Welcome to the Huberman Lab Podcast, where we discuss science and science-based tools for everyday life. I'm Andrew Huberman and I'm a professor of neurobiology and ophthalmology at Stanford School of Medicine. Today I have the pleasure of introducing Dr. Lex Friedman as our guest on the Huberman Lab Podcast. Dr. Friedman is a researcher at MIT specializing in machine learning, artificial intelligence, and human robot interactions. I must say that the conversation with Lex was without question one of the most fascinating conversations that I've ever had, not just in my career but in my lifetime. I knew that Lex worked on these topics and I think many of you are probably familiar with Lex and his interest in these topics from his incredible podcast, the Lex Friedman Podcast. If you're not already watching that podcast, please subscribe to it. It is absolutely fantastic. But in holding this conversation with Lex, I realized something far more important. He revealed to us a bit of his dream, his dream about humans and robots, about humans and machines, and about how those interactions can change the way that we perceive ourselves and that we interact with the world. We discuss relationships of all kinds, relationships with animals, relationships with friends, relationships with family, and romantic relationships. And we discuss relationships with machines, machines that move and machines that don't move, and machines that come to understand us in ways that we could never understand for ourselves, and how those machines can educate us about ourselves. Before this conversation, I had no concept of the ways in which machines could inform me or anyone about themselves. By the end, I was absolutely taken with the idea, and I'm still taken with the idea, that interactions with machines of a very particular kind, a kind that Lex understands and wants to bring to the world, can not only transform the self, but may very well transform humanity. So whether or not you're familiar with Dr. Lex Friedman or not, I'm certain you're going to learn a tremendous amount from him during the course of our discussion, and that it will transform the way you think about yourself and about the world. Before we begin, I want to mention that this podcast is separate from my teaching and research rules at Stanford. It is, however, part of my desire and effort to bring a zero cost to consumer information about science and science related tools to the general public. And now my conversation with Dr. Lex Friedman. We meet again. We meet again. Thanks so much for sitting down with me. I have a question that I think is on a lot of people's minds or ought to be on a lot of people's minds. Because we hear these terms a lot these days, but I think most people, including most scientists and including me, don't know really what is artificial intelligence. And how is it different from things like machine learning and robotics? So if you would be so kind as to explain to us, what is artificial intelligence and what is machine learning? Well, I think that question is as complicated and as fascinating as the question of what is intelligence. So I think of artificial intelligence first as a big philosophical thing. Pamela McCordick said, AI was the ancient wish to forge the gods or was born as an ancient wish to forge the gods. So I think at the big philosophical level, it's our longing to create other intelligence systems, perhaps systems more powerful than us. At the more narrow level, I think it's also a set of tools that are computational mathematical tools to automate different tasks. And also it's our attempt to understand our own mind. So build systems that exhibit some intelligent behavior in order to understand what is intelligence in our own selves. So all those things are true. Of course, what AI really means is a community as a set of researchers and engineers, it's a set of tools, a set of computational techniques that allow you to solve various problems. There's a long history that approaches the problem from different perspectives, what's always been throughout one of the threads, one of the communities goes under the flag of machine learning, which is emphasizing in the AI space, the task of learning. How do you make a machine that knows very little in the beginning, follow some kind of process and learns to become better and better and a particular task? What's been most very effective in the recent, about 15 years is a set of techniques that fall under the flag of deep learning that utilize neural networks. When your networks are these fascinating things inspired by the structure of the human brain very loosely, but they have, it's a network of these little basic computational units called neurons, artificial neurons. So, you know, there's a lot of these architecture seven input and output, they know nothing in the beginning and their task with learning something interesting. What that something interesting is usually involves a particular task. There's a lot of ways to talk about this and break this down. Like one of them is how much human supervision is required to teach this thing. The way to realize learning is broad category is the neural network knows nothing in the beginning and then it's given a bunch of examples of in computer vision that would be examples of cats dogs cars traffic signs and then you're given the image and you're given the ground truth of what's in that image. When you get a large database of such image examples where you know the truth, the, the neural network is able to learn by example, that's called supervised learning. The question, there's a lot of fascinating questions within that, which is how do you provide the truth when you've given an image of a cat. How do you provide to the computer that this image contains a cat. Do you just say the entire image is a picture of a cat. Do you do what's very commonly been done, which is a bounty box. You have a very crude box around the cat's face saying this is a cat. Do you do semantic segmentation mind you this is a 2D image of a cat. So it's not the computer knows nothing about our three dimensional world is just looking at a set of pixels. So semantic segmentation is drawing a nice very crisp outline around the cat and saying that's a cat. That's really difficult to provide that truth and one of the fundamental open questions in computer vision is, is that even a good representation of the truth. Now there is another contrasting set of ideas, their attention, their overlapping is what's used to be called unsupervised learning. What's commonly now called self supervised learning, which is trying to get less and less and less human supervision into into into the task. So self supervised learning is more is been very successful in the domain of language model, natural language processing and now more and more is being successful in computer vision task. And was the idea there is let the machine without any ground truth annotation, just look at pictures on the internet or look at text on the internet and try to learn something generalizable about the ideas. That are at the core of language or at the core vision and based on that. We humans at its best like to call that common sense so with this we have this giant base of knowledge on top of which we build more sophisticated knowledge but we have this kind of common sense knowledge. And so the idea of self supervised learning is to build this common sense knowledge about what are the fundamental visual ideas that make up a cat and a dog and all those kinds of things without ever having human supervision. The dream there is the you just you just let an AI system that's self supervised run around the internet for a while watch YouTube videos for millions of millions of hours and without any supervision be primed and ready to actually learn with very few examples once the human is able to show up. We think of children in this way human children is your parents only give one or two examples to teach a concept the dream with self