Lily Francus - Transcript

Jim: Well, hello everyone, it's Jim O'Shaughnessy with my colleague, Jamie Catherwood and today's very special guest, Lily Francus, who I met through Twitter and who I think is an outstanding example of my thesis that Twitter maybe, possibly, kind of, could emerge as a global intelligence network. The reason I say that is because I think the odds of me meeting Lilian and being able to chat with her and reading her work and everything would have probably been pretty low without Twitter. Twitter allows the big brain people, like Lily, to put out some very, very serious stuff while at the same time being very amusing.

Jim: Welcome Lily.

Lily: Thank you, glad to be here.

Jim: I read most of your stuff. You have a new project going called Salience capital, am I getting that right?

Lily: Salience capital.

Jim: Salience, okay. Please explain.

Lily: Salience capital is really... I've been pumping out a lot of research on Twitter through my blog, @nope_its_lily. We're doing a lot of experimentation, especially in the option space, and we wanted to coagulate it into this legal structure where we could share research and tooling, similar to my indicator, the Nope Chart, that I can talk about more later in a more unified and cohesive way, especially to appeal to institutional or high net worth investors.

Jim: It's really great. And again, that's the other thing that I see happening. I am so bullish on young people today because you guys understand these tools. Olds, like me, can kind of get it, but I was an early adopter of technology. You guys, it's like the fish in the water, right? You understand it so fluidly that you can just make magic happen.

Jim: Let's talk about the magic. I always joke that one of my favorite phrases in economics is ceteris paribus, which is, all other things remaining the same, right? And they never do.

Lily: Of course. We know it's a dynamic system, we're seeing the market shift literally in real time. As we're recording this, there's a deposition on Robinhood. It's going to be difficult for people to say, yes, let's compare 2010, 2015, or maybe even 2021, to 2020.

Jim: I agree. One of the things, when I was reading your research, that I'm going to ask you also, because not all of our listeners are going to be fluent in options terminology, you basically came up with, and I love this acronym, NOPE, which is

Net Option Pricing Effect. What you're doing is looking at a delta gamma hedging strategy, right? Now, can you translate for me and explain that to me like I'm a five-year-old?

Lily: Perfect, I love doing that. The net option pricing effect, we call it NOPE. It actually originally was OPE, but we're millennials, so it had to be funny; similar to squeeze metrics to [inaudible 00:08:51] his indicators?

Lily: The NOPEs measures concept of delta and balance on a ticker. A lot of people are familiar through the work of others, like [simcarson 00:09:03] or squeeze metrics with [Nyammah 00:09:05]. We've been hearing on the news with GameStop, this concept of the gamma squeeze, where the options market, instead of just being used for more informed speculators who want access to higher leverage, it's actually driving the underlying price due to the effects and change of this market over time.

Lily: To give a brief overview, an option represents a contract that someone can either buy or sell shares to you at a certain price at a certain date. If we say it's buying shares from here, this would be a put option. It's used traditionally by investors to hedge and as an insurance policy. It can also be a call option, which effectively says, I will be able to purchase this from you so you will sell it to me at a certain price at a certain date.

Lily: What's interesting about these contracts and what attracts a ton of people to them, is their convexity. This is my thesis, why they got so popular the last couple of years with the advent of these brokers like Robin hood, for instance. You see that option contracts went from these really niche, not super niche, to actual investors, mathematical products that most people had never heard of to one of the dominant ways of trading on the current market.

Lily: What's interesting about them is an option, especially when you're long on option... When you buy it, versus when you sell it to somebody, when you're long on option, you have an asymmetric risk and reward payout. Let's take an example of GameStop. With Gamestop, it's $45 now, lets say I'm very bullish on it, but I'm also scared that it might go to $0, so I don't want to necessarily buy a hundred shares of it because my $45, $4,500 total, could go to zero. If I'm bullish on it, I can, instead of buying shares, just buy a long option on it, either for 45 or a higher price, the co-option. That way I get all of the upside on it, but a limited amount of the downside. This is critical because it works well for retail investors, especially those who just got the stimulus, who are dreaming of riches, who are the symptom of the wealth inequality in this country. Someone still needs to pay them when it hits $60, $70, $100. What happens there?

Lily: When an option is sold, traditionally the person who sells it, we call them market-makers because they make the markets. They sell at ask, they buy at bid, and they pocket the difference as their job. What they do is they hedge this option contract accordingly so that they don't care if it expires worthless, they don't care whether it expires at $400, they will make money of the.

Lily: The way that they have to do that is through this measurement of a hedging ratio, which is really how many shares do I need to buy or sell of the underlying asset to hedge away my market risk at a certain time on an option?

Lily: Let's go back to the GameStop example. If we're sell someone a call at $45, let's say that's the current price, so this would be 50 delta. Delta is a lot of things. But in this example, we're going to call it the hedging ratio, which is if I own 50 shares, and sell you a call at the money or at the current price, then my directional risk is neutralized. If it goes up, it doesn't matter to me, if it goes down, it doesn't matter to me. Delta is great. You know, it's really the weight of the option market. I'll talk about that more later on, but it changes over time. As we said, the option contract itself has convexity. It's nonlinear. Actually, if you look at it, it almost looks like a parabola, especially farther away from the two extremes of zero delta and a hundred delta.

Lily: What this means is that the market maker needs to continuously buy and sell shares. This 50 delta position at $45, now it might be 60 delta at $48, or 40 delta at $42. The rate of delta changing, this amount of shares I need to hold to neutralize my risk of selling you an option, is called gamma. Gamma gets a lot of attention because it's the second derivative, so it's the derivative delta in respect to the [small 00:13:46] price of the underlying, but it makes it really fun because you can buy these severely out of money or very far from the current stock price options. When you do enough of them, it actually starts moving the underlying price toward the option contract strike price, which is the amount that you're going to buy or sell at a certain date on.

Lily: When it does that, you get these effects called gamma squeezes, where it starts moving the price toward that direction, which convinces other speculators to start also buying option contracts, which also starts moving the price, which keeps it moving that direction.

Lily: This is a new phenomenon. If you look historically you can find examples of it with Neo, with [inaudible 00:14:35], and I use historically lately, because that's November 2020, but in market time, that might as well be 1930. It's definitely gotten more common, especially as retail investors have become a larger of the market. As we talked about, it's a much safer bet. If you're bullish, if you want to gamble, instead of putting all the capital to buy a stock, I'm going to put a little bit of capital and that little bit of capital can become a lot of capital. It's really very casinoesque for a lot of people. This is what I talk about a lot with the danger of these option contracts.

Jim: Yeah. It's a mixed blessing, right? I'm very much in favor of young people discovering investing and doing their homework, but the problem, seems to me, is for every Lily, there are 10,000 Chads, who have no understanding of the options market. The app that they're trading it on looks like a casino app. Just knowing what I know about human behavior, that gets really, really dicey. It's something I think that we all have to talk about.

Jim: I want to stay on this strategy because I'm fascinated by it. I began life by the way, as an options trader back in 1980. I remember I bought the Texas Instruments computer because it had 16k and it had a module for determining the implied volatility using the Black Sholes Option Pricing model. Guess how long it took me to do each implied volatility?

Lily: Several seconds, if not minutes?

Jim: Five minutes.

