

“One MILLION Dollars”

Dr. Evil: Gentlemen, it has come to my attention that a breakaway Russian Republic called Kreplachistan will be transferring a nuclear warhead to the United Nations in a few days. Here's the plan. We get the warhead and we hold the world ransom for... one MILLION dollars!

Number Two: Don't you think we should ask for **more** than a million dollars? A million dollars isn't exactly a lot of money these days. Virtucon alone makes over 9 billion dollars a year!

Dr. Evil: Really? That's a lot of money.

– “*Austin Powers: International Man of Mystery*” (1997)



Dr. Manhattan: I have walked across the surface of the Sun. I have witnessed events so tiny and so fast they can hardly be said to have occurred at all. But you, Adrian, you're just a man. The world's smartest man poses no more threat to me than does its smartest termite.

– “*Watchmen*” (2009)



Eddie Morra: I don't have delusions of grandeur. I have an actual recipe for grandeur.

– “*Limitless*” (2011)

Carl Van Loon: Have you been talking with anyone?

Eddie Morra: No, I haven't been talking with anyone, Carl. I'm not stupid.

Carl Van Loon: I know you're not stupid, Eddie, but don't make the classic smart person's mistake of thinking no one's smarter than you.

– “*Limitless*” (2011)

DIY's newest frontier is algorithmic trading. Spurred on by their own curiosity and coached by hobbyist groups and online courses, thousands of day-trading tinkerers are writing up their own trading software and turning it loose on the markets.

Interactive Brokers Group actively solicits at-home algorithmic traders with services to support their transactions. YouTube videos from traders and companies explaining the basics have tens of thousands of views. More than 170,000 people enrolled in a popular online course, “Computational Investing,” taught by Georgia Institute of Technology professor Tucker Balch. Only about 5% completed it.

— *Wall Street Journal*, “*Algorithmic Trading: The Play at Home Version*” August 9, 2015

London day trader Navinder Sarao has been formally indicted by a U.S. federal grand jury on charges of market manipulation that prosecutors say helped contribute to the 2010 "flash crash," according to a Sept. 2 court filing made public on Thursday.

The Justice Department first announced criminal charges against Sarao in April and is seeking to have him extradited to the United States to stand trial.

Sarao is accused of using an automated trading program to "spoo" markets by generating large sell orders that pushed down prices. He then canceled those trades and bought contracts at lower prices, prosecutors say.

— **CNBC, "US Federal Grand Jury Indicts 'Flash Crash' Trader" September 3, 2015**

Anxiety in the industry surged last week after Li Yifei, the prominent China chief of the world's largest publicly traded hedge fund, disappeared and Bloomberg News reported that she had been taken into custody to assist a police inquiry into market volatility. Her employer, the London-based Man Group, did little to dispel fears, declining to comment on her whereabouts.

Ms. Li resurfaced on Sunday and denied that she had been detained, saying that she had been in "an industry meeting" and "meditating" at a Taoist retreat. But many in the finance sector are unconvinced.

— **New York Times, "China's Response to Stock Plunge Rattles Traders" September 9, 2015**

I've written several Epsilon Theory notes about modern market structure ("[Season of the Glitch](#)", "[Fear and Loathing on the Marketing Trail, 2014](#)", "[The Adaptive Genius of Rigged Markets](#)", "[Hollow Men, Hollow Markets, Hollow World](#)"), all of which have been very well received. I've also written several Epsilon Theory notes about Big Data and non-human intelligences ("[Troy Will Burn – the Big Deal about Big Data](#)", "[First Known When Lost](#)", "[Rise of the Machines](#)"), all of which have generated a yawn. This divergence in reader reaction has puzzled me, because it seems so obvious to me that the issues are two sides of the same coin. So why can't I communicate that?

It's only over the last few days, after listening to old-school luminaries like Leon Cooperman and Dick Grasso rail against systematic investment strategies, index derivative hedging, and algorithmic market making *as if they were the same thing (!)* ... it's only after reading press stories that praise the US indictment of Navinder Sarao, the London trader who supposedly triggered the "Flash Crash" from his home computer, but condemn the Chinese detention of Man Group's Li Yifei *as if they were different things (!)* ... it's only after seeing 500 commercials for "DIY trading platforms" on TV today *as if this were a thing at all (!)* ... that I think I've finally figured this out.