supervised learning is that will be the same with with machines that they would watch millions of hours of YouTube videos and then come to a human and be able to understand when the human shows them this is a cat. I remember this the cat they will understand that a cat is not just a thing with pointy ears or cat cat is a thing that's orange or is furry they'll see something more fundamental that we humans might not actually be able to introspect and understand like if I asked you what makes a cat versus a dog you wouldn't probably not be able to answer that. But if I showed you brought to your cat and a dog you'll be able to tell the difference what are the ideas that your brain uses to make that difference that's the whole dream with self supervised learning is it would be able to learn that on its own that set of common sense knowledge that's able to tell the difference and then there's like a lot of incredible uses of self supervised learning very weirdly called self play mechanism that's the mechanism behind the reinforcement learning successes of the systems that wanted to go at alpha zero that wanted chess. Oh I see that play games that play games got it so the idea of self play is probably applies to other domains than just games is a system that just plays against itself. And this is fascinating in all kinds of domains but it knows nothing in the beginning and the whole idea is it creates a bunch of mutations of itself and plays against those versions of itself. And the fascinating thing is when you play against systems that are a little bit better than you you start to get better yourself like learning that's how you learning happens that's true for martial arts that true in a lot of cases where you want to do it. Or you want to be interacting with with systems that are just a little better than you and then through this process of interacting with systems just a little better than you you start following this process where everybody starts getting better and better and better and better and better until you are several orders of magnitude better than the world champion in chess for example and it's fascinating because it's like a runaway system one of the most terrifying and exciting things that David silver the creator of alpha go enough is zero one of the leaders of the team said. To me is they haven't found the ceiling for alpha zero meaning it could just arbitrarily keep improving now in the realm of chess that doesn't matter to us that it's like it just ran away with the game of chess like it's like just so much better than humans but the question is what if you can create that in the realm that does have a bigger deeper effect on human beings and societies that are just a little bit more than you can see. So there's a lot of things that can be a terrifying process to me it's an exciting process if you supervise it correctly if you inject if what's called value alignment you you make sure that the goals that the AI is optimizing is aligned with human beings and human societies. There's a lot of fascinating things to talk about within the specifics of new networks and all the problems that people are working on but I would say they're really big exciting one is self supervise learning where trying to get less and less human supervision. Less and less human supervision of new networks and also just a comment and I'll shut up now please keep going I'm learning I have questions but I'm learning so please keep going so that to me what's exciting is not the theory it's always the application one of the most exciting applications of artificial intelligence. Specifically new networks and machine learning is test autopilot so these are systems that are working in the real world this isn't an academic exercise this is human lives a stake this is safety critical. These are automated vehicles autonomous semi autonomous we want to be okay we've gone through wars on these topics semi autonomous semi autonomous so even though it's called the FSD full self driving it is currently not fully autonomous. The human supervision is required so human is tasked with overseeing the systems in fact liability wise the human is always responsible this is a human factor psychology question which is fascinating I'm fascinated by the the whole space which is a whole space of human robot interaction when AI systems and humans work together to accomplish task that dance to me is one of the smaller communities but I think it will be one of the most important open problems once they're solved is how the humans and robots dance together to me semi autonomous driving is one of those spaces so for for Elon for example he doesn't see it that way he sees the same of semi autonomous driving as a stepping stone towards fully autonomous driving like humans and robots can't dance well together like humans and humans dance and robots and robots dance like we need to this is an engineering problem we need to design a perfect robot that solves this problem to me forever maybe this is not the case with the world is going to be full of problems where it's always humans and robots have to interact because I think robots will always be flawed just like humans are going to be flawed our flawed and that's what makes life beautiful that they're flawed that's where learning happens at the edge of your capabilities so you always have to figure out how can robots and flawed humans interact together such that they like the the sum is bigger than the whole as opposed to focusing on just building the perfect robot so that's one of most exciting applications I would say of artificial intelligence to me is autonomous driving and semi autonomous driving and that's a really good example machine learning because those systems are constantly learning and there's a there's a process there that maybe I can comment on the Andre Kapati who's the head of autopilot calls it the data engine and this process applies for a lot of machine learning which is you build the system that's pretty good at doing stuff you send any you send it out into the real world it starts doing the stuff and then it runs into what are called edge cases like failure cases where it screws up you know we do this as kids that you know you have this as adult we do this as well adults adults exactly but we learn really quickly but the whole point this is the fascinating thing about driving is you realize there's millions of edge cases there's just like weird situations that you did not expect and so the data engine processes you collect those edge cases and then you go back to the drawing board and learn from them as you have to create this data pipeline where all these cars hundreds of thousands of cars are driving around and something weird happens and so whenever this weird detector fires it's another important concept that piece of data goes back to the mothership for the training for the retraining of the system and through this data engine process it keeps improving and getting better and better and better and better and better so basically you send out a pretty clever AI systems out into the world and let it find the edge cases let it screw up just enough to figure out where the edge cases are and then go back and learn from them and then send out that new version and keep updating that version is the updating done by humans the annotation is done by humans so you have to the weird examples come back the edge cases and you have to label what actually happened in there there's also some mechanisms for automatic automatically labeling but mostly I think you always have to rely on humans to improve to understand what's happening in the weird weird cases and then there's a lot of debate and it's the other thing what is artificial intelligence which is a bunch of smart people having very different opinions about what is intelligence so AI is basically a community of people who don't agree on anything it seems to be the case I'm you know first of all this is a beautiful description of terms that I've heard