Jim: Literally, I would be reading a book over here, punching it into the computer, reading the book. The strategy I came up with is not nearly as elegant as yours, but this is back in the Dark Ages and very few people were even using computers to price options. The strategy that I figured out was one that compared implied volatility of different options within the same option series. There was a fairly obvious tell, if you will, in this data. I'd go long one, short the other, and so it was, I thought, pretty good strategy because it was singles and doubles.

Lily: Before 1987, it was perfect.

Jim: Yeah. Exactly. Singles and doubles, and all of a sudden about a year into it, it stopped working and I'm like, "Okay, this is interesting." I go to the library because we olds had to do that. We actually had to go to a library and look for the research paper. My favorite library had all of these various research papers, journal of portfolio management, et cetera, et cetera, et cetera. I found an academic paper doing the math for my strategy. What I thought immediately was, "Okay, so technical anomalies will get [arbed 00:18:05] away if people understand them and get the math."

Lily: Of course.

Jim: Human anomalies don't get arbed away. In other words, in non-leveraged, the kind of investing I do, which is long only...

Lily: Much safer nowadays.

Jim: Yeah, no kidding. No leverage, et cetera. But back to yours, because what fascinated me is something that I've always thought, but you put it very elegantly in the way you talk about it. Liquidity is an extremely important lever in markets in general, but in derivative markets in particular. Talk a little bit about how the liquidity of the various markets illiquid versus very liquid, et cetera, affect the NOPE indicator.

Lily: So I guess, before that, I'll just go into the importance of liquidity, because I think a lot of people are learning, especially with the [inaudible 00:19:09], what liquidity means and how important it is to the current market.

Lily: Liquidity is pretty much everything, especially on stocks without strong fundamentals. When you're looking at the Teslas of the world, when you're looking at the Gamestops of the world, what you're seeing is you need this ability to buy and sell the asset quickly, and ideally without shifting the price. When that doesn't happen, people panic. There wouldn't be a Tesla if you didn't believe you could sell it for more money either the same day or the next day. This is largely provided to us nowadays with high-frequency firms which make up 60, 70% of the trading volume and the normal US trading session. What's interesting about liquidity, a lot of people have talked about this, the rise of passive investing; that these ETFs are draining liquidity from the market in the sense that not only does the normal rebalancing of it, especially for these equal weight ones or stuff that isn't a floating [inaudible 00:20:18]. In those cases, you see the mechanical buying and selling of shares.

Lily: Mike Green has done a fantastic job talking about this, especially. You see it, also, through the redemption process and creation. There was a paper that actually just came out in December where they found 2% anomalous return for stocks in these ETF baskets. The interesting part about liquidity, in the sense of ETS, is it's visible. You can see it, you can calculate what percentage of the flow load isn't captured by the ETFs. If you had enough time, if you had enough patience, you could for sure figure out the anomalous effects that they're impacting the market with and hopefully capitalize on.

Lily: What's more interesting, at least in my sense, is that options also are creating liquidity, especially in yet [underlying 00:21:16]. The options market is interesting because the option market itself has no finite liquidity. An option contract can be written, or created, or destroyed anytime, as long as there's somebody who's willing to buy or sell it from you versus shares, which theoretically are a physical manifestation of the company's capitalization.

Lily: When we see options, they can be created de novo, but they still need to be hedged. There is no way to rationally price an option without figuring out how to neutralize this directional risk. If you go back to the '70s with Black Shoals, because everybody still believes somehow we use Black Shoals to price options, don't know why retail believes that, but it's clearly not the case.

Lily: If you look at the derivation of actuals, what it effectively is, is the price of an option is equivalent to the price of dynamically hedging the position. That is the concept underlining dynamic replication in market systems. It is this the only rational price for an option because otherwise, you introduce arbitrage. Someone could always undercut you.

Lily: What this implies, and I think a lot of people are not familiar with this, is that options, by nature, are draining liquidity from the underlying, because at the other side of your trade, someone needs to keep hedging it.

Jim: Right.

Lily: It's more insidious as I talk about on my blog posts, its impact on liquidity because historically it wasn't a big part of the market. You might've seen investors have those $5 puts where, crash test basically your insurance, those weren't a large part of the trading volume. They didn't really impact price in any measurable way.

Lily: The first paper that I can actually find that documents any effect of the options market was around 2007 with [Alan Podishman 00:23:20]. There's been new research recently by Andrea Barbone with gamma fragility documenting these intranet gamble reversals, but there was no cohesive understanding in all of this, about why they were impacting it past, for instance, society in the gamma squeeze. It was more like, "Okay, we're seeing this effect. It's anomalous. Good luck to you."

Lily: What's interesting is people like squeeze metrics. For myself, we have been looking at this novel market environment. You can find on my Twitter, for instance, based on my data and the NOPE indicator, which I'll get into next, we see a pretty dramatic change after [inaudible 00:24:03] in 2018, where suddenly dealer imbalances of delta end of day exploded.

Lily: What this implies, not only is a higher proportional options being traded, which of course you can argue as Robinhood, you can argue with institutions, it really doesn't matter. But more importantly, it implies that the options market is draining more and more liquidity from the underlying market. This has some pretty dramatic effects. Most seasoned people listening to this know about the relationship between liquidity and volatility itself. We've been seeing more volatility lately. VIX can not stay under 20, no matter how much everybody prays, no matter how much we hit all time highs, we see higher returns because of the relationship between volatility and returns. We see instability. At the end of the day, when you have a liquid market, you're sensitive to perturbation, and this is what follows from my last post.

Lily: ... the perturbation. And this is what follows from my last post. These small effects, for instance, I don't know, yesterday, the Hang Seng TECH Index fell 3%, so of course we're seeing a tech sell-off today. But we see a stronger sell-off. We see stronger movements upwards and downwards, and this is perfect for a volatility trader, love volatility myself. It's less perfect for your grandparents' 401k. Might be a problem.

Lily: Getting into this, one of the reasons that I started being on Twitter and started being part of this conversation was invention of my indicator, the Net Options Pricing Effect. It's a very blunt instrument that at least attempts to measure this implied liquidity of market. It really, really is this concept of the Delta imbalance, which is the weight, as we describe, of the option market versus the available liquidity of the [inner 00:26:00] line. And we see some interesting facts. A lot of people have been documenting the appearance of reversals on the S&P. It's been very fun to do magic tricks on Twitter, where one of my first introductions was calling these intraday reversions before they happened, which seems to fly in the

face of a lot of stuff like the random walk hypothesis, because sure, you can do it once, you can do it twice, but when you do it consistently, people are like, "Okay, wait, maybe something is there after all."

Jim: That also brings up the image for me of another problem, I guess, that I see with so much, and it's an old Wall Street term, but dumb money coming into a marketplace, especially a derivatives marketplace, right? That that operates very differently than many people, even smart people who've done some homework, would assume it should operate, right. So for example, I think immediately of Mandelbrot's 'prices have memory', right. That flies in the face of all accepted Orthodox economic theory, but he does a very good job of proving it, right?

Jim: And I know that you touch on it as well, and so I worry a little bit since liquidity is the key and it causes a not small level of market impact, right? When I think about it, having read your stuff, which I think is brilliant, I think kind of three things, right? So number one, other people are going to read the math and they're going to have their own note indicators and the high frequency guys and gals are going to put it into their mix, right? And so it might be blunted slightly from that. I'm interested in your opinion on that. And secondly, the thing that I worry more about, honestly, is... what do they call them? Diamond hands? Okay. Right? So these guys with these fucking crazy names, like Fuck you, trader, I'm good, whatever. And...

