, "Stephen is highly intelligent and very capable, if only he would settle down." My parents were creative in their attempt to incentivize me to obtain top grades. They drove me around the wealthy neighborhoods pointing out the most ostentatious mansions, took me to the expensive car dealerships, and brought home brochures of beautiful boats, all with the hope that an innate desire to acquire nice things would trigger a shift in my priorities. In high school they even offered to buy me a new car if I was able to finish a semester with nothing but A's on my report card. I give them credit and I'm thankful that they cared enough to worry about me. Unfortunately, what they didn't understand is that I wanted to settle down and get straight A's as much as they did. A lack of motivation was never the problem.

Being a late bloomer, both physically and emotionally, I was perennially immature. Right up until I left for college, that immaturity was the explanation given for my hyperactivity and inability to focus on any task for more than a few minutes. However, when I continued to struggle

with the same issues in college, it was clear there was more to it, but what could I do?

Every year, I followed all the usual advice and mimicked the behavior of the best students, but the results remained the same. My mind would drift and my energy knew no bounds. The first two years of college were a struggle even though I desperately wanted to do well, get good grades, and show everyone what I could accomplish. Finally, after struggling academically for 14 years I had an epiphany. Rather than worrying about the outcome (grades), I would focus my effort and attention on the only thing I could actually control, the process itself. What it required was a departure from the annual fool's game I played, where I would pretend that suddenly this would be the year when I would settle down and be able to focus on anything for more than 5 to 10 minutes at a time. Instead, I accepted that my boundless energy and inability to focus is a factor that affects my ability to achieve the outcome I desire, but it is one that I cannot control. It was a state. Therefore, in order for me to improve the odds of achieving the outcome I desired I would need to consider alternative actions, a different approach, one that would take my inability to settled down and focus into account.

I devised a radical new learning process for myself whereby I broke everything down into the most minuscule of tasks, what I later came to define as *bija*. Each of those tasks required me to focus for just five to ten minutes. When I finished a task, I would get up, walk around, maybe shoot the basketball, draw a picture, or get a drink of water. Then, a few minutes later, I'd return to my studies. Not necessarily the same assignment or even the same subject, but to another education-related task that required just 5 to 10 minutes of my attention.

I created repetition exercises to essentially trick my brain into cataloging information properly. My system required constant vigilance, but was specifically adapted to accommodate my natural inclinations, allowing me to jump around from topic to topic in short intervals. It fundamentally flipped the traditional approach on its head. Whereas most students put in some work throughout the semester with the occasional burst of intense activity as exams approached, my method required short bursts of intense activity at the moment when material was introduced and dwindled down to literally nothing as exams approached.

So, while the libraries were packed until 5 a.m. with caffeine-infused students during exams I had absolutely nothing to do, no notes to review, no books to read, and no practice exercises to do. Nothing. It's difficult to explain just how uncomfortable I felt at those moments. I mean, I had no track record of success to give me any reason to believe that the system I devised for studying was better than the one followed by previous generations of incredibly smart students, not to mention every student on every campus at that exact moment. I was torn.

On the one hand, I believed wholeheartedly in my method, because every facet of it was deliberately designed to be rational and effective, but that didn't quell my doubt. Although I was incredibly relaxed and confident in my knowledge of the material, ironically, possession of that state of mind worried me when everyone around me was so uncharacteristically stressed. In the end, my concerns were unfounded. I achieved straight A's, not just that semester, but every semester that followed. For the last two years of my undergraduate studies as well as my time in graduate school at NYU I was consistently on the Dean's List and President's Honor Roll.

I learned many great lessons from the experience. Perhaps most important of all was the realization that we can't control the outcome, only the process that leads to it. When you improve the process, when you make hundreds of tiny decisions even marginally better, you can dramatically improve your odds of achieving the results you desire. Ultimately, *that* is what you control. As it relates to education, what is within the student's control is the development and execution of a process that improves their odds of learning the material. When that happens, the grades inevitably follow.

The same goes for generating alpha. Daily, weekly, monthly, quarterly, and even annual returns are not something you can choose. Instead, they are merely a reflection of the quality of the process that guides the millions of decisions made along the way. The better the process, the greater the likelihood each of those decisions will improve the odds of generating better returns. Simply coming to this realization can go a long way toward reducing your vulnerability to systematic errors in judgment, including hindsight bias. When all of the focus is on outcome, it can

cause us to make mistakes in interpreting statistics, like overweighting small sample sets.