many times among my colleagues at Stanford meetings in the outside world and there's so many fascinating things I have so many questions but I do want to ask one question about the culture of AI because it does seem to be a community where at least as an outsider where it seems like there's very little consensus about what the terms and the operational definitions even mean and there seems to be a lot of splitting happening now if not just supervised and unsupervised learning but these sort of intermediate conditions where machines are autonomous but then go back for more instruction like kids go home from college during the summer and get a little you know mom still feeds them then eventually they leave the nest kind of thing is there something in particular about engineers or about people in this realm of engineering that you think lends itself to disagreement yeah I think so first of all the more specific you get the less disagreement there is so there's a lot of disagreement about what is artificial intelligence but there's less disagreement about what is machine learning and even less when you talk about active learning or machine teaching or self supervised learning and then when you get into like NLP language models or transformers when you get into specific neural network architectures there's less and less and less disagreement about those terms so you might be hearing the disagreement from the high level terms and that has to do with the fact that engineering especially when you're talking about intelligence systems is is a little bit of an art and a science so the art part is is the thing that creates disagreements because then you start having disagreements about how easy or difficult the particular problem is for example a lot of people disagree with Elon how difficult the problem of autonomous driving is and so but nobody knows so there's a lot of disagreement about what are the limits of these techniques and through that the terminology also contains within it the disagreements but overall I think it's also a young science that also has to do with that so like it's not just engineering it's that artificial intelligence truly as a large scale discipline where it's thousands tens of thousands hundreds of thousands people working on it huge amounts of money being made that's a very recent thing so we're trying to figure out those terms and of course as egos and personalities and a lot of fame to be made you know like the term deep learning for example neural networks have been around for many many decades since the sixties you can argue since the forties so there was a rebranding of neural networks into the word deep learning term deep learning that was part of the reintegration of the field but it's really the same exact thing I didn't know that I mean I grew up in the age of neuroscience when neural networks were discussed computational neural networks computational neuroscience and theoretical neuroscience they had their own journals it wasn't actually taken terribly seriously by experimentalists until a few years ago I would say about five to seven years ago excellent theoretical neuroscientists like Larry Abbott and other I've called certainly at Stanford as well that people started paying attention to computational methods but these terms neural networks computational methods I actually didn't know that neural network works in deep learning where those have now become kind of synonymous they were always what no there always the same thing interesting it was so I'm a neuroscientist and I didn't know that so well because you know what's probably mean something else in your science not something else but a little different flavor depending on the field and that's fascinating too because neuroscience and AI people have started working together dancing a lot more in the recent I would say probably decade machines are going into the brain I have a couple questions but one thing that I'm sort of fixated on that I find incredibly interesting is this example you gave of playing a game with a mutated version of yourself as a competitor yeah I find that incredibly interesting as a kind of a parallel or a mirror for what happens when we try and learn as humans which is we generate repetitions of whatever it is we're trying to learn and we make errors occasionally we succeed I'm in a simple example for instance of trying to throw bulls eyes on a dart board yeah I'm gonna have errors errors errors miss the dart board and maybe occasionally hit a bulls eye and I don't know exactly what I just did right but then let's say I was playing darts against a version of myself where my I was wearing a visual prism like my visual I had a visual defect you learn certain things in that mode as well you're saying that a machine can sort of mutate itself does the mutation always cause a deficiency that it needs to overcome because mutations in biology sometimes give us superpowers right occasionally you'll get somebody who has better than twenty twenty vision and they can see better than ninety nine point nine percent of people out there so when you talk about a machine playing a game against a mutated version of itself is the mutation always a what we call a negative mutation or a or an adaptive or a maladaptive mutation no you don't know until you get you you mutate first and then figure out and they compete against each other so you're evolving your the machine gets to evolve itself in real time yeah and I think of it which would be exciting if you could actually do with humans it's not just so usually you freeze a version of the system so really you take on Andrew of yesterday and you make ten clones of them and then maybe you mutate maybe not and then you do a bunch of competitions of the and you're off today like you fight to the death who wins last so I love that idea of like creating a bunch of clones of myself from like from each of the day from the past year and just seeing who's going to be better at like podcasting or science or picking up chicks at a bar or I don't know or competing in jiu jitsu that's the one way to do it I mean a lot of Lexus would have to die for that process but that's essentially what happens is in reinforcement learning through the self play mechanisms it's a graveyard of systems that didn't do that well and the the the surviving the good one survive do you think that I mean Darwin's theory of evolution I might have worked in some sense in this way but at the population level I mean you get a bunch of birds with different shape beaks and some birds have the shape beaks that allows them to get the seeds I'm as a trivial trivial simple example of Darwinian evolution but I think it's it's correct if not even though it's not exhaustive is that what you're referring to you essentially that normally this is done between members of a different species lots of different members of species have different traits and some get selected for but you could actually create multiple versions of yourself with different traits so with I should probably have said this but perhaps it's implied with machine learning with reinforcement learning through these processes one of the big requirements is to have an objective function a loss function a utility function those are all different terms for the same thing is there's a like an equation that says what's good and then you're trying to optimize that equit the equation so there's a clear goal for these systems like because it's a game like with chess there's it there's a goal but for anything anything you want machine learning to solve there needs to be an objective function in machine learning is usually called loss function that you're optimizing the interesting thing about evolution complicated of course but the goal also seems to be evolving like it's a I guess adaptation to the environment is the goal but it's unclear you can convert that always it's a survival of the fittest it's unclear what the fittest is in machine learning the starting point and this is like