Jim: I put up a screenshot that a friend of mine put it in one of our chats that just made me laugh so hard. It was of all the lingo that they're using. And diamond hands are one of them. And anyway, but it seems to me that those people are armed with slingshots and people like you are armed with high power rifles with scopes on them. Am I being too dramatic?

Lily: No. My understanding of this effect isn't structural. I mean, you could argue, sure, if everybody plays the spiral versions, maybe they won't happen. I think my usual analogy is this is akin to gravity or friction itself. It exists because it has to exist. That's why we've seen robust correlations going back to 2007 intrude or end of day, for instance. It's not something that can effectively be arbitraged away without changing the nature of the market or introducing new opportunities for trading this indicator.

Lily: But I agree. I've had discussions with people. I think a lot of people in the industry are pretty familiar at least with the tasks and assumptions I make in my model. This is not something that comes as a surprise to most people. I think a lot of, especially as basal assumptions are fairly obvious, you can see... I feel very few people at this point believe that options do not have an effect on the underlying price. If they do, maybe they should pay more attention to the market.

Lily: It's pretty clear at this point that that assumption is incorrect. So it is easy picking. When you have this knowledge, we kind of briefly talked about this with retail. Most retail investors do not even know what the Greeks are. They use

options fairly, I can't do lottery tickets, or vote, actually, Robinhood does a terrible, terrible, terrible job with this. They actually have fully gamified their interface to implement it that a co-option may just represent this as, "Oh, are you bullish or are you bearish?" And the most basal understanding of the option contract, which completely negates important stuff like implied volatility or expiry or strike price. And we're seeing more and more of this. People are jumping into options without understanding what they are. A lot of them treat it akin to buying the stock but cheaper, with more pad if they get it right.

Lily: To put it mildly, it's fucking up the market, you know. Not going to mince words here, it is fucking up the market. A lot of the weird effects we're seeing are due to this preponderance of options and informed participants who take the time to learn will benefit. It's the nature of these things. Retail has always been the prey of the market. Not really the predator. There's been a few cases you could say, like GameStop, where certain participants were caught with their pants down like Melvin or other long short firms. But at the same time, it wasn't a story of the retail David versus the Melvin Goliath. There was the Melvin Goliath versus the retail David, who was behind another Goliath, which was other firms preying on the situation. And at the end of the day, David still got screwed by Goliath. Just a different Goliath.

Jim: Yeah. And that is something that a lot of people, because so many people are kind of narrative thinkers. And so when I watched this narrative unfold, I just shook my head and it was like, "I can't believe... I remember the old Saturday Night Live bit, you probably don't, you're too young. But it was when George Bush was running against Dukakis. And so Bush is rambling on about "thousand points a light" and Dukakis was very smart guy, is sitting there and he goes, "I can't believe I'm losing to this guy." But so the idea of this narrative, everyone loves, and I understand narrative, it's deep in our genes, we can't do anything about its effect on us, I don't think. Unless you build all sorts of walls, which I've tried to do for years and even then, right. Narrative just gets it. Stories beat facts every single time. But to me at least, very, very obvious that Melvin just had shit risk controls.

Lily: They did.

Jim: And so back in the day, long-term capital management, right? I knew those guys and I would listen to the pitch. And I would just say, "You know that it's not if, it's when you go bankrupt, right?" And they would just get really angry with me. And it's just like, "Well, when you use that kind of..." again, leverage illiquid disaster, right?

Lily: For sure.

Jim: And I put that quote of yours up because I really loved it. No amount of dead trees on the floor is going to cause a fire. It's always a match, right? And so when long-term capital management happened, it was kind of one of the first of the really big blow ups. But essentially they got virtually all of the other people on

the street to take it over, if you will, because the order book. If you got the book, and you know ahead of time what everybody wants to buy and what everybody wants to sell, gosh, that seems like almost about as sure a thing as you're going to be able to find on Wall Street.

Lily: Exactly. I think a lot of people are waking up to this idea. This kind of pissed me off in the whole GameStop thing, I kind of ranted about this on Twitter when it was happening, that it was co-opted to the social movement. At the end of it, toward the end of it, people were like, "Okay, I'm not only in GameStop to make money, I'm doing it to fight the corrupt system. This is a vote with my conscience." And I'm like, "Dude, you are being played so hard by big companies profiting here." And this always happens to retail. They're always the bag holders. This was predictable a mile away, I couldn't have told you when it was going to happen, it was more it will happen. We're just waiting for it.

Lily: And they learn that there's two sets of rules. The big guys, when they screw up, they get bailed out. You saw Melvin get bailed out by Citadel and Point 72, which by the way, was terrible optics on the part of Citadel. On one end, they were making the markets and fulfilling orders of Robin Hood, which was causing GameStop and also bailing out the main villain [crosstalk 00:35:47], and then I'm like, "Dude, what were you doing here?" And I think actually, I'm going to bring up another brilliant writer, this guy on Twitter Chris Abdel Nasser. I don't know if you're familiar with him, if you're not you should check out his blog, [inaudible 00:36:03].

Lily: And he actually talks about in the case of GameStop or other highly shorted stocks, there's an interesting paradox we risk here. Because as you short a stock, it becomes a smaller part of your book because the price go down. So you actually, to keep up the same amount of return on it, if you believe yourself short on it, you actually need to short more of it. And this theme is a paradox because as it goes lower in price, you get more risk to it and it starts going up. So for the same return, your actual reward is decreasing.

Jim: Yep.

Lily: So with Melvin, and I was kind of validated today with the congressional health testimony, they actually closed out pretty early on in the squeeze. I don't think most people are surprised by that. When nobody is going to hold a stock from $4 to $468. There's no matter how much they believe in their thesis, it would be insane. And I think a lot of people are waking up to understanding the rules of Wall Street through this mess, but I fully believe it will happen again.

Jim: Well, yeah. I think kind of, because of the structural nature of it, and I had Mike Green on and I found his thesis very fascinating. I'm not fully on board, but I'm very rarely fully on board any hypothesis or thesis, but he's a very smart guy. And the idea of the dislocations being caused by passive flows into ETFs, again, kind of like shooting ducks in a barrel, really. Because all you got to do is do your

homework and see what does the underlying situation look like in terms of who owns what percent of that float, right?

Lily: Exactly.

Jim: Then it's just kind of like arithmetic. I mean, it's not really high math, right, in terms of that.

Lily: It's not. And it's interesting that even with this, because like you said, this is publicly available information for the most part. One area of price distortion, which is more interesting, I think, on the passive side is the creation redemption process. And it's still publicly visible through arbitration to the net asset value of the ETF. But it's more difficult for instance in, let's say scheduled re-eval or the effect of the ATS implied liquidity on the available float for an underlying, those are pretty straightforward. Don't change very often. But at the end of the day, it is still available information to market participants. So it's interesting that even despite this, there seems to be some level of arbitrage possible that guarantees returns.

Jim: Well. And also, I remember back in the day when options were getting going and I was trading them, very few people. I mean, literally most people would ask, "What are you doing, Jim?" And I told them, they're like, "What is that?" They really hadn't heard of them. But I remember that sort of options were sold as instruments that would reduce volatility rather than increase volatility. I didn't buy it then, and then I read you, and I know you don't buy it. And so why did they get away with telling that story, that that options were going to reduce volatility?

