“One of the main focuses of my training sessions is to help individuals find their unique voices in the learning process. We all have our strengths, our weaknesses, our styles of learning, our personalities. Developing introspective sensitivity to these issues is critical to long-term success.”

-Josh Waitzkin

Writing papers for me is very therapeutic. It gives me a chance to share thoughts and views on the future that combine macro themes with markets and psychology. The internal debate involved in the learning process in my head before these words hit the paper is fairly intense. As these views are shaped, I question everything and look for more and more external insights before feeling my thoughts are clear enough to share. Many times, the paper changes dramatically during this process. Much of this learning process comes from the experience of growing up in a house where my father was very argumentative and cynical, thinking the best way to teach me was to never agree with me and to try to prove that in life you will hear few facts and infinite opinions. Spending many years after I left home reading books on psychology for obvious reasons, I am sure that internal debate in my head is directly related to those combative debating sessions with my father. Needless to say when you are taught 2+2=4 and the rest is up for debate, I had a hard time enjoying the ‘sage on the stage’ routine that school offered up. Once I entered into the world of finance, and in particular derivatives, the opportunity to brainstorm ideas and solve problems with others, combined with the job of a stock market cryptographer, created an environment where learning became enjoyable and quickly an obsession. Remembering what my father taught me that most of life is art, not science, I write these papers as a Bayesian thinker knowing that these views are all probabilistic and need to evolve as new data comes into play. Once a paper is done, there are usually a lot of differing views from the readers which many times has helped set up the next journey of thought into the following paper. However, never do I remember
as much feedback and back and forth as was associated with this last paper. What is most interesting to me is people seemed to be polarized on their views. On one side, many people who seemed to be scared of artificial intelligence (“AI”) were happy that someone was skeptical of this AI arms race. On the other side, the AI crowd forced me into the role of the public defender of the brain, which seemed to be on trial. Given these polarizing and passionate views on both sides, it inspired me to expand my thoughts on this topic.

One of these conversations that had the strongest impact on me was with a reporter I have gotten to know over the last year. The reporter has an informed, inquisitive, skeptical and present mind which generally leads to conversations that have the feel of a debate but with the interactive continuity of a great brainstorming session. It helped me connect more dots than I had before the conversation, questioning some of my beliefs and adding to my thoughts. Basically, it reignited the internal debate left over from the last paper. For what it is worth, I highly recommend searching for these types of people as they contribute greatly to our ability to build a latticework of mental models by bringing in their own experiences and acquired knowledge. True brainstorming is an incredible way of getting to higher levels on a topic but such sessions in this industry, due to the competitiveness of the people and the hierarchical corporate structures, are sometimes difficult to achieve. Books are great but finding people with whom you can engage has always helped me conceptualize the debate in my head. In this particular conversation, the reporter was pressing me on providing more depth to my answer on why the brain was so important for asset management given computers were already able to do so much. I realized at this point that maybe the Bruce Springsteen analogy I used in my last paper, although entertaining for me, did not fully get across the message I wanted. Before the AI zealots again force me to play the public defender of the brain here are some preemptive statements to clarify my AI views and move on to focus in this paper on how the brain and AI will coexist in the future of asset management.

“Nobody phrases it this way, but I think that artificial intelligence is almost a humanities discipline. It’s really an attempt to understand human intelligence and human cognition.” - Sebastian Thrun

To begin, although there are clearly productivity differences between the brain and AI, we all can agree there are over seven billion human brains on the planet and all those brains are different in the same way that not all artificial intelligence is the same. It is also kind of silly to be so confident in our comparison of AI to the brain when, we actually know very little about the brain at this point and it is not even fair to generalize and say “the brain.” In this business, there may not be many but there are some brains capable of managing their emotional biases, connecting dots of their experiences and knowledge and being able to probabilistically enter and size an idea while updating the reward to risk based on new data in a way that is better than many computers. Also, given human influences in the computers, the same biases involved in the decision making in the brains are impacting most of those machine’s brains as well. In terms of the rise of autonomous portfolios and technology’s impact on financial markets, there is little doubt it is only in the infant stage and,