what human ingenuity provides is that fitness function of what's good what's bad which it lets you know which of the system is the same as the one that you're looking for it lets you know which of the systems is going to win so you need to have a equation like that one of the fascinating things about humans is we figure out objective functions for so like we're it's the meaning of life like why the hell are we here and a machine currently has to have a hard coded statement about why has to have a meaning of artificial intelligence based life right it can't so like there's a lot of interesting explorations about that function being more about curiosity about learning new things and all that kind of stuff but it's still hard coded if you want a machine to be able to be good at stuff it has to be given very clear statements of what good at stuff means that's one of the challenges of artificial intelligence is you have to formalize the in order to solve a problem you have to formalize it and you have to provide both like the full sensory information you have to be very clear about what is the data that's being collected and you have to also be clear about the objective function what is the goal that you're trying to reach and that's a very difficult thing for artificial intelligence I love the mention curiosity I'm sure this definition fall short in many ways but I define curiosity as a strong interest in knowing something but without an attachment to the outcome you know it's sort of a it's not it could be a random search but there's not really an emotional attachment it's really just a desire to discover and unveil what's there without hoping it's a you know a gold coin under a rock you're just looking under rocks is that more or less how the machine you know within machine learning it sounds like there are elements of reward prediction and you know rewards the machine has to know when it's done the right thing so it can you make machines that are curious or are the sorts of machines that you are describing curious by design yeah curiosity is a kind of symptom not the goal so what what happens is one of the big trade-offs and reinforce some learning is this exploration versus exploitation so when you know very little it pays off to explore a lot even sub optimal like even trajectories that seem like they're not going to lead anywhere that's called exploration the smarter and smarter smarter you get the more emphasis you put on exploitation meaning you take the best solution you take the best path now through that process the exploration can look like curiosity by us humans but it's really just trying to get out of the local optimal of the thing that's already discovered it's from an AI perspective it's always looking to optimize the objective function it derives and we can talk about the slot more but in terms of the tools of machine learning today it derives no pleasure from just the curiosity of like I don't know discovery there's no dopamine for there's no machine there's no reward system chemical or I guess electronic reward system that said if you look at machine learning literature and reinforcement learning literature they will use like deep mind we use terms like dopamine were constantly trying to use the human brain to inspire totally new solutions to these problems so they'll think like how does dopamine function in the human brain and how can that lead to more interesting ways to discover optimal solutions but ultimately currently the there has to be a formal objective function now you could argue that humans also has a set of objective functions we're trying to optimize we're just not able to introspect them we don't actually know what we're looking for and seeking and doing well like Lisa from the bar he's spoken with at least on Instagram I hope you get through you yeah I hope you actually have her on this podcast I'll be sure of it so she has a very long time to do with it has to do with homeostasis is like that basically there's a very dumb objective function at the brain is trying to optimize like to keep like body temperature the same like there's a very dumb kind of optimization function happening and then what we humans do with our fancy consciousness and cognitive abilities as we tell stories to ourselves so we can have nice podcast but really it's the brain trying to maintain just like healthy state I guess that's fascinating I also see the human brain and I hope artificial intelligence systems as not just systems that solve problems or optimize a goal but also storytellers I think there's a power to telling stories we tell stories to each other that's what communication is like when you're alone that's when you solve problems that that's when it makes sense to talk about solving problems but when you're a community the capability to communicate tell stories whole share ideas in such a way that those ideas are stable over a long period of time that's like that's being a charismatic storyteller and I think both humans are very good at this arguably I would I would argue that's why we are who we are is we're great storytellers and an AI I hope will also become that so it's not just about being able to solve problems with a clear objective function it's afterwards be able to tell like a way better like make up a way better story about why you did something or why you failed so you think that robots or and or machines of some sort are going to start telling human stories well definitely so the technical field for that is called explainable and explainable AI explainable artificial intelligence is trying to figure out how you get the AI system to explain to us humans why the how it failed or why it succeeded or there's a lot of different sort of versions of this or to visualize how it understands the world that's a really difficult problem especially with neural networks that are famously opaque that they we don't understand in many cases why a particular neural network does what it does so well and to try to figure out where it's going to fail that requires the AI to explain itself there's a huge amount of money like there's a huge amount of money in this especially from government funding and so on because if you want to deploy AI systems in the real world we humans at least want to ask you a question like why the hell did you do that like in a dark way why did you just kill that person right like if a car ran over a person went to understand why that happened and again we're sometimes very unfair to AI systems because we humans can't often not explain why very well but that's the field of explainable AI that's very people are very interested in because the more and more rely on AI systems like the Twitter recommender system that AI algorithm that's I would say impacting elections perhaps starting wars or at least military conflict that's that algorithm we want to ask that algorithm first of all do you know what the hell you're doing do you know do you understand the society level effects you're having it can you explain the possible other trajectories like we would have that kind of conversation with a human we want to be able to do that with an AI and in my own personal level I think it would be nice to talk to AI systems for stupid stuff like robots when they fail to what do you fall down the stairs yeah but I'm not an engineering question but almost like a endearing question like like I'm looking for if I fell and you and I were hanging out I don't think you need an explanation exactly what were the dynamic like what was the underactuated system problem here like what what what was the texture of the floor or so on or like what was the one what you're thinking that or you might joke about like your drunk again go home or something like there could be humor in it that that's an opportunity like storytelling isn't just explanation of what happened it's something that makes people laugh makes people fall in love makes people dream and understand things in a way that poetry makes people understand things