Lily: I mean, it's the same reason Melvin got away with their risk came signing off on their position. You know, at the end of the day, when options were invented, they did reduce volatility because they weren't a large portion of the market. When they're used for their normal purpose, which is as insurance on underlying positions, they tend to stabilize the market because they provide insurance, just like insurance allows us or [inaudible 00:40:19] the future is really, it gives us a way to hedge our risk for uncertain events. So in that case, it makes up a small portion of the market. But in the degenerate case, which gives it, they named my series on this...

Jim: Yeah, I know. By the way, I love the names that you give everything. And I love that it's Queen Delta and that you really do wish you were a witch. The other Greek, I just was laughing. I love it, because the problem is, from my perspective, I, as you might guess, read virtually every academic paper.

Lily: They're so dry.

Jim: Oh, they're horrible. I mean, my God, it's just like, "Ahh." And literally, I once joked that you could make a huge, or not huge, you could do really well by just summarizing academic papers, because the 30 pages you should be able to get

down to, oh, probably two pages and the turgid language, it just makes me want to [inaudible 00:41:25].

Lily: I know. At the end of the day, a lot of these concepts, I really mean, I'm a strong believer. And if you cannot explain it to a five-year-old, you are not understanding what's going on.

Jim: Yes. I totally agree.

Lily: A good example on Twitter, this is about...

Jim: Where we have a lot of five year olds thought.

Lily: Exactly.

Lily: I was like, "Let's dive into why put-call parity works. Can you explain to me without, let's say, the generic replication argument, can you give me an intuitive reason why puts and calls are the same. Most people could, you had portfolio managers, you had credit analysts, they were going to the mathematics of it. And it's like, "Okay, that's cool. Math is great. But at the end of the day, why does it work?" And the real answer is it works because it's the spot price of an asset is there's only one, it's the same law of one price.

Lily: So the upside risk and the downside risk have to be equal because that's what makes price work. Otherwise, there is no concept of one price. So that's why put puts and calls are equal. And most people cannot make those logical leaps, and I think I'm in academy right now. I'm a first year mathematics student. And in general, I feel a lot of people having issues, getting to the core understanding of things, especially you see this in mathematics, you see those for sure in computer science.

Lily: I think, A, you are not going to be good at what you're doing if you rely on [inaudible 00:43:00] mathematics. Mathematics is a human formalism of complicated ideas. It allows us to evaluate and understand the world around us, but it's just a crutch. When you're trying to understand these options, you need to understand the system and the [inaudible 00:43:17] what's going on more than, let's say, telling me how does the role act on a call option versus a put option? Because that's trivia. I could create a Python package to do that for you, but if you want to understand and capitalize on the market at large, you need to understand how the pieces move together.

Jim: Right. And that's why I think that your writing is especially lucid, because I haven't done much on the option side for a while, but it was fun for me because I remember... I always try to do that, right? So I always try. And what I find works for me is that I read it and think about it and then write it out. Because if you don't write it out, you don't know whether you know it or not, right?

Lily: Of course. Yeah.

Jim: And when you're writing you go, "Oh, I'm an idiot. I can't understand this yet." And so you got to go back, you got to read it again. Then you got to write it out again, and you think, "Oh, that's a little better." It's an iterative process, right? And I love your comment about mathematics because if you dig deep enough, right, peel the onion long enough, every... Charles Dodgson, Lewis Carroll, wrote a very brief thing called 'What the Tortoise Said to Achilles'. And he was a logistician, and a very good one. And if you read 'Alice in Wonderland' from the point of view of him being a logistician, it's a whole different book. Or if you're stoned, whew. Because she was on psychedelics, right? The whole time.

Jim: Anyway, in 'What the Tortoise Said to Achilles', he basically posits that every human system, even logic and math, if you keep digging, you keep going down, you keep going down, A implies this, and B implies as this, et cetera, et cetera. He goes, "You're going to find at the bottom, an assertion by a human being that this is true without proof," right? So it's like, "What? Wait, you mean that..." and if you do, I'm sure somebody like you has already probably done this. If you keep going down and down and down, right, you find, "Huh, I guess we're building castles in air."

Lily: That's exactly it. My model, for instance, I came with no finance background. I tell people this mostly to shock them at this point, but it's completely the truth. I started trading in April of 2020. I've actually been in lockdown more than I've been in the market, I'm in California. And people are like, "How the bleep do you this much about market microstructure?" It's two fold. One, I'm an obsessive type. So when I learn something, I learn it. I am looking to understand the deeper implications here. And two, I just picked a really dumb, stupid question. I saw the behavior in August and I was like, "Can I predict market crashes?" And everybody would be like, "No, that's insane." I mean, that's literally the golden goose, right? Of course, if you can predict the market, you've made a shit ton of money. You're the next Renaissance.

Lily: And what this let me do when I started observing the world around me is I started with a clean slate. I didn't know much about options. I didn't know much about the market. I had invested for years, I have a business background from my undergraduate as well too, but they teach you about sonic bond pricing, which, congrats, you put everybody to sleep.

Jim: No kidding.

Lily: You could get a lot more kids interested in going into finance if you started teaching them about options, at this point. As a first class, I think a lot more people would sign up for it. But what really captivated me was I noticed two weird behaviors of this indicator when I started looking into it. The first one was in August, it exploded. The value of getting on S&P or [inaudible 00:47:28] were insane. I was like, "Whoa, what is going on?" And I saw how it behaved in

previous circumstances with my knowledge of put call, as well as looking at Apple. And I saw it maybe as a contrarian indicator.

Lily: So I remember warning people when I saw this indicator exploding September 2nd. I was in unusual whale discord because I started with retail. I'm a day trader like everybody else. And I just warn people. I'm like, "Get out of the market. This is not good, guys. Literally close your positions, you're making a lot of money." Because that's when that's when the S&P went from 345 to 357 in three days, I'm like, "This is bad. Get out." Next day, we dropped 4% or 3%, the September 3rd correction that started all the way in September. And I just remember, I'm like, "Whoa." I'm like, "Okay, there must be something here to cause this."

Lily: And this second realization came when someone had the bright idea to graph it. And I was still opposed to technical analysis, I don't believe it's real. People have talked to me [inaudible 00:48:37] with us. There's been enough studies in the works for you. As you know, my people would say [inaudible 00:48:45]. So what I did notice was when we graphed it, because we had actually started with a flat number. So you can't see anything cool with numbers. You just see, "Oh, it's now 100, oh it's now 90." When we graphed it, it traced the shape of the S&P price intraday. And it's with Delta over volume. Delta of course, relates to price in a certain way, but it was not due to price. It was this weird behavior where looking at auction market Delta and looking at volume, I could tell you what the S&P did.

Lily: And it was like, "What is going on here?" There was no explanation for months, I got [inaudible 00:49:25] with this. I was like, "There must be a deeper connection here, given what we're seeing." And it kind of took me down the rabbit hole. I just kept asking why and why and why. I met some very smart people along the way, like Jonathan Gibbons, who runs, Vol is Well on Twitter, as well as he is a partner in big tech, a finance firm. Along the way, I got breadcrumbs from people where they're like, "This might be related to liquidity." I still didn't know for months. And it finally clicked as I delve in deep in more and more, as I wrote more, as like you said, you start understanding more. And through this, not only did I understand-

Lily: You start understanding more and through this, not only did I understand what my own indicator were doing, but I also discovered this whole world and Mark and my restructure.