We're all Dr. Evil today, thinking that one million dollars is a lot of money, or that one second is a short period of time, or that we are individually smart or capable in a systemically interesting

way. We use our small-number brains to make sense of an increasingly large-number investment world, and as a result both our market fears and our market dreams are increasingly out of touch with reality.

There are a million examples of this phenomenon I could use (including the phrase “a million examples” which, if true, would take me a lifetime to write and you a lifetime to read, even though neither you nor I considered the phrase in that literal context), but here’s a good one. A few months ago I wrote an Epsilon Theory note on the blurry distinction between luck and skill, titled “[The Talented Mr. Ripley](#)”, where I pointed out that it was now quite feasible with a few million dollars and a few months to build a perfect putting machine, one that would put every professional human golfer to shame. Judging from the reader emails I received on this, you might have thought I had just said that the world was flat and the sun was a big candle in the sky. “Preposterous!” was the gist of these emails – sometimes said nicely and sometimes (actually, most of the time) not so nicely – as apparently I know nothing about golf nor about the various failed efforts in the past to build a mechanical putting device.

Actually, I know a lot about these mechanical putting devices, and to compare them to the *non-human putting intelligences* that are constructible today is like comparing Lascaux cave art to HD television. It’s relatively child’s play to build a machine today that can identify and measure the impedance of *every single blade of grass between a golf ball and the cup*, one that measures elevation shifts of less than the width of an eyelash, one that applies force within an erg tolerance that human skin would interpret as the faintest breeze. That’s what I’m talking about. Do you know how the most advanced surreptitious listening devices, i.e. bugs, operate today? By measuring the vibrations in the glass window of the room where the conversation is taking place and translating those vibrations back into the sound waves that produced them. That’s what I’m talking about. Now replace “blades of grass” with “individual stock trades”. Now replace “conversation” with “investment strategy”. Arthur C. Clarke famously said that any sufficiently advanced technology is indistinguishable from magic. Do you really think we bring to bear less powerful magic in markets with trillions of dollars at stake than we do in spycraft and sports?

And let’s be clear, the machines are here to stay. They’re *better* at this than we are. The magic is in place because the magic works for the people and institutions that wield the magic, and no amount of rending of garments and gnashing of teeth by the old guard is going to change that. Sure, I can understand why [Dick Grasso would suggest](#) that we should go back to a pre-Reg NMS system of

human specialists and cozy market making guilds, where trading spreads were measured in eighths and it made sense to pay the CEO of a non-profit exchange \$140 million in “retirement benefits.” And I almost sympathize with the nostalgic remembrances of a long list of Hero Investors recently appearing on CNBC, pining for a pre-Reg FD system of [entrenched management whispering in the ear of entrenched money managers](#), where upstart quants knew their place and the high priests of stock picking held undisputed sway. But it ain’t happening.

And let’s also be clear, the gulf between humans and machines is getting wider, not narrower. Even today, one of the popular myths associated with computer science is that non-human intelligences are brute force machines and inferior to humans at tasks like pattern recognition. In truth, a massively parallel processor cluster with in-line memory – something you can access today for less money than a junior analyst’s salary – is far better at pattern recognition than any human. And I mean “far better” in the same way that the sun is far better at electromagnetic radiation than a light bulb. Much has been made about how robot technologies are replacing low-end industrial and service jobs. Okay. Sure ... I guess I’d be worried about that if I were working in a Foxconn factory or a Bay Area toll booth. But far more important for anyone reading this note is how non-human intelligences are replacing high-end pattern recognition jobs. Like trading. Or investing. Or asset allocation. Or advising.