as opposed to a rigorous log of where every sensor was where every actuated was I mean I find this incredible because you know one of the hallmarks of severe autism spectrum disorders is a report of experience from the autistic person that is very much a catalog of action steps it's like how do you feel today and they'll say well I got up and I did this and then I did this and I did this and it's not at all the way that a person with who doesn't have autism spectrum disorder would would respond and the way you describe these machines has so much human has so much humanism or so much of a human and biological element but I realize that we are talking about machines I want to make sure that I understand if there's a distinction between a machine that learns a machine with artificial intelligence and a robot at what point does a machine become a robot so if I have a ballpoint pen I'm assuming I wouldn't call that a robot but if my ballpoint pen can come to me when it's on when I move to the opposite side of the table if it moves by whatever mechanism at that point does it become a robot okay there's a million ways to explore this question it's a fascinating one so first of all there's a question of what is life like how do you know something is a living form and not and it's similar to the question of when does sort of a maybe a cold computational system becomes a we're already loading these words with a lot of robots and machine but so one I think movement is important but that's a kind of a boring idea that a robot is just a machine that's able to act in the world so one artificial intelligence could be both just the thinking thing which I think is what machine learning is and also the acting thing which is what we usually think about robots so robots are the things that have a perception system that's able to take in the world however you define the world is able to think and learn and do whatever the hell it does inside and then act on the world so that's the difference between maybe an AI system learn machine and a robot is something that's able a robot is something that's able to perceive the world and act in the world so it could be through language or sound or it could be through movement or both I think it could also be in the digital space as long as there's a aspect of entity that's inside the machine and a world that's outside the machine and there's a sense in which the machine is sensing that world and acting in it so we could for instance there could be a version of a robot according to your definition that I think you're providing where the robot I where I go to sleep at night and this robot goes and forges for information that it thinks I want to see loaded on my desktop in the morning there was no movement of that machine there was no language but it essentially has movement in in cyberspace yeah there's a distinction that I think is important in that there's a there's an element of it being an entity or there's in the digital or the physical space so when you have something like Alexa in your home most of the speech recognition most of what Alexa is doing is constantly being sent back to the mother ship the one Alexa is there on its own that's to me a robot when it's there interacting with the world when it's simply a finger of the main mother ship that's not then Alexa's not a robot then it's just an interaction device that then maybe the main Amazon Alexa AI big big system is the robot so that's important because there's some elements to us humans I think where we want there to be an entity whether in the digital or the physical space that's where ideas of consciousness come in and all those kinds of things that we project our understanding what it means to be a being and so to take that further when does a machine become a robot I think there's a there's a special moment there's a special moment in a person's life in a robot's life where it surprises you I think surprise is a really powerful thing where you know how the thing works and yet it surprises you that that's a magical moment for us humans so whether it's a chess playing program that does something that you haven't seen before that makes people smile like huh those moments happen with alpha zero for the first time in chess playing or grandmasters were really surprised by a move they didn't understand the move and then they study and study and then then they understood it but that moment of surprise that's for grandmasters in chess I find that moment of surprise really powerful really magical in just every day life because it supersedes the human brain in that moment not so it's not supersedes like outperforms but surprises you in a positive sense like I didn't I didn't think you could do that I didn't think that you had that in you and I think that moment is a big transition for a robot from a from a moment of being a servant that particular that accomplishes a particular task with some level of accuracy with some rate of failure to an entity a being that's struggling just like you are in this world and that that's a really important moment that I think you're not going to find many people in the community that talk like I just did I I'm not speaking like some philosopher some hippie I'm speaking from purely engineering perspective I think it's really important for robots to become entities and explore that as a real engineering problem as opposed to everybody treats robots in the robotics community they don't even call them a he or she they don't give them try to avoid giving them names they really want to see it like a system like a servant they see it as a servant is trying to accomplish a task to me and don't think I'm just romanticizing the notion I think it's a being it's a currently perhaps a dumb being but in the in the long arc of history humans are pretty dumb beings too so I would agree with that statement so I tend to really want to explore this treating robots really as entities yeah so like anthropomorphization which is the sort of the act of looking at the inanimate object and projecting onto it life like features I think robotics generally sees that as a as a negative I see it as a super power like that we need to use that well well I'm struck by how that really grabs on to the relationship between human and machine or human and robot so it's the simple question is and I think you've already told us the answer but does interacting with a robot change you does it in other words do we develop relationships to robots yeah I definitely I definitely think so I think I think the moment you see a robot or AI systems as more than just servants but entities they begin to change you just like good friends do just like relationships just like other humans I think for that you have to have certain aspects of that interaction like the robots ability to say no to have its own sense of identity to have its own set of goals that's not constantly serving you but instead trying to understand the world and do that dance of understanding through communication with you so I definitely think there's a lot of thoughts about this as you mean no and that's at the core of my lifelong dream actually of what I want to do which is I believe that most people have a notion of loneliness in them that we haven't discovered that that we haven't explored I should say and I see AI systems as helping us explore that so that we can become better humans better people towards each other so I think that connection between human and AI human and robot is not only possible but will help us understand ourselves in ways that are like several orders of magnitude deeper than we ever could have imagined I tend to believe that well I have a very wild levels of belief in terms of how impactful that would be so when I think about human relationships I don't always break them down into variables but we could explore a few of those variables and see how they map to human robot relationships one is just time right if you spend zero time with another person at all in in cyberspace