Jim: So a couple of things. You, I think demonstrate the power of beginner's mind. I always try to... And I mean that as a compliment. I always try to be in beginner's mind, because if you're in beginner's mind, you are not at all ashamed or embarrassed about saying, "Why? I don't understand that. Why? Explain that to me please? Why? Why does that happen like that?" And it might irritate other people, but a beginner's mind is essential, in my opinion, to being able to reason from first principles, to being humble, because I'm very happy to say, " I don't have beliefs, I have models."

Jim: And it's easier because beliefs tie to your emotions and you make them part of yourselves. And so you could start with a simple assertion, " I believe X, it could be totally wrong, probably is totally wrong." But then you get these, "This hill I will die on." And I always say I won't die on any of those hills. I'm the George Patton.

Lily: For sure.

Jim: Yeah, right? So I want the other poor, dumb bastard to die on his hill. I'm not dying on mine. I'll die for family, but that's it. And when you think of yourself as having models and trying to be as scientific as you can, it's my opinion that what happens is words have enormous power. And we don't... most people don't understand that. The symbolism and the... There's a reason that that meme, "He who controls the memes, controls the universe." Symbols, they who control symbols control you.

Jim: And we are inundated with symbols that made their way into our DNA, and labels, another thing. "When you label me, you negate me," one of the philosophers said, and I think there's a ton of truth to that. So if you try to approach things like, "It's not a belief, it's a model," because what is a model? A model is meant to be challenged, right?

Lily: It's meant to be wrong. All models are wrong [inaudible 00:52:32].

Jim: Exactly. Exactly right. And so just that shift from, "I believe," to, "Well, I have a model that suggests."

Lily: Exactly. Yeah, I was going to mention, when I started this, my hypothesis was actually based on earnings. I'm proud or not proud to admit that I think some people have noticed on Twitter. When I first joined in October, it was actually just to get predictions from my earnings model.

Jim: Yeah.

Lily: And it was wrong. Our data, we learned later, was effectively corrupted on our back test. I still have no idea what it's doing, but apparently it's predicting earnings. If you want to go down that rabbit hole, we could not figure out a logical way. They're calculating Greeks for us. When we got back [inaudible 00:53:17] this company Orax, which I've talked about briefly on Twitter, we couldn't see an effect. And I stopped because the model was wrong.

Jim: Right.

Lily: Does it mean it's not a correct hypothesis? At the end of the day, if someone's bored enough, they can go to delve deeper and see, maybe we missed something, but we did notice what it could be used for. [crosstalk 00:53:38] And

that's when we shifted, because beliefs are useless. At the end of the day, we're all here to make money, that's why we're in the market.

Lily: And at a certain point, you have to say, "Okay, this is wrong. Maybe it's useful for something else. Maybe I have to start all over again."

Jim: But that's how you grow, right? That's how you grow as a thinker and as one who has various hypotheses and thesis on things. Because again, a belief could be simply assertive like, "I believe in the Easter Bunny," okay. And if I really want to believe in the Easter Bunny, if you try to give me every fact in the world to show me the Easter Bunny doesn't exist, I will simply use those facts. And this is a much different discussion, but I will use those facts to deepen my belief.

Jim: And then when that happens, if we were modeling it, what you'd see is that belief sinking down to your lizard or primitive mind, and down there, it attaches to all the emotions. And so, suddenly I believe in the Easter Bunny and you come in and say, "Jim, there's no Easter Bunny." I do that as an attack, Lily is attacking me, Jim. And that's why you see all of these heated reactions. Half the reason I'm on Twitter, I don't try to hide this fact, I'm building a huge data set because I have some hypotheses that I want to test out.

Jim: And it just fascinates me because people don't... To me, it seems like a really simple thing. Robert Anton Wilson, I loved his quote, which is, "I don't have any beliefs, but I have many suspicions."

Lily: Exactly. When I started writing my blog, I don't know if you've seen my posts on Salience, which I think you'd like because you're a meme Lord. It's a new regime. I don't think anybody really could honestly say they know everything or know enough. I've been very honest along the way with my failures because it's twofold. One, I want to try to serve as inspiration for more people. I think a lot of my friends in the retail community have been excited to see what's going on with the model.

Lily: I've talked to many, many people and this goes back to a lot of people who had asked me, "Okay, so what you have worked, why are you telling people about this?" And the simple answer is I didn't know it worked when I started talking about it.

Jim: Right.

Lily: I joined Twitter and joined the conversation with awesome people like you, like Alex [inaudible 00:56:30], like Chris [inaudible 00:56:32] because I wanted to learn. I didn't know much when I first joined. I know a lot more now, I know a lot more cool people and I'm happy that I'm now providing valuable information to others. And the second reason, like you touched on, is it is a data set. A lot of people have implicitly noticed you can capitalize on these meme effects, it's the real thing.

Lily: Another hobby of mine is I run a subject called Medics in the Marketplace, where I just predict the next names to arise. And it isn't black magic, I don't have a crystal wall, or maybe I do, but I won't tell you about that, that's [inaudible 00:57:17] So it's really trying to coagulate this system of rules to understand human behavior, because definitely don't need to explain this to you, but the market is really just applied psychology at the end of the day. It is human minds making mostly poor decisions, and if you understand those minds, you can take advantage of it.

Jim: Boom, that's it. It's like I've said for years, markets change second-by-second. Human behavior barely budges millennia by millennia. There's your edge, arbitrage human nature.

Lily: So it's interesting. My posts on this, I would 99% agree with that. I think what has changed human behavior is the internet. That has never been the case in human history, that we've had this level of hyper connection.

Jim: Mm-hmm (affirmative).

Lily: You see this in communities like WallStreetBets, where any person... And I think Steve Hoffman in his discussion today with Congress kind of alluded to this. Every person voice and opinion, and Twitter too, is weighted equally if they have a good idea. Some people have more reach initially, but I think my rage on financial Twitter is pretty evidence that it is a weighing scale.

Lily: Yes, there are dumb people with massive audiences. Yes, there are people with bad ideas, but at the end of the day, every person on the internet has the chance to become the next Keith Gill.

Jim: Which is one of the things that I absolutely love about it. I think you're absolutely right about... I've long said the internet, especially social media, is the biggest psychological experiment in human history without a control group.

Lily: For sure.

Jim: Unless we consider the Amish a control group, and I think that they have some sub-categories that would make them not a good control group. So I differ a little bit on that, and again, I'm probably wrong, but it is... Talent does rise to the top. I've been thinking about this a lot, and one of the things that I see happening because I have the privilege of being able to have a pretty big megaphone. Then I see people like you, I see people like Liz, who I interviewed kind of first on this podcast, Jamie Catherwood, who is with us today, got a job through the internet.

Jim: And so I think the salient point here is that the old boy network, as they used to call it, that you couldn't penetrate if you were outside of it, is gone. It's losing, its dying.

Lily: For sure.

Jim: It is not getting rid of relationships however. What is happening is used to be, "Well, I was in skull and bones and I know Tommy from there and he's a great guy," or, "Sally this, or [inaudible 01:00:24]." Now, it doesn't matter. It doesn't matter where you were at school. What matters is do you got the chops? And if you've got the chops and you have interesting stuff like this, which I'm really not kidding, this is like... My wife was asking me, she says, "You seem unusually excited today for this podcast." I'm like, "They should just give her a PhD. She should put all of this together," and that should be your thesis and I'd give you a PhD.