Consider another real-world example. One of my coaching clients shared with me that she tends to cut her positioning, following months when she had performed poorly, and increase it, after positive months. It's a very common process among investment managers. After analyzing her trading data it turned out she was more systematic in this process than she even realized. We then ran a scenario analysis over her seven-year track record as a hedge fund portfolio manager where we made just one adjustment to her process: we unwound all of those reactive adjustments. In other words, after every down month we erased the downward size adjustment for the following month and vice versa for the up months, leaving everything else constant. Her results, with this and only this adjustment are shown in Table 12.1.

Think about that impact on her returns over those seven years. She reduced her average annual return by a full 250 bps and her total return by 3,000 bps by focusing on the outcome rather than the process. By the way her version generated a better Sharpe ratio, but which return stream would you prefer?

Again, all we can control are our decisions, but not just those that are directly related to markets such as macro/micro analysis, valuation, technical analysis, and historical returns. There's so much more to generating alpha.

Table 12.1 Investment performance with and without systematic adjustments

	Actual Return	**Return with Adjustment Removed**
Year 1	9.5%	16.0%
Year 2	7.1%	5.5%
Year 3	10.1%	9.9%
Year 4	10.3%	16.1%
Year 5	3.5%	2.7%
Year 6	9.8%	12.1%
Year 7	9.2%	14.8%
Average Annual Return	**8.5%**	**11.0%**

Think about your typical day. How much of it is spent trying to figure out if the Fed will or won't, China will or won't, and so on? Now, how much of your day is spent doing a similar analysis and investigation of your decision-making process? How much time is spent quantifying your expectations, comparing your postmortem against your premortem analysis? How much effort do you put into developing and maintaining proactive processes ahead of the trade, versus fretting over the best course of *re*action later on?

With decades of cognitive, behavioral, and decisional research proving that we are all vulnerable to systematic errors in judgment, doesn't it make sense to make the effort and take the necessary steps to improve our decision-making process? In order to shift the odds of success in our favor we must be deliberate in our approach every step of the way. We must be vigilant in our defense against bias and suboptimal selections.

Think about your track record over the past year or even over the past 10 years. Would you say your returns are an accurate reflection of your market views? If you're like most investment managers you've probably underperformed them. I estimate that roughly 20% of your returns can be attributed to your investment and market analysis, with the remaining 80% being a function of your decision-making process. Meanwhile, most professional investors spend upward of 80% of their time and research budget focused on the aspect that contributes just 20% to their bottom line.

Think about it on a grand scale across all market participants. How else do you explain the incredibly high correlation in views shared by market participants accompanied by a wide dispersion in returns? According to Mark Buchanan's *The Social Atom*:

> The economics consultancy London Economics assessed the predictions of more than thirty of the top British economic forecasting groups, including the Treasury, the National Institute, and the London Business School. They concluded: It is a conventional joke that there are as many different opinions about the future of the economy as there are economists. The truth is quite the opposite. Economic forecasters … all say more or less the same thing at the same time; the degree of

> agreement is astounding. The differences between forecasts are trivial relative to the differences between all forecasts and what happens.

As a result, when I coach experienced investment managers, we spend very little, if any, time discussing the factors that account for the 20% impact. Instead we focus on the decision-making process itself.

Figure 12.1 depicts another actual example from a coaching client. In this case, it's a hedge fund CIO. We began by discussing the evolution of the firm's first year in business, which led to identifying key moments of significance, strictly from a managerial perspective. In other words, they bore no relation to market action or portfolio-manager performance. We also limited the analysis to consider only those issues that were identified in real time, thereby avoiding the benefits of hindsight. In the end, *he* identified four alternative decisions that would have been more objective at the time. The shaded dashed line reflected his actual allocation process. Holding everything else constant, including market views, execution, structuring, and sizing, the alternatives would have added between 400 and 1400 additional basis points to the fund's returns.