1 http://www.gweiss.com/Insights/Alpha-Springsteen.aspx
as with most industries today, technology will continue to disrupt our industry and for years to come will drive many participants to close down in this adapt or die process. At the same time, given AI is high on the IQ scale, AI is already better than the brain at pattern recognition and the ability to go through large amounts of data and make immediate predictive decisions in rational markets. Finally, I am a strong believer that AI in the future will replace the majority of jobs that humans do, so there is no desire for me to argue against machine learning, deep learning, neural networks, Watson or even Rock ‘Em Sock ‘Em Robots. I get it; computers are the winners or losers depending on how you look at it. However, there is a big difference between all of these statements and my belief that currently within the asset management industry there is tremendous AI hype and we are seeing some sort of bubble in this AI arms race which will leave many receiving worthless results on their investments.

“When dealing with people, remember you are not dealing with creatures of logic, but with creatures of emotion.” - Dale Carnegie

Hopefully with the “AI is great” portion of the paper out of the way, we can move on to where I do think some brains still have an edge over AI in the markets and the asset management industry. The topic of the last paper was on the difficulties of using data analytics to forecast human emotion and why behavioral economics is so important. As a reminder, the initial thought was sparked by the Michael Lewis book, The Undoing Project which described the works of Daniel Kahneman and Amos Tversky. Because the financial markets are just an emotional pendulum that swings between greed and fear, behavioral economics continues to gather disciples. We have the actual experiences of some of the greatest mathematical minds in history who have monetary investment scars due to the unpredictability of human emotion to illustrate this. Two of those minds have these famous quotes. Sir Isaac Newton said: “I can calculate the movement of stars, but not the madness of men” and “The market can stay irrational longer than you can stay solvent” is a quote attributed to John Maynard Keynes. Even Winston Churchill lost the equivalent of one million dollars in today’s money during the crash in 1929. Taking this point further is this line from a Psychology Today article: “Economic models fail to factor in the emotions and unconscious mental life that drive human behavior in conditions where the future is uncertain says the study, which argues that banks and financial institutions should be as wary of ‘emotional inflation’ as they are fiscal inflation.” This point of human emotion gets directly into the concept of behavioral economics and finance, which is why the work of Kahneman and Tversky is so important to read for the computer crowd. On a recent hike, I heard someone speak about the important connection between human emotion and financial markets. It was a podcast with one of the most respected persons in the field of quantitative investment management who when asked looking back what he would have done differently studying movements in markets said: “I wish I understood just how important human emotion is in financial decisions. I did not really appreciate that logic was not enough in determining how people actually behave.” This quote is from Andrew Lo, the director of
The book is about Andrew’s journey to explain his view of why markets do not follow, A Random Walk Down Wall Street, made famous by Burton Malkiel in his bestselling book in 1973. The Adaptive Market Hypothesis argues how financial markets and investors more closely follow the laws of biology rather than physics. His argument is financial markets during rational periods follow the efficient market hypothesis but during irrational periods it is more important to think about behavioral economics. Using the pendulum as a visual, think of irrational periods near the point where the pendulum shifts the other direction. In between those shifts, the bulk of the swing has competitive efficient markets where the wisdom of crowds is present until after enough time has passed for people to forget the feelings at the last turn and then the madness of mobs takes over and emotional decisions are driving markets. Combining the rational (efficient) with the irrational (behavioral) leads to his thought that markets are better explained in terms of evolutionary biology and neuroscience rather than physics and math. He references one of my now favorite quotes on the unpredictability of human emotion by Nobel Prize winner in Physics Richard Feynman who said: “Imagine how much harder physics would be if electrons had feelings!”