Lily: Thank you.

Jim: And so it's just like... But that's what's changing. What's changing is... Like the old cartoon that I used to love in the New Yorker. It shows the two cats, and the one is saying to the other, "On the internet, no one knows you're a cat." Right.

Lily: Exactly.

Jim: But the point is that what it's doing is it is freeing talent to a degree that I certainly haven't seen happening in my earlier life. Yeah, persistence. Yeah, intelligence. Yeah, all those things. A lot of those things are the same, except what you have now is it used to be either, What Works on Wall Street. Why did I write What Works on Wall Street? Because back then, a book was the ultimate imperator. "You have been blessed by the powers that be and okay, so you now go do that."

Lily: And I think one of the interesting things for my stuff, first of all, thank you for the compliments, was I started in the daily trader communities. I was on unusual wheels. I was just another form user. I don't have a pedigree in finance for instance, nobody should necessarily pay attention to me just because I don't know, I worked at a big place, will get big thing.

Lily: I had to compete in the marketplace for ideas. Every single person who came across what I was doing, I had to convince them, "Yes, this is real and this is what I did," because nobody... Why would you believe some 25 year-old student who just says, "Oh, I can predict the market?" Because it's like, no, of course you can't. What's interesting is that also, a lot of the reason my blog posts are structured the way they are is not only based on my informal background in finance, but also my readers.

Lily: My readers today, I joke, are... My blog is where Wall Street meets WallStreetBets because I seem to have people on both sides reading what I'm writing. At this point, being flamed for people like Michael Burry who shared my stuff. And I've had to make sure that my concepts are digestible because if I start

whipping out advanced lingo, most people would probably find what I write pretty hard to digest without a background.

Lily: But I do try to fight the exclusive narrative because at the end of the day, I like educating people. I like talking and you're going to miss most of your audience if you don't know how to write.

Jim: Yeah, I totally agree. And I think that it's very complex because what really bright people are able to do in my experience, and I've interacted with many, many of them, is they're able to take very complex topics and make them simple enough to understand, but not simplistic. And people often get those... They conflate those too. And we're not saying that, "Oh, we're going to write this at a fifth grade level." No, of course not.

Jim: It is, you understand a topic well enough so that you can distill it to its essence, right?

Lily: For sure.

Jim: And so, what's funny is... So I have nothing but respect for people who can make a living trading. I couldn't do it. It would just... My DNA doesn't express that way.

Lily: I feel the same way [inaudible 01:05:30].

Jim: And so, I went down a very different route which is, "Okay, so if we're going to make the temporal function important," and by the way, it is very important. And so, as you increase the time horizon, the options for you open up, in my opinion. As you collapse the time horizon, your options narrow very, very quickly. And I'm not saying that because of that, people are never going to be able to succeed at it, because obviously people do. I'm just saying that it takes a very special person to be able to... It's like... I'm lazy. I'm notoriously lazy. And so it's like, why wouldn't I just give myself all these options and have the... Like the Quant crash of several years ago, 2007, several years. It's like, didn't touch us. Even though our portfolios got smacked on that day, because of the structure of our portfolios, we didn't have any margin calls.

Jim: In fact, we benefited because we buy every day and we are continuously rebalancing. So we got this gift of prices for many of our names being 7%, 8%, 9% lower...

Lily: Shopping spree.

Jim: Exactly, but not because we anticipated it frankly, just because our models, our long-term models, and our algos are programmed based on decades and not days. And it's just different. I think trading is really hard, even when you've got really interesting metrics like you use. Another thing that you say that I really like is there's a Soren Kierkegaard... There's two quotes, which I like, that kind of

define it. And Soren Kierkegaard is the first, which is, "Life can only be understood backwards, but it must be lived forwards."

Jim: And then, I don't know if you like science fiction or not, but there's a great book called American gods. And...

Lily: Neil Gaiman.

Jim: Yeah, exactly. And so there's a TV show... I'm much more of a book guy than a TV show guy, but pander to me with zombies Sci-Fi, I'll be there all day long. And there's a great quote that Odin played by a favorite actor of mine says to his companion Shadow Moon. He says, "Oh, like all fortunes Shadow: Opaque on arrival, inevitable in retrospect."

Jim: And so, I worry sometimes that the way our brains function, so time A, you don't have the data, and you don't know, and you're faffing about and blah, blah, blah. And you have models and yours appear to be working quite nicely. Time B, you do have the data, you know what happened, but is there a danger? Even for yourself, is there a danger of thinking you knew at time A, what you didn't know or am I being just overly dramatic?

Lily: No, I guess my response to those quotes is something I say a lot, is yes of course I could predict, or I could stop 9/11 now being in 2020. So I think the danger of retrospect is completely... Everybody in the industry knows I've never performed as well as [inaudible 01:09:32].

Jim: Right.

Lily: So there's a massive danger in saying this works backwards and implying it should work forwards. Never guarantee... Past returns do not guarantee future performance.

Jim: Right.

Lily: And I think that's why I was so adamant about not only introducing my model to other people, but also I think a lot of people on Twitter started following me once I called the [inaudible 01:09:58] versions, which was ahead of time saying S&P will go down or go up.

Jim: Right.

Lily: And that way, you kind of snoop out this hindsight bias because yeah, of course, if I look at RSI, it probably predicted all of the last crashes if you set the range properly, but you're effectively predicting the past, which doesn't really have a value. And I think that's where, especially a lot of the retail side, gets caught up in a lot of these indicators. I actually don't use any indicators that burden when I trade. And it's interesting because I do not consider myself a trader either.

Lily: I trade for fun. I don't trade large because I know enough about the market to know that the [inaudible 01:10:46] of trading yourself is pretty small, if not negative. And I try to warn people of that most people are not cut out to be a trader.

Jim: Right.

Lily: I think a lot of people now are seeing all this free money and it's like, "Oh, I'm going to be a day trader as my job." First off, you're probably not going to learn any usable skills. So you're going to have this guide period where you're mostly struggling to make money. You give to the market, you lose something to the market. You won't have as much socialization as you would at another place, which is a problem for most people I would imagine.

Lily: And most people are just not very good at it. At the end of the day, like you said with your long-term horizon, the market has its own rate of movement. And when you try to predict these events during the daytime on very small scales, it's really a job for a machine, not a person. And even then, these models, they come in fashion, they get crowded, they blow up spectacularly. And trading, I would definitely consider myself more of an anti-trader. It's hilarious to me that certain models of mine work best with zero day options...

Jim: Right.

Lily: Because I'm a risk averse person. And it's like, "Here, I just gave you an edge for doing the most degenerate gambling on the market possible."

Jim: I love the fact though, that you say that. You're one of the few people, and I just find that so inspiring because you just come right out and say, "This is for degenerates." And again, the power of language. When you're willing to be totally honest about it, and that's why I love reading your stuff because you're funny. And you're also using humor in a way to be honest.

Jim: And so degenerate trader is funny, but it's true too. And I guess the challenge that I face, I always... I really would love it if young people took an interest in investing.

Lily: Yeah.

Jim: Because it's a great way to make a great future for yourself. But that's 40 years from now for people like you, right?