The point I am making here is that your returns are dependent on so much more than knowing whether the Fed will or won't. When you

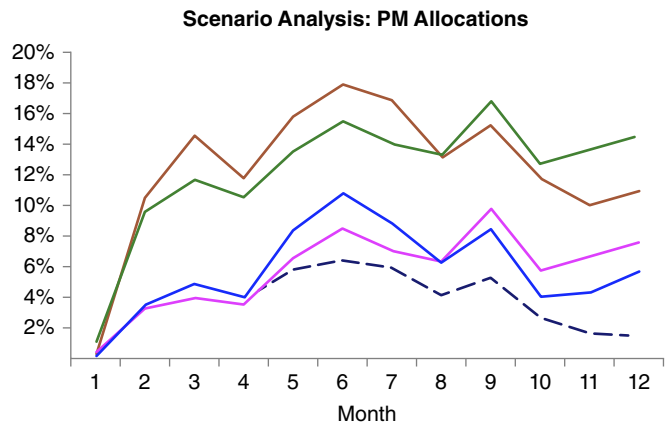

Figure 12.1 Scenario analysis: portfolio manager allocations

come to that realization, you will begin to ask new questions, explore new ideas, realize greater potential, and, I expect, enjoy the process a whole lot more.

Why Size Matters

Through the years, one aspect of trading has created more uncertainty, generated more volatility, injected more emotion, and had a greater negative impact on the returns of otherwise excellent managers than any other. Whether I work with a 25-year veteran of the industry or a brand-new portfolio manager, this is by far the one facet that perplexes almost every single one of them. It's the one that no one talks about and everyone is afraid to ask about for fear of looking like an amateur. However, whether I mention it in a talk, broach the subject in an investment committee meeting or raise the topic in a coaching session, it immediately triggers the undivided attention of everyone who manages a portfolio. If you are one of them, you already know what it is. I will argue that it lies at the heart of the reason that most trend followers have done so poorly over the past several years, a period that arguably should have been one of the best for investors of that breed. The issue is how to size positions.

Many traders readily admit that they make something close to 80% of their profit from just 20% of their trades. Rather than arguing here why that should not be the case, I will focus on what it does to the sizing process and the damage it causes. When you believe that only a couple of trades hold the key to your success in a given year you tend to approach position sizing with the idea that it has to be on a size that will "move the needle," if this one turns out to be one of those few. You think about where the stock can go and how much you need to have on for it to have a meaningful impact on the portfolio if it does. Of course, you recognize the possibility that it may not work out as planned, and so you set a stop loss for the underlying position based on how much you are prepared to lose.

If there is one thing cognitive science has taught us about ourselves it's that we are natural-born optimists, and this method for sizing is proof.

When entering the trade, it embodies all that is possible in a trade. We see far more clearly how it can go right than wrong. Why else would we enter it? If it goes in the right direction almost straight out of the gates and continues without much pain along the way that optimism grows, making it difficult to imagine how it could possibly go wrong. You feel confident in your abilities and see the price action as confirmation of your initial beliefs. With this newfound confidence you increase the size, moving up your stop-loss along the way. After all, that would be the prudent thing to do. (Or is it?)

Unfortunately, as was acknowledged at the outset, most of the trades don't wind up being big contributors to the portfolio's profitability, which is why we tend to use "tight stops" as a key risk management technique. After all, if a trade isn't going to be moving the needle in a positive way, we need to ensure that it doesn't dig us in such a hole that we can't ever get out. As soon as a trade exhibits any sort of uncertainty our overly optimistic expectations at initiation are called into question. With every tick in either direction the trajectory of that trade is extrapolated out into the future as either a positive game changer or ruinous disaster. Swings of such proportion can be mentally and emotionally exhausting, making us more and more nervous, less optimistic, and ultimately risk-averse.

Essentially, the fundamental problem with this sizing methodology is that at initiation, that moment when we determine the proper size, we are focused on the upside potential, and from the first moment that we realize it won't be the unobstructed slam dunk we'd foreseen, we become focused on minimizing the downside. That can be an issue in and of itself, but the impact of it has been exacerbated over the past seven years. You see, risk controls for portfolio managers and even many asset allocators have been tightened. Portfolio stops have gotten smaller and questions from the board come sooner than they used to. At the same time, our performance expectations have been slow to adjust in accordance. In other words, we expect to generate the same returns with tighter stops and risk constraints. So we get into trades (and add to those that work initially) by sizing according to our performance expectations, and get taken out (prematurely) according to the reduced risk limitations. Simply stated, we are oversizing positions by approaching it from this side.