“It is not the most intellectual of the species that survives; it is not the strongest that survives; but the species that survives is the one that is able best to adapt and adjust to the changing environment in which it finds itself.”
- Charles Darwin

As much as I have enjoyed the movement in behavioral economics in recent years, Andrew Lo’s work on thinking about the dynamic nature of markets in evolutionary biological terms has combined the emotion of greed and fear and the concept of dynamic markets in a way that has let my imagination run. Environments change over time and the market participants or species in the ecosystem adapt, innovate and compete to survive. Andrew sums it up this way:

“The adaptive markets hypothesis says that all economic institutions, like our own species, develop and change over time, depending on the population of investors that are engaged with them.”

There is little doubt due to demographics, debt, central bank intervention, negative interest rates, the rise of China, the introduction to the iPhone, cloud computing, fracking etc., that the environment has changed in the last ten years as much as any ten year period in history. All of us are species within the ecosystem and artificial intelligence is a growing species bringing competition and forcing us all to adapt in a pace not seen in the industry before. The growing competition of quantitative investing has been evolving for a long time but in very recent years due to cloud computing lowering the cost, quant competition has increased significantly. This has helped drive down available alpha by increasing the overall wisdom of crowds and shrinking the available alpha through more efficient markets. In addition to investment competition, data analytics has led to more transparency for the allocators to know what they are actually paying for, which is driving fee
pressure as competition from cheaper beta intensifies. The need to adapt is what is driving the money into the arms race of AI. Since 2013 in my Adapt or Die\(^2\) papers, I have written about how technology was forcing all people and organizations to be flexible, agile and nimble so I am not fighting the trend and again, believe the autonomous portfolio trend will continue to drive the natural selection process of the survivors like in Andrew Lo’s biological markets hypothesis. The ecosystem of AI and humans will both have to differentiate themselves to guarantee survivorship as we all fight for the available alpha like any other species fighting for food and water.

Given the increased competition within the efficient market times, I believe the species who will end up the survivors will be the ones most effectively able to navigate the irrational periods Andrew Lo highlights. Irrational periods in the market like 2008, 2000 and 1987, do not occur often but they do have important impacts to returns over the longer term. As a firm, we have highlighted that the regime shifts we have seen since 2008 have been shorter and sharper due to the new environment and ecosystem. Identifying these pendulum turns or regime shifts has always been difficult and given the concept of adaptive biological markets, the dots or leading indicators also evolve and change. Remember, history never repeats but it does rhyme. In addition to the puzzle of dots changing all the time from regime shift to regime shift, biases contribute to making these regime shifts difficult to catch. To start, there is a strong behavioral bias for market participants against calling for turns. Some of it is just the historical knowledge that markets are up over 70% of the years over time which leads to the fear of being wrong. There is also a bias that people think markets only go down on bad news so when the news is good and markets are making new all-time highs like in 1999 or 2007, there is no need to worry about a turn. One of my favorite’s biases is the argument that nobody can time the markets. Technically I agree that I have yet to meet the person or computer that can exactly pick tops and bottoms, although I have met a few say they can. But what we can do is combine Bayesian thinking with a probability distribution curve and constantly reassess reward to risk ratios. There is a big difference between reducing risk and eliminating risk. The human brain is a time machine constantly bouncing between the past and the future using our knowledge and experience to predict the future. Yet too many people in our business, particularly analysts and strategists, make a specific price forecast, sometime with a specific time which forms an anchoring bias that prevents them from using new data to change their views. They become biased based on their writings and need to defend them. The fact is we all have biases and it is very difficult to be unbiased in our decision making but like it is difficult for a baseball player to bat .300, the survivors will be the ones in the ecosystem best at identifying the pendulum shift from rational to irrational markets early. I still believe for now, most of those will be brains finding the dots looking at human emotion in the market.