Lily: Yeah. I think on my end, it's been a phenomenal experience with those. I did not expect any of... If you had told me in December that I would be on Bloomberg by February, I'd say, "Yeah, that sounds like something that probably won't happen."

Jim: "Probably," I love that. Again, you're a probabilistic thinker and I love probabilistic thinkers. Although a friend of mine was saying to me, "Jim, stop telling people to be probabilistic thinkers. You want to be a probabilistic thinker because you're sitting there and surveying the game space." And he goes, "Think about it." He goes, "Make yourself Genghis Kahn." And he goes, "You're Genghis Kahn sitting up on your elephant, surveying the game of space and thinking probabilistically about what will be the greatest outcome."

Jim: He goes, "You don't want the guys working for you with the spears down there to be probabilistic thinkers," because they're going to be thinking, "Huh? I think my highest odds is dropping my spear, running into the woods. And I'm going to... That's my highest chance to live." But I honestly think that again, deterministic thinking, zero, yes. Zero 100, yes. No, that's wrong. It's like [crosstalk 01:14:35] gray, right? Everything is much more gray.

Lily: It's interesting. One of my drugs on this and it's exactly what you're talking about is the more I learn about the market, the worst I probably am as a trader because the people I've seen who make and also lose the most money are the ones who barely understand it at all. When you buy a [inaudible 01:14:58] on Tesla or GameStop, you don't want to know the odds. Nowadays...

Lily: I know the odds. I mean, nowadays, I bet so little money, because my [inaudible 01:15:06] is significantly larger than, for instance, the amount I bet on Twitter. Most of my money is in Microsoft and my former employer, Stripe, so I'm keeping it there. The more I learn, it's like I understand all these probabilities and I understand where things could go wrong, and then I just get more unsure of myself. I think the best people are probably people like you, who understand these probabilities and still can pull themselves from analysis paralysis.

Jim: Yeah, that's the challenge, right? It takes a while. It really takes a while, and it takes life punching you in the face. That helps a lot, because when you get punched in the face, you just sort of get used to the idea that mistakes are nothing to be ashamed of. They're learning opportunities. If I'm less dumb at the end of the day than I started the day, I view that as a win, right?

Lily: I have the same ... Literally, I call it incremental improvement. It's exactly the same thing you just said.

Jim: Yeah, and so I just think it's the way that you're going to have the highest ability to recalibrate your models and thinking to get to better outcomes, right? I mean, at the end of the day, what are you looking for? You're looking for the ability to take actions and/or make bets or place wagers that pay off, right?

Lily: Exactly. I think a lot of people, and I see this with my model now, especially because it was first adopted by retail traders well before anybody paid attention to it. It was kind of this known concept with my group of friends and also some auxiliaries, and I think a lot of people look at it with this dogmatic devotion to

their models, where, "Okay, I am going to trade it, and if it's wrong, I'm going to castigate it and say, 'This is crap.'" It's like this is not how the real world works. I had people who got legitimately angry that my model predicted, for instance, wrong on Inauguration Day, where we went up 2%. I've had people be like, "Okay, maybe you should consider X, Y, and Z as a response to these events." I'm like, "This is not how a factor works. In the real world, we exist in probability. So of course it's sometimes wrong. If it wasn't wrong ever, that's probably just you over-fitting your model."

Jim: Absolutely. That's always been one of the things that people have ... They have these reflexive reactions to a back test, either good or bad, but they're missing the point, right? So a back test is directional, but the thing that's good about a back test, in my opinion, is one bit of information that it gives you if you're doing it honestly, and we bootstrap everything ... I'm sure you're familiar with that term. So you get to know how often it's wrong and by what magnitude. So when you're looking at an honest back test, you better see some massive drawdowns-

Lily: [crosstalk 01:18:24].

Jim: ... because that's part of the deal, right?

Lily: I mean, it's been interesting, because I had some collaborators early on who no longer work on the new project for various reasons. A lot of people just, I'm going to say, simply just shit on it. I was one pushing forward when it failed on earnings. Okay. There's some days it spectacularly fails, like Inauguration Day. Okay, and a lot of people at that point are just like, "Oh, this is not worth pursuing." What really kept me going on was in November, when I wrote my paper, the [inaudible 01:19:05] document that now has been viewed over 10,000 times for various reasons, is I saw this fairly robust correlation of predicting next-day returns, where not only did we see that it predicted the color, but it predicted a different mean. I couldn't prove it with the standard deviation, because the deviation was super large. So there really isn't any statisticalness. But my logic was, "I've been seeing this effect since 2007. It's 2020 now. This probably means there's something more there"-

Jim: Right.

Lily: ... because in the market, spurious correlations do not usually last 13 years.

Jim: Unless you've got an in to either increase or decrease butter production in Bangladesh, right?

Lily: Exactly, or parrots and global warming.

Jim: So Lily, what's next for you? I mean, obviously, kind of the world's your oyster here. What would you like if ... because I'm going to ask you a question about actually being able to wave a wand as my final question, but if you could just

pursue your muse, what would be next? What would be your ideal life, so to speak?

Lily: So it's interesting. I think a lot of people have asked me that, and I've said very tough answers before, like, "Oh, I have no idea. I just never thought I was going to get here." I mean, I did not plan on blowing up on Twitter. I did not plan on people paying attention to the model. I just talked about it because I wanted to, and I think now ... So we're starting actually a quantitative research firm on this research and similar strategies. I'm very passionate about data. I'm very passionate about research. I just love exploring the big questions and looking for ways to monetize that, either open to partnering, positions.

Lily: It's really a very new thing for me, because I come from a bioinformatics/computer science background. I did this originally as a science project because I was bored during the summer before my PhD. Now I'm kind of rectifying the fact that, "Well, maybe this is something I should continue doing." Academia is great. I really have learned a lot through my studies. I think what I've learned through this whole endeavor is it would kind of be a fantastic missed opportunity for me not to look at ways I can [inaudible 01:21:51] this into to a career. So we'll see. I mean, hopefully by the time this comes out in a month, I'll have a better answer for you.

Jim: So I love that answer, though, because it means to me at least that you're very open-minded about it. If I could give you advice, I would tell you if you can get into a career that allows you to be curious about everything and be able to follow that curiosity, I mean, I don't know. I don't think I could think of a better job. Certainly, for me, it's been like heaven, right? Because what's great about markets is there's always another question. There's always another rabbit hole. If you're really, really curious, what a great place. It's kind of like the Olympics of business, but does it mean that you should ... I have huge admiration for scientists, too. I mean, what I'm doing hopefully is helping my investors and all of that and whatnot. But come on. I'm not curing cancer here.

Lily: Yeah. I mean, so I originally did my PhD. I was a software engineer at LinkedIn and Stripe. When people, even when I started pursuing a PhD, they were like, "Why are you doing this?" My parents still don't understand why I went for a PhD, because it effectively has negative expected value for me versus having stayed in technology.

Jim: Right.

Lily: But I was really interested in doing something more impactful. I was a web dev in my former life, and it's lucrative. It is not interesting. You are not solving novel problems 99% of your day. People ask me, because I went into bioinformatics because my brother is autistic. Actually, before I started my PhD, I formed a company with some other people called [inaudible 01:23:54]. It was an app for helping parents and doctors and people involved in a child with autism's life connect, share data, and also create strategies for analyzing those data to

provide better therapeutic results. It failed. Most companies fail. Most startups fail. We closed it after two and a half years. It really did inspire me to look at this bigger picture. Whether it's in bioinformatics or finance, I just want to do research that matters, and I'm happy to share with people. I'm happy to, of course, monetize it. But at the end of the day, I just want to answer questions. I want to push human knowledge slightly and say at the end of the day I did something that mattered.