Instead, position sizing should be approached from the opposite end of the spectrum. Sizing should be the very last step in the investment process. It comes after the view is developed, the asset and instrument is selected, and the structure is determined. When expectations are set for where the underlying should go if I'm right and where it just simply should not trade unless I'm dead wrong, *then* size should be considered. The stop-loss level should be determined by market factors, *not* as it relates to your P&L. Period. The next step is to allocate an amount of capital you are prepared to lose should things not work out as expected. In other words, what is the most you are willing to lose if you are absolutely dead wrong?

With both the appropriate, market driven stop-loss level and the maximum notional loss you are willing to accept having been identified, determining the *maximum* position size requires a very simple calculation. Divide the notional amount you are prepared to lose in the trade by the percentage distance from entry level to stop-loss, including expected slippage, and you have the maximum notional size for the trade. If, when you multiply that number by the percentage you expect to make if all goes as expected on the upside, it is not enough to "move the needle," you have a decision to make. You can either acknowledge that the risk/reward profile of the trade wasn't quite as good as you thought and pass on it, or accept that although this particular trade may not be the one that makes your year, it will be managed in a way that dramatically improves the odds of it being a positive contributor in the end. When you do that, you are likely to move away from having to depend on hitting the lottery a couple of times a year and toward more sustainable, consistent, and, most importantly, profitable performance results.

Lessons from Nick Saban and the Octagon

After going 14-0 in the 2016 regular season, Nick Saban's Alabama Crimson Tide football team beat fourth-ranked Washington to earn a spot in yet another National Championship game. As of that moment, in the four years preceding Saban's arrival, 'Bama won just a hair over 50% of their games and hadn't competed for a championship in 15 years. Since he took the head coaching job in 2007, however, they've

become a perennial powerhouse of the highest order, winning 87% of their games, achieving the number-one ranking at some point in every season since 2008, and winning the national championship in 2009, 2011, 2012, 2015, 2016, and 2017. It's an impressive feat considering the obstacles.

There is an incredible amount of turnover on college football rosters year in and year out, and recruiting has never been more competitive, yet one of the Tide's strengths is their depth at every position. Amazingly, many of the best high school recruits will often sit out a season or two, just to have the opportunity to learn from and play for Nick Saban. Although that is an advantage, when you win as often as Alabama does, the competition is constantly nipping at your heels, trying to poach your talent – and rarely at an opportune moment. Case in point, with just days left until his team competed in the Super Bowl of college football, Saban had to welcome his fifth offensive coordinator in 10 years, after Lane Kiffin took the head coaching job at FAU. On top of all this, Alabama competes in the strongest division of the toughest conference in the country, meaning the strength of their schedule is notoriously challenging. How then is Saban able to keep Alabama so competitive year after year? Process.

As it is for Saban's mentor, Bill Bellichick and his New England Patriots, what makes 'Bama's program so unique isn't the roster or support staff, but rather what he constantly refers to as "the process." It is the consistent approach to decision-making in training, practice, game planning, and execution, which focuses on minimizing mistakes that attracts the country's best talent and repeatedly delivers championships to Tuscaloosa.

What I know from my own conversations over the years in focusing on process in the investment industry is that many people confuse having a regimented process in place with being dogmatic and unwavering. That superficial assessment of process is naive, both in our industry and in football. In fact, one of the hallmarks of a good process is dynamism. It is purposefully developed to accommodate and adapt to change in the environment, not to ignore or defy it. Saban's approach serves as evidence of this fact. Although most who have achieved his level of success in any industry tend to plod along stubbornly following the same formula, Saban's system is built to adapt to the environment, rather than expecting

the environment to adapt to it, no matter how much he might disagree with the direction in which it is headed.