\(^2\) [https://www.gweiss.com/Insights/Adapt-or-Die.aspx](https://www.gweiss.com/Insights/Adapt-or-Die.aspx)  
[https://www.gweiss.com/Insights/Adapt-or-Die-Part-II-The-Signal-or-the-Noise-China.aspx](https://www.gweiss.com/Insights/Adapt-or-Die-Part-II-The-Signal-or-the-Noise-China.aspx)
“I believe that good investors are successful not because of their IQ, but because they have an investing discipline. But, what is more disciplined than a machine? A well-researched machine can make many average investors redundant, leaving behind only the really good human investors with exceptional intuition and skill.” – Stan Druckenmiller

All this talk about behavior, emotions and biases brings us back to Richard Feynman’s quote on feelings and why I think the brain has an edge. In a world where AI makes IQ ubiquitous, the advantage shifts to emotional intelligence or ‘EQ’. I have written in the past about the book A Whole New Mind where Daniel Pink talks about the future being dominated by right-brain thinkers as we transition from the Information Age into the Conceptual Age. Emotional intelligence is still a relatively new thought which became popular in the 1995 book by that title written by Daniel Goleman. Psychology Today defines it as “the ability to identify and manage your own emotions and the emotions of others. It is generally said to include three skills: emotional awareness; the ability to harness emotions and apply them to tasks like thinking and problem solving.” This reads like a trading psychology handbook but it extends to elite athletes, the Navy Seals and anything which takes mental strength and involves regulating thoughts, managing your emotions and behaving productively. Josh Waitzkin talks about it in his book The Art of Learning, which I referenced over the years as a must read. You can also just go read the chapters in the Market Wizard books with Paul Tudor Jones and Stan Druckenmiller and you can see the emotional intelligence within the answers during their interviews.

“Emotional intelligence is the ability to sense, understand, and effectively apply the power and acumen of emotions as a source of human energy, information, connection, and influence.” – Robert K. Cooper, Neuroscientist and author of Executive EQ

Outside of the markets, another example of emotional intelligence that depends on forecasting human emotions is comedy. From an article in Psychology Today: “On stage, comedians need to know how to respond to the audience. The ability to fine tune an act and tailor it to a specific audience is largely related to emotional intelligence. Comedians need to be sensitive to how their act is perceived, and this sensitivity is essential to their success.” The brilliant George Carlin adds depth to this thought with this quote about the complexity of his process of predicting what will be funny:

“And every time you see it, touch it, look at it, or think of it, it gets deeper in the brain, the network gets deeper, and at some point, it gets to be a telling mass that says to you, “OK. Take a look at this now. This is gonna be funny. You got enough data, take a look at this.” So I’m drawn to something and start writing about it, and then you really start writing, and that’s when the real ideas pounce out, and new ideas, and new thoughts and images, and then bing, ba-bam ba-boom, that’s the creative part.”
I was at Caroline’s on Broadway Comedy Club last week and during the show, in thinking about this paper, when the day comes that a robot is on stage as the headline act, I will concede AI has the emotional intelligence to forecast human emotion better than a brain.

“I read a study that measured the efficiency of locomotion for various species on the planet. The condor used the least energy to move a kilometer. Humans came in with a rather unimpressive showing about a third of the way down the list....That didn’t look so good, but then someone at Scientific American had the insight to test the efficiency of locomotion for a man on a bicycle and a man on a bicycle blew the condor away. That’s what a computer is to me: the computer is the most remarkable tool that we’ve ever come up with. It’s the equivalent of a bicycle for our minds.”

-Steve Jobs

Survivors will have high EQ. In addition to emotional intelligence, the other common thread to survivors in my opinion will be the ones in the ecosystem that realize the benefits both artificial intelligence and the brain bring to the table together and embrace what some call the Augmented Age or Cognitive Collaboration as best described in these quotes:

“With intelligence augmentation, the ultimate goal is not building machines that think like humans, but designing machines that help humans think better.” - Deloitte

“Some have voiced fears that artificial intelligence could replace humans altogether. But that isn’t likely. A more valuable approach may be to view machine and human intelligence as complementary, with each bringing its own strengths to the table.” - Deloitte

“No man is better than a machine, and no machine is better than a man with a machine.” - Paul Tudor Jones