Jim: Oh, man, you are preaching to the choir here. I have enormous respect for that point of view. I love curious people. I love people who want to answer and provide those answers, because, unfortunately, I wish it was far more the norm, right? Because it makes life just so much more interesting. So someone with an active mind like yours, I predict you can go wherever you want to go. I think you will do great things.

Lily: Thank you. Yeah. I mean, one of the things I like the most is education. I like explaining topics. My goal after a PhD, even still now, even in finance is I want to help people learn, because not only is it important to do research for yourself and push human knowledge slightly, but you can magnify your effort by outreach, by writing. Just pick up a pen or the virtual pen and write. Teach people something new. You'll also learn more yourself doing it.

Jim: Always, always. I was watching a video on the quantum physicist Bohm. I don't know if you're familiar with him, but he had a quote that I loved. It's like, "If you don't know about something, the best way to learn about it is to write a book on that subject."

Lily: Honestly, every blog post I write, I learn something new.

Jim: Exactly.

Lily: Yesterday was more [crosstalk 01:26:20] creation redemption process. When you fact-check, you're like, "Oh, okay, this is something new I could look at later."

Jim: It's so cool, because when you start doing that, too, you just become far less certain about a lot of stuff, right? Because I've been down so many rat holes or rabbit holes, common beliefs that we can't get into now because we're running out of time. But I'd love to have you back, because this is a great discussion.

Lily: It was super fun. I would love to continue it.

Jim: Well, so we will do that. But you learn a ton of things that people believe, if you do your homework and you keep pulling on that thread and you keep going down to find the original citation, it's made up, much like the piece by Dotson, right? Somebody decided, "Well, I think that this is true," and then it catches on. Again, this is in the world of both mimetic with an I, mimetic behavior and desire, and mem, M-E, which also ... They're very different, by the way. But truth has

nothing to do with the hardiness of a mean, right? It's kind of like [crosstalk 01:27:37], right?

Lily: Nothing.

Jim: If it fits in, boom. You just take over the world with it, even though it's wrong. So that's one of the other things that I just love doing, is I just love saying, "Okay, I wonder where that came from," because you'll often be surprised. You'll see that most people or people wanting to lecture you or tell you that they know, I'll tell you, dogma, that is the death of thought. I can tell you'll never slip into dogma, which is fantastic.

Lily: [inaudible 01:28:15]. Yeah. I mean, I've been happy to ... It's interesting. I mean, I think there is a lot of meritocracy out there. I don't think you could argue if people are reading my stuff as a 25-year-old bioinformatics student in finance, I can't ... It's so far from dogmatic, when you read it and evaluate these ideas, that I'm really happy to be part of the conversation.

Jim: Oh, and that's what I love about it, because you're very good at that. You're very good at using humor, to be honest, which is something I sometimes try to do, and you're only 25. Oh my God. You're going to scale the heights. I can't wait to watch and see what happens with you. So this will end up being a super infinite loop, because I'm not going to edit much of it out. So we're already at an hour and a half

Jim: so Lily, I am the Sith lord or the Jedi master who can bestow on you empress for a day. You are going to be able to promulgate two things. You can't kill anyone, and you can't put anyone in a reeducation camp or do any of those nasty things. But you get to say a word that is like a spell, and suddenly everyone is like, "Oh, yeah. Oh, wow. I'm going to do that idea." What two things you got for me that you would make everyone think, "Yeah, I'm going to behave like that" or "I'm going to do that"?

Lily: I mean, I think it goes back ... I'm going to talk more [inaudible 01:30:14] here, because I could say something like universal basic income or ban fake news or restructure the market to [inaudible 01:30:22] exposure to my indicators so you don't crash in 2023. Those aren't that interesting. I would say two things are always remember the human. I think a lot of people, especially in the Internet era, seem to have forgot that at the other side of the keyboard, there's someone else that cares. There's someone else who's reading what you're saying. We're all people. I mean, I think one of the coolest things with my platform and work with day traders has just been raising money for charity. I love doing it. I love being able to say, "Okay, let's come together and do this cool, good thing."

Lily: I think the other one is always remember your time on Earth is finite. Since I was a kid ... This is why I loved Hamilton so much, the musical, because there was a song about him running out of time, and I'm like, "Holy shit. This is me." Since I

was a kid, I've always felt I was running out of time to do something that mattered. I think a lot of us, we take for granted that we're alive. At the end of the day, everything, everybody dies. It's a part of the life. You can be stressed about it. You can cry about it. It's just how it is. I know for me, at the end of my life, I want to say that Lily [inaudible 01:31:43] was here. I want something to stand in time, saying that my existence in this minor block of the universe mattered at least to somebody.

Lily: I don't know if it's a good philosophy. I think it's my philosophy. It really drives me to always push. It's never enough to just be here now, as Ram Dass would say. It's always, "Can I be the best version of myself? Can I help humanity understand slightly more whatever it is? Can I do something that changes someone's opinion? Will someone remember me when I'm gone?"

Jim: Wow. Okay. So I'm going to adopt you, maybe, because you've enunciated very beautifully my philosophy of life, which is live it. There's a great couplet that goes, "Love and time, with reverence use. Treat them as a departing friend, nor the golden gifts refuse which in youth sincere they send, for each year, their price is more and they less simple than before." People don't get that. I wake up and go to sleep saying the same thing. "Thank you. Thank you, universe." The fact that I'm even here means I beat the cosmic odds, right?

Lily: Exactly.

Jim: You did, too. Anyone who's here, we are also the result of millions of years of people who didn't fuck up, right?

Lily: That's the best way to put it. I mean, and I think just ... Yeah, I mean, you do not need to be the next Jim O'Shaughnessy here. You do not need to measure yourself against another person. At the end of day, we are all people. Just do the right thing. Just try to be the best version of yourself. It doesn't matter if you succeed. Just try.

Jim: I totally agree, and I also love that. Don't measure yourself against other people. Measure yourself only against yourself. Can you be better today than you were yesterday? Then you're succeeding, and you're not being envious or jealous. These are just such poisonous emotions that we all have, because we're all humans, and we all operate on human operating system. So I love that last ... I mean, man, you are pointed in the right direction, which is up.

Lily: Thank you. Yeah. I mean, I love with my platform that I've been able to highlight other young people. I think a lot of young people want to join this conversation. I think I have been fortunate to be given that platform. I think that's not only my joy to do, but it's also my responsibility.

Jim: Fantastic, Lily. All right. So there will definitely be, for all of you out there, a second hour or maybe hour and a half, because it feels to me like we just

touched the surface of a bunch of stuff. But this has been delightful. You are a very charming and very brilliant young woman who I know is going to do very, very well.

Lily: Thank you.

Jim: So doff the cap to you.

Lily: Perfect.

Jim: Now, go kill them.

Lily: I will try my best.

Jim: All right.

Lily: It's been a month.

Jim: Fantastic. Enjoy. Enjoy, enjoy. This was so much fun.

Lily: Thank you. You, too.