or on the phone or in person you essentially have no relationship to them if you spend a lot of time you have a relationship this is obvious but I guess one variable would be time how much time you spend with the other entity robot or human the other would be wins and successes you know you enjoy successes together I'll give a absolutely trivial example this in a moment but the other would be failures when you struggle with somebody whether or not you struggle between one another you disagree like I was really struck by the fact that you said that robot saying no I've never thought about a robot saying no to me but there it is I look forward to you being one of the first to send the robot so do I so there's there's struggle you grow you know when you struggle with somebody you grow closer sometimes the struggles are imposed between those two people so called trauma bonding they call it in the whole psychology literature and pop psychology but in any case I could imagine so time successes together struggle together and then just peaceful time hanging out at home watching watching movies waking up near one another here we're breaking down the kind of elements of relationships of any kind so do you think that these elements apply to robot human relationships and if so then I could see how if that if the robot is its own entity and has some autonomy in terms of how it reacts you it's not just they are just to serve you it's not just a servant it actually has opinions and can tell you when maybe you're thinking as flawed or your actions are flawed it can also leave it can could also leave so I've never conceptualized robot human interactions this way so tell me more about how this might look are we thinking about a human appearing robot I know you and I both had intense relationships to our we have separate dogs obviously but to animals this sounds a lot like human animal interaction so what is the ideal human robot relationship so there's a lot to be said here but you actually pinpointed one of the big big first steps which is idea of time and it's a huge limitation in machine learning community currently as this not now we're back to like the actual details lifelong learning is a is a problem space that focuses on how AI systems can learn over a long period of time what's currently most machine learning systems are not able to do is to all of the things you've listed under time the successes the failures are just chilling together watching movies AI systems are not able to do that which is all the beautiful magical moments that I believe are the days filled with they're not able to keep track of those together with you there's a can't move with you and be with you no no like literally we don't have the the techniques to do the learning the actual learning of containing those moments current machine learning systems are really focused on understanding the world in the following way it's more like the perception system like looking around understand like what's in the scene that there's a bunch of people sitting down that there is a camera is a microphone that there's a table understand that but the fact that we shared this moment of talking today and still remember that for next time you're for like next time you're doing something remember that this moment happened we don't know how to do that technique quite this is what I'm this is what I'm hoping to innovate on as I think it's a very very important component of what it means to create a deep relationship that sharing of moments together could you post a photo of you in the robot like self selfie with robot and the robot sees that image and recognizes that was time spent there was there were smiles or there were tears and create some sort of metric of of emotional depth in the relationship and update its behavior so it text you in the middle of the night and say why I mean you texted me back yes all of those things but we could dig into that but I think that time element to get everything else just sharing moments together that changes everything I believe that changes everything there's specific things that are more in terms of systems that can explain you it's more technical and probably a little bit offline because I have kind of wild ideas how that can revolutionize social networks and operating systems but the point is that element alone forget all the other things we're talking about you like emotions saying no all that just remember sharing moments together will change everything we don't currently have systems that share moments together like even just you and your fridge just all those times you went late at night and and eight things you shouldn't have eaten that was a secret moment you had with your refrigerator you shared that moment that darkness or that beautiful moment where you just you know like hard broken for some reason you're eating that ice cream or whatever that's a special moment and that refrigerator was there for you and the fact that it missed the opportunity to remember that is tragic and once it does remember that I think you're going to be very attached to the refrigerator you're going to go through some some hell with that refrigerator most of us have like in in a developed world have weird relationships with food right so you can go through some deep moments of trauma and triumph with food and at the core of that is the refrigerator so a smart refrigerator I believe would change society not just the refrigerator but the these ideas in the systems all around us so that I just want to comment on how powerful that idea of time is and then there's a bunch of elements of actual interaction of allowing you as a human to feel like you're being heard truly heard truly understood that we human like deep friendship is like that I think but we're still there's still an element of selfishness there's still an element of not really being able to understand another human and a lot of the times when you're going through trauma together through difficult times and through successes you're actually starting to get that inkling of understanding of each other but I think that could be done more aggressively more efficiently like if you think of a great therapist I think I've never actually been to a therapist but I'm a believer I used to want to be a psychiatrist Russians go to therapists and they don't they don't and if they do the therapist don't live to tell the story I do believe in talk there which friendship is to me is talk therapy or like it's like it's you don't necessarily need to talk it's like just connecting through in the space of ideas and the space of experiences and I think there's a lot of ideas of how to make the distance to be able to ask the right questions and truly hear another human this is what we try to do with podcasting right I think there's ways to do that with AI but above all else just remembering the collection of moments they make up the day the week the months I think you maybe have some of this as well some of my closest friends still are the friends from high school that's time we've been through a bunch of shit together and that like we've we're very different people but just the fact that we've been through that and we remember those moments and those moments somehow create a depth of connection like nothing else like you and your refrigerator I love that because the I'd a my graduate advisor I'm for sure she passed away but when she passed away somebody said it hurt at a memorial you know all these amazing things she had done et cetera and then her kids got up there and she had young children that I knew as they were when she was pregnant with them and it was really you're even now I can feel like your heart gets heavy thinking about this they're going to grow up without their mother and it was really amazing very very strong young girls and now young women and what they said was incredible they said what they really appreciated most about their mother who was an amazing person is all the unstructured time they spent