This sounds easy but getting people to combine forces with the computer remains a challenge. One of the largest problems in the AI arms race is quants and fundamentalists have had trouble syncing for years now. This is one of the reasons I think the response to my last paper was so polarizing. Like religion and politics, it is hard to get the two sides to work together. They speak different languages and usually get siloed. Just remember the scene from Moneyball between the scout and Billy Bean..."Adapt or die....” Think about the challenge it has been for some of the largest incumbent tech companies to adapt. Despite having Watson, this is a quote from an MIT Review article last year. “IBM might be overhyping the AI engine that beat humans on Jeopardy! But it would take a superhuman effort to overcome the huge challenges facing the company.” The difficulties also extend into the world’s allocators. There is a reason the phrase ‘black box’ brings
fears to many in the industry. With more money flowing into quant approaches, how are investors going to deal with the lack of answers given when there are surprising returns that demand answers? Also, as we move further into deep learning, the more difficult it becomes to perform true due diligence and really know the investment process. Without the ability to perform deep due diligence, the decision will be based solely on incredibly attractive back tests or prior returns. Sounds like an AI version of Madoff is in our future.

Seldom in these papers do I use the firm as an example but for this paper, since I was grilled on my last paper, it makes sense. Four years ago we hired the head of our data scientist team with the vision to build a team to be an integrated part of all aspects of the firm and not just the investment process. In addition to helping to make the company run more efficiently, we wanted to help our portfolio managers in an emotionally intelligent approach. Referencing the Steve Jobs’ quote, we wanted to give them a bicycle to augment their skills. The first goal was to help them with self-awareness by showing them their historical biases. After that we wanted to focus on a risk system that not only provided real time risk but also show them the factors within their universe rather than just the broad market. Pattern recognition can only improve with awareness so to be able to see potential risk, you need to look at factor risk in the universe the same way PMs know the SPX, oil or 10 year rate charts. Most risk set ups are policing and for autopsy risk management to give reasons why someone lost money. To compete better with quantitative strategies, we wanted to give them a dashboard with their current readings as well as provide them with the various ways they could adjust those readings when they wanted. Rather than autonomous or behind the scene risk optimization we wanted them to have the ability to optimize risk when they felt it made sense with a targeted granular approach. Finally, with these tools in place to help, we wanted to measure their ability to handle the emotional regime shifts by being able to provide details on their behavioral decision making with regards to turnover which is critical to an active manager. In baseball terms, think of all this as helping a batter identify their biases of success and weakness in terms of types of pitches and location. From there, move the focus to looking at the results when the count is in their favor or against them and work on their decision making by improving their pattern recognition through video prepping of the next pitcher to help them lay off pitches and change the risk reward of their at bats. To address the difficulties mentioned before, we view the most important part of this process to be the integration of the data scientists with the teams themselves as they collaborate in the build out of the analytics and tools.

“Confidence is a feeling, which reflects the coherence of the information and the cognitive ease of processing it. It is wise to take admissions of uncertainty seriously, but declarations of high confidence mainly tell you that an individual has constructed a coherent story in his mind, not necessarily that the story is true.” - Daniel Kahneman, Thinking, Fast and Slow

Surviving the dynamic nature of biological markets is not getting easier with the advancements in technology and in the end, racing with the machines seems to be a requirement if you want to be one of the survivors. Before wrapping up this point, I wanted to recommend that
everyone go back and watch the movie the Imitation Game based on the story of Alan Turing and the cracking of the German Enigma code in World War II. I think it is a great way of thinking about how cognitive collaboration between humans and AI will be essential going forward when it comes to breaking the stock market code. In the end, cracking the Enigma code took Alan Turing's group and a computer together. Neither could have done it without the other. However, what was also needed was the complacency by the Germans on the other side. People should remember the importance of this complacency when it comes to the markets because it is one of the signs to look for before the pendulum shifts. Since March, I have talked about my beliefs that the risk in the market has changed and we should all be watching the dots for signals of the next important regime shift. Remember, as Andrew Lo said, markets become irrational when emotions take over and to get there, you need greed or fear to be present. In May 2013, in my first Adapt or Die³ paper, I wrote this line near the end of my paper: “There are many problems that come with increased technology but I think stocks will outperform bonds and commodities over the years to come until we start to see sentiment at the country level move higher.” The sentiment I was referencing in that paper was the Conference Board Consumer Confidence Index which at the time was at levels more consistent with recessions. Four years later and it is finally back at levels associated with complacency at 118.9. The great technical work of Ned Davis shows that historically when the index is above 113, the Dow Jones has an average return of less than 1% and only 16.5% of the time is it above that level. As a comparison, below a level of 66, it has an average return of 14.8%. In addition to the higher consumer confidence, as I mentioned in the last paper, I use the Investor’s Intelligence Bull/Bear ratio as another long term tool of sentiment with again statistics of significance provided through the work of Ned Davis. Since 1970, with readings where they are currently, returns for the Dow Jones have been less than 1%. Less than 25% of the time have the sentiment numbers been at this level. It is currently on a sell signal. The last buy signal was Q1 of last year.