He told ESPN.com, "It's unbelievable how much the game has changed, and it's really hard to coach defense now. But hey, it's on me – regardless of the way I think football should be played – if I don't change with it."[1]

In another major sporting event on the same weekend UFC's bantamweight champion Amanda Nunes defended her title against the former champion, Ronda Rousey, who was making a comeback after a one-year break. Nunes knocked Rousey out just 48 seconds into the first round. Ahead of the bout the UFC and the media focused almost exclusively on the return of golden girl Rousey who earned $3,000,000 to World Champion Nunes's comparatively paltry $200,000. Rather than worrying about being disrespected, Amanda concentrated on her process. In the post-fight interview the champ spoke the truth to those who follow her sport. The lesson translates easily to our industry and should be heeded by those of us who participate.

Nunes told ESPN.com that she trained strenuously so she would be able to respond to Rousey's every move, whether it was physical or mental. Rousey made no changes to her coaching staff or her style following her devastating loss to Holly Holmes and in preparation for Nunes. That didn't go unnoticed by her opponent. "Always when I see something wrong with my evolution, I try to make some changes," Nunes said. "I feel like [Rousey] doesn't know those things like a real fighter. I feel like if she doesn't know how to make some changes in her game, she's not a real fighter."[2]

Rousey was a dominant fighter leading up to her *shocking* loss to Holmes. She appeared to be unbeatable. Rather than recognizing that Holmes exposed Rousey's weaknesses, it seemed that everyone but Nunes dismissed the loss as little more than an unlucky kick to the head. A fluke. Instead, Nunes exposed the early career of Rousey as the fluke, but not before Rousey took the UFC and hundreds of thousands of pay-per-view fans to the cleaners.

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[1] Quoted in Chris Low, "Nick Saban has adapted to and conquered a new style of college football," ESPN.com, January 3, 2017.

[2] Quoted in Brett Okamoto, "Amanda Nunes stops Ronda Rousey in 48 seconds at UFC 207," ESPN .com, December 31, 2016.

The lesson to be learned from Nick Saban, Amanda Nunes, and even Ronda Rousey is that a positive track record doesn't grant you immunity from a constantly evolving environment. If you want to continue to compete at the highest level you must adapt and evolve as well. You are finished the minute you rest on your laurels.

Doubling Down on Luck

While on holiday I spent some time at the craps table. I don't frequent casinos very often, but when I do, the only game that draws my attention is craps. If you think about it, it is the only truly social game on the floor. When a roller gets "hot" and everyone around the table is making money, the atmosphere is electric. People high-five, nicknames catch on, and bonds are developed among players. There is no other game like it in the building.

It is also a fascinating place to witness the pure, unadulterated flaws of the human brain in action. Otherwise smart, successful people unabashedly display a disconcerting level of naivety regarding statistics and the role of luck versus skill, rarely seen outside of financial markets. Yes, the craps table represents a microcosm of the broad financial markets, and the participants in both exhibit eerily similar behaviors.

First, there's the misguided idea that the next roll is somehow dependent on previous rolls. Clearly it's not. What makes this particularly fascinating is that it can be misguided on both sides of reality by the same person, simultaneously. For example, imagine a player has thrown several hard rolls (a hard eight is two fours, a hard six is two threes, etc.). Many bettors believe the odds favor it happening again as though the shooter possesses some magical ability to make two fair dice land with the same number on each facing upward. Hard bets are the house's favorites among the multiroll bets because they provide the house with the biggest edge. Winning a hard bet is an extreme long shot. When a hard bet pays off bettors should consider themselves incredibly lucky,

take the money, and walk away. Unfortunately, they rarely do. More often than not they let it ride, thereby turning a winning bet into just another loser.

At the same time, when a shooter hasn't thrown a seven for quite a while, many bettors believe the odds favor her throwing one soon. This reflects a belief in reversion to the mean in the short run. So, simultaneously, the bettor is exhibiting a misguided belief in the hot hand as well as a misguided belief in short run reversion to the mean.

The reality of course is that the next roll presents the exact same odds as every other roll. No matter how it may "feel" when you are caught up in the excitement of the moment. That means the most likely roll of all will total seven (1 + 6, 2 +5, 3 + 4, 4 + 3, 5 + 2, 6 + 1, or 6 out of 36 possible combinations). Unfortunately for the bettor, the social convention at the craps table dictates that you shouldn't bet against the shooter (and the overwhelming majority of the other bettors at the table), which means most won't make the "Don't Come" bet, it's considered anti-social.