together and it wasn't the trips to the zoo it wasn't you know oh you know she woke up at five in the morning and drove us to school she did all those things too she had two hour commute in each direction it was incredible rental lab et cetera but it was the unstructured time so on the passing of their mother that that's what they remembered was the the biggest give and what bonded them to her was all the time where they just kind of hung out and the way you described the relationship to a refrigerator is so I want to say human like but I'm almost reluctant to say that what I'm realizing as we're talking is that what we think of as human like might actually be the a lower form of relationship there may be relationships that are far better than the sorts of relationships that we can conceive in our minds right now based on what these machine relationship interactions could teach us do I have that right yeah I think so I think there's no reason to see machines as somehow incapable of teaching us something that's deeply human I don't think humans have a monopoly on that I think we understand ourselves very poorly and we need to have the kind of prompting from a machine and definitely part of that is just remembering the moments remember the moments I'm you know I think the unstructured time together I wonder if it's quite so unstructured that's like calling this podcast unstructured time maybe what they meant was it wasn't a big outing it wasn't this there was no specific goal but a goal was created through the lack of a goal like we just hang out and then you start playing you know thumb war you end up playing thumb war for an hour there so it's it's the structure emerges from lack of structure no but the thing is the moments there's something about those times that creates special moments and I think that those could be optimized for I think we think of like a big outing is I don't know going to six flags or something some big the grand canyon or going to some I don't know that I think we would need to we don't quite yet understand as humans what creates magical moments I think this possible to optimize a lot of those things and perhaps like podcasting is helping people discover that like maybe the thing we want to optimize for isn't necessarily like some sexy like quick clips maybe what we want is long form authenticity depth depth so we were trying to figure that out certainly from a deep connection between between humans and humans and the AI systems I think long conversations or long periods of communication over a series of moments like my new perhaps seemingly insignificant to the big ones the big success of the big failures those are all just stitching those together and talking throughout I think that's the formula for a really really deep connection that from a very specific engineering perspective is I think a fascinating open problem that has been really worked on very much and for me from a if I have the guts and I mean there's a lot of things to say but one of it is guts is I'll build a startup around it so let's talk about this startup and let's talk about the dream you mentioned this dream before in our previous conversations always as little hints dropped here and there just for anyone listening there's never been an offline conversation about this dream I'm not privy to anything except what Lex says now and I realized that there's no way to capture the full essence of a dream in any kind of verbal statement in a way that captures all of it but what is the what is this dream that you've referred to now several times when we've sat down together and talked on the phone maybe it's this company maybe it's something distinct if you feel comfortable it'd be great if you could share a little bit about what that is Sure so the way people express long-term vision I've noticed is quite different like Elon as an example somebody who can very crisply say exactly what the goal is also has to do with the fact that problems he's solving have nothing to do with humans so my long-term vision is a little bit more difficult to express in words I've noticed as I've tried it could be my brain's failure but there's a way to sneak up to it so let me just say a few things early on in life and also in the recent years I've interacted with a few robots where I understood there's magic there and that magic could be shared by millions if it's brought to light what I first met spot from Boston Dynamics I realized there's magic there that nobody else is seeing is the dog is the dog sorry the spot is the four-legged robot from Boston Dynamics some people might have seen it as a yellow dog and you know sometimes in life you just notice something that just grabs you and I believe that this is something that this magic is something that could be every single device in the world the way that I think maybe Steve Jobs thought about the personal computer was didn't think about it the personal computer this way but Steve did which is like he thought that the personal computer should be as thin as a sheet of paper and everybody should have one I mean this idea I think it is heartbreaking that we're getting the world is being filled up with machines that are soulless and I think every one of them can have that same magic one of the things that also inspired me in terms of a startup is that magic can be engineered much easier than I thought that's my intuition with everything I've ever built and worked on so the dream is to add a bit of that magic in every single computing system in the world so the way that Windows operating system for a long time was the primary operating system everybody interacted with they built apps on top of it I think this is something that should be as a layer almost as an operating system in every device that humans interact with in the world with that actually looks like the actual dream when I was a kid it didn't have this concrete form of a business it had more of a dream of exploring your own loneliness by interacting with machines robots this deep connection between humans and robots was always a dream and so for me I'd love to see a world where there's every home has a robot and not a robot that washes the dishes or sex robot or I don't know I think of any kind of activity the robot can do but more like a companion a family member a family member the way dog is but a dog that's also able to speak your language too so not just connect the way a dog does by looking at you and looking away and almost like smiling with its soul in that kind of way but also to actually understand what the hell like why are you so excited about the successes like understand the details understand the traumas and I just think that has always filled me with the excitement that I could with artificial intelligence bring joy to a lot of people more recently I've been more and more hard-broken to see the kind of division, derision, even hate that's boiling up on the internet through social networks and I thought this kind of mechanism is exactly applicable in the context of social networks as well so it's an operating system that serves as your guide on the internet one of the biggest problems with YouTube and social networks currently is they're optimizing for engagement I think if you create AI systems that know each individual person you're able to optimize for long-term growth for a long-term happiness of the individual or the individual and there's a lot of other things to say which is the in order for AI systems to learn everything about you they need to collect, they need to just like you and I when we talk offline we're collecting data about each other, secrets about each other the same way AI has to do that and that allows you to and that requires you to rethink ideas of ownership of data I think each individual should own all of their data and very easily be able to leave just like AI systems can leave, humans can disappear and delete all of their data in a moment's notice which is actually better than we humans can do, once we