The question is not how we “fix” markets by stuffing the technology genie back into the bottle and we somehow return to the halcyon days of yore where, in Lake Wobegon fashion, all of us were above average stock pickers and financial advisors. No, the question we need to ask ourselves is both a lot less heroic and far more realistic. **How do we ADAPT to a market jungle where human intelligences are no longer the apex predator?**

I’ve got two sets of suggestions, depending on whether you see yourself as a trader or an investor. It’s a lot to digest, so let’s look at traders in the balance of this week’s note and at investors next week.



Every trader who ever lived believes that, like the Bradley Cooper character in “Limitless”, he or she has a recipe for grandeur. It doesn’t matter whether they find that recipe in prices or volumes or volatility or spreads or any other aspect of a security, all traders have an internalized pattern recognition system that they believe gives them a persistent edge. Most of them are wrong.

In modern large-number markets, any trading strategy based on naïve inference is certain to have zero edge, zero alpha. By naïve inference I mean selecting a strategy based solely on the econometric fit of a time series data matrix to some market outcome like price change. It's a trading strategy that works because ... it works. There's no "why?" answered here, and as a result the strategy is certain to be derivative, non-robust, and quickly arbitrated. Or to put it in slightly different terms, whatever purely inductive trading strategy you think gives you an edge is already being used by thousands of non-human intelligences, and they're using the strategy far more effectively than you are. To the degree a naïve inference strategy works at all, you're just tagging along behind the non-human intelligences, picking up their crumbs.

What trading strategies have even a theoretical possibility of edge or alpha? Here are two.

Possibility 1: Find a market niche where your counterparties are non-economic or differently-economic market participants – like an oil futures market where a giant, lumbering integrated oilco seeks to hedge production, or where a sovereign wealth fund looks for inflation protection (Remember those happy days when giant allocators addressed inflation concerns in commodity markets? Me, neither.) – and scalp a few dimes by taking advantage of their very different preference functions. Traders who pursue this type of strategy have a name in biological systems. They're called parasites. I call them beautiful parasites (see the Epsilon Theory note "[Parasite Rex](#)"), because they capture more pure alpha than any strategy I know.

Possibility 2: Find a market niche where you understand the impact of exogenous signals like news reports or policy statements on the behavioral tendencies of other human market participants, in exactly the same way that a good poker player "plays the player" as much as he plays the cards. These market niches tend to be sectors or assets that are driven less by fundamentals than they are by stories – think technology stocks rather than industrials – although here in the Golden Age of the Central Banker it's hard to find any corner of the capital markets that's not driven by policy and narrative. The game that these traders have internalized isn't poker, of course, but is almost always some variant of what modern game theorists call "[The Common Knowledge Game](#)", and what old-school game theorists like John Maynard Keynes called "The Newspaper Beauty Contest".

What do these two examples of potentially alpha-generating trading strategies have in common? They operate in a world that a non-human intelligence – which is effectively a super-human inference machine – can't figure out. Today's effective alpha-generating trading strategies are based on a game

(in the technical sense of the word, meaning a strategic interaction between humans where my decisions depend on your decisions, and vice versa) where you can have very different outcomes from one trade to another even if the external/measurable characteristics of the trades are identical. This is [the hallmark of games with more than one equilibrium solution](#), which simply means that there are multiple stable outcomes of the game that can arise from a single matrix of descriptive data. It means that you can't predict the outcome of a multi-equilibrium game just by knowing the externally visible attributes of the players. It means that the pattern of outcomes can't be recognized with naïve (or sophisticated) inference techniques. It means that traders who successfully internalize the pattern recognition of strategic behaviors rather than the pattern recognition of time series data have a chance of not just surviving, but thriving in a market jungle niche.

Sigh. Look ... I know that this note is going to fall on a lot of deaf ears. It's an utterly un-heroic vision of what makes for a successful trader in a market dominated by non-human intelligences, as I'm basically saying that you should find some small tidal pool to crawl into rather than roam free like some majestic jungle cat. As such it flies in the face of every bit of heroic advertising that the industry spews forth *ad nauseam* every day, my personal fave being the "Type-E" commercials with Kevin Spacey



shilling for E*Trade. Generalist traders are some of my favorite people in the world. They're really smart. But they're not smart enough. None of us are. After all, we're only human.

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