One bettor at the table would get very upset when the shooter didn't roll "with enthusiasm." What he meant was, the shooter didn't hit the opposite wall with his roll. This is a rule put in place by the casinos, because it ensures that a shooter can't line up the dice preroll, and lightly toss them so that they land in the same way. However, it wasn't the casino that was upset with the lack of enthusiasm, it was a bettor who was actually putting pressure on the shooter to reduce the odds of success for *himself!*

Another bettor criticized me for "betting like an amateur," because I only played "Don't Come" line and never let my winners ride.

Most bettors like to begin small and wait to see if a shooter gets hot before increasing their bets. By letting winning bets ride they are sizing up their positions as the shooter's momentum builds. Not to mention, they are playing with the *house's* money, so if it is lost it won't hurt nearly as much. Again, all of these behaviors are predicated on the misguided belief that the next roll is in some way affected by previous rolls.

Capitalizing on Change

The connection between the two topics just discussed and our job as investors should be obvious but they are particularly relevant in today's markets thanks to the rise of FinTech. Throughout my career the moments that presented the greatest opportunity have always been when modeling shortcomings were resolved through new algorithms delivered via user-friendly, graphical user interface (GUI)-packaged solutions. For example, when I first started in the industry, we were using Black-Scholes without skew to price options and manage risk. The methodology was clearly flawed, especially when applied to emerging markets, but it took years for it to come to light. Along the way, some traders learned to make manual adjustments and those adjustments created bifurcated markets. If you wanted to buy calls/sell puts, you went to one group of market makers, and if you wanted to sell calls/buy puts, you'd go to another. When some of the banks created skew models to revalue their positions the bifurcation grew to extremes. I distilled the different models down to their essence, then found the situation whereby the difference would be exhibited in its most extreme form, and picked at it until the differences disappeared. I remember the first trade as if it was yesterday.

US Dollar versus Brazilian Real was a $5 million market at the time. The at-the-money implied volatility was trading at 15 and so were the risk reversals. It was the most extreme skew in the market. Nothing else came close. I went to my boss and said, "I can sell a 15 delta call, buy a 35 delta call, and earn premium. How much can I do that on?" He responded by letting me know arbitrages don't exist in currency markets. They are too efficient. When I pressed him, he said, if you can do it, you do as much as possible. For the 35 deltas, I went to two of the biggest market makers that weren't yet pricing in skew, and for the 15 deltas, I went to two that were. I put the trade on in $100 million with each counterparty, and I earned $200,000. It was even better than an arbitrage because I was long a call spread and had earned premium. Unfortunately, in the end, I only earned the premium, but had USD/BRL exploded I would have made a fortune. Do that enough times and you have a very profitable career.

When new products are launched, they are often modeled by quants with little experience in trading. In currencies, these exotic options were modeled with the most liquid currency pairs in mind, where interest rate differentials, skew, and even underlying implied volatilities are fairly staid. The models are then loaded into the same user-friendly, GUI-packaged systems with which the traders, salespeople, and risk managers are familiar for all related assets. After all, a currency is a currency is a currency, right?

To this day, new products are rolled out by quants and delivered into the hands of trusting souls across the industry. The quants trust that those using their models understand their limitations, and the users trust that the developers wouldn't have released something unless it had already been properly vetted. Neither is typically true, but the divide is rarely discovered until someone suffers extreme pain as a result. At the moment, the divide appears to be quite wide in the factor modeling that has taken the industry by storm. Not a week goes by without several discussions with my clients about the impact of these models on their risk management and positioning. The conversations are often laden with exasperation and frustration. The constant adjustments demanded by risk management are causing real losses, and disrupting solid investment processes. Now, you can either continue complaining about them, proceed as usual, thereby being victimized by them and feign surprise at your poor performance at year end, or you can dig into the models, understand what they are designed to fix, discover what new flaws they have exposed, and make adjustments to capitalize on them.

As Coach Saban says, we don't have to like what is happening in markets, but if we don't make the proper adjustments to capitalize on them, it's on us. The proliferation of FinTech products, including AI, introduces many new sources of alpha generation, particularly now in the early stages when human intervention plays such a large role. You may never see such an abundance of opportunities to generate truly uncorrelated alpha again. The only question is, will you be a victim or beneficiary?