“Success breeds complacency. Complacency breeds failure. Only the paranoid survive.” – Andy Grove

There is one final point I want to make on this topic before ending. Given all focus currently on risk optimization, the complacency I am worried about is in the form of volatility. There is a direct relationship between lower rates and exponential innovation that I feel many market participants choose to ignore. The faster innovation happens, the more disruption and deflation, which helps keep rates lower. At the same time, the demographics and liabilities associated with those demographics creates an insatiable need for yields which does not exist. Technology, the need for yield and a 2008 PTSD has led to a crowding in a strategy I fear will show soon with the complacency in the market. Andrew Lo in an interview in 2015 made this statement:

“I think there’s definitely a case in point of the idea of alpha becoming beta. The idea that once you start popularizing a particular investment approach,
and it becomes so popular, that in and of itself creates these kinds of shock waves. So for example if the strategy itself underperforms, now we have a larger number of investors that are going to be unwinding that strategy and that will create a kind of cascade effect where the strategy will underperform even more as people start to take money out of the strategy. There are a number of examples. Risk parity, of course, is the most recent. But before that trend following, before that value investing, growth investing, earnings surprise, earnings momentum, any kind of a strategy can become a crowded trade. And when it does you have to just make sure that the risk premium associated with that trade is commensurate with the potential risks of getting hit with these unwinds.” ………” Not only are they exaggerating the moves, but I think they are creating volatility of volatility. So it’s making the market quite a bit more complicated and the dynamics now are much more different and much more difficult to manage if you’re not aware of how these dynamics play out.”

The investment approach that I think has become crowded and serves as the next shock wave is actually not an investment approach. It is an exit approach. There is a crowding in risk optimization, information ratio targeting, volatility targeting, back testing, yield enhancement, risk parity, Sharpe ratios, carry and outright volatility selling. All of these words have grown in importance during the last 10 years and each has an exit strategy based on an assumption that future liquidity will be present and I think the great Howard Marks line should be remembered as the FED and PBOC continue to tighten and complacency is out there after eight years of rising assets:

“The bottom line is unambiguous. Liquidity can be transient and paradoxical. It’s plentiful when you don’t care about it and scarce when you need it most. Given the way it waxes and wanes, it’s dangerous to assume the liquidity that’s available in good times will be there when the tide goes out.”

Since everyone will need a reason to define the next time the tide does go out and answer the question as to why it occurred, I am sure, ironically, it will be about the theme in this paper. Like the debate around the brain vs AI, the next pendulum shift to me will be the recognition that the physical world (autos, retail, energy, rents, fiat money, capital controls) is being disrupted by the virtual world (autonomous vehicles, amazon, fracking, virtual reality, cryptocurrency, blockchain) and it is accelerating currently. More than ever in these biological markets where we are seeing shorter and sharper cycles, survivors will be able to navigate the pendulum shifts while producing alpha that is uncorrelated not only to other assets but other species in the ecosystem by constantly reassessing the probabilities using emotional intelligence while riding a bike to get down Wall Street.

-Jordi
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