load the data into each other it's there I think it's very important to be both give people complete control over their data in order to establish trust that they can trust you and the second part of trust is transparency whenever the data is used to make it very clear what is being used for and not clear in a lawyerly legal sense but clear in a way that people really understand what it's used for I believe when people have the ability to delete all their data and walk away and know how the data is being used I think they'll stay the possibility of a clean breakup is actually what will keep people together yeah I think so, I think exactly, I think a happy marriage requires the ability to divorce easily without the divorce industrial complex or whatever this currently going on there's so much money to be made from lawyers and divorce but yeah the ability to leave is what enables love I think there's something I've heard that phrase from a semi cynical friend that marriage is the leading cause of divorce but now we've heard that divorce or the possibility of divorce could be the leading cause of marriage of a happy marriage, good point, of a happy marriage so yeah so there's a lot of details there but the big dream is that connection between AI system and a human and I haven't, you know there's so much fear about artificial intelligence systems and about robots that I haven't quite found the right words to express that vision because the vision I have is one, it's not like some naive delusional vision of like technology is going to save everybody I really do just have a positive view of ways AI systems can help humans explore themselves I love that positivity and I agree that the stance everything is doomed is equally bad to say that everything is going to turn out alright there has to be a dedicated effort and clearly you're thinking about what that dedicated effort would look like you mentioned two aspects to this dream and I want to make sure that I understand where they connect if they do or if they are independent streams one was this hypothetical robot family member or some other form of robot that would allow people to experience the kind of delight that you experienced many times and that you would like the world to be able to have and it's such a beautiful idea of this give and the other is social media or social network platforms that really serve individuals and their best selves and their happiness and their growth is there crossover between those or these two parallel dreams? 100% the same thing it's difficult to kind of explain without going through details but maybe one easy way to explain the way I think about social networks is to create an AI system that's yours it's not like Amazon Alexa that's centralized you own the data it's like your little friend that becomes your representative on Twitter that helps you find things that will make you feel good that will also challenge your thinking to make you grow but not get to that not let you get lost in the negative spiral of dopamine that gets you to be angry or most just get you to be not open to learning and so that little representative is optimizing your long term health and it's I believe that that is not only good for human beings it's also good for business I think long term you can make a lot of money by challenging this idea that the only way to make money is maximizing engagement and one of the things that people disagree with me on is they think Twitter is always going to win like maximizing engagement is always going to win I don't think so. I think people have woken up now to understanding that like they don't always feel good the ones who are on Twitter a lot that they don't always feel good at the end of the week. I would love feedback from whatever this creature, whatever I can't I don't know what to call it as to maybe at the end of the week it would automatically unfollow some of the people that I follow because it relies through some really smart data about how I was feeling inside or how I was sleeping or something that just wasn't good for me but it might also put things in people in front of me that I ought to see. Is that the kind of deliver of what this looks like? I don't know because of the interaction, because of sharing the moments and learning a lot about you you're now able to understand what interactions led you to become a better version of yourself like the person you yourself are happy with. If you're into a flat earth and you feel very good about it that you believe the earth is flat, the idea that you should censor is ridiculous. If it makes you feel good and you're becoming the best version of yourself I think you should be getting as much flat earth as possible. It's also good to challenge your ideas but not because the centralized committee decided but because you tell to the system that you like challenging your ideas I think all of us do. And then which actually YouTube doesn't do that well once you go down the flat earth rabbit hole that's all you're going to see. It's nice to get some really powerful communicators to argue against flat earth and it's nice to see that for you and potentially at least long term to expand your horizons. Maybe the earth is not flat but if you continue to live your whole life thinking the earth is flat I think and you're being a good father or son or daughter like you're being the best version of yourself and you're happy with yourself I think there is flat. So I think this kind of idea and I'm just using that kind of silly ridiculous example because I don't like the idea of centralized forces controlling what you can and can't see. But I also don't like this idea of not censoring anything because that's always the biggest problem with that is there's a central decider. I think you yourself can decide what you want to see and not and it's good to have a companion that reminds you that you felt shitty last time you did this or you felt good last time you did this. I feel like in every good story there's a guide or a companion that flies out or forages a little bit further a little bit differently and brings back information that helps us or at least tries to steer us in the right direction. So that's exactly what I'm thinking and what I've been working on. As you mentioned as a bunch of difficulties here you see me up and down a little bit recently so there's technically a lot of challenges here. Like with a lot of technologies and the reason I'm talking about it on a podcast comfortably as opposed to working in secret is it's really hard and maybe it's time is not come. And that's something you have to constantly struggle with in terms of like entrepreneur early as a startup. Like I've also mentioned to you maybe offline I really don't care about money. I don't care about business success all those kinds of things. So it's a difficult decision to make how much of your time do you want to go all in here and give everything to this to big roll the dice. Because I've also realized that's working on some of these problems both with the robotics and the technical side on in terms of the machine learning system that I'm describing. It's lonely is really lonely because both on a personal level and a technical level so the technical level I'm surrounded by people that kind of. They don't doubt me which I think all entrepreneurs go through and they doubt you in the following sense they they know how difficult it is like the people that colleagues of mine they know how difficult life long learning is they also know how difficult it is to build a system like this to build the competitive social network. And in general there's a kind of loneliness to just working on something on your own for a long period of time and you start to doubt whether given that you don't have a track record of success like that's a big one. When you look in the mirror especially when you're young but I still have that I'm most things you look in the mirror is like any of these big dreams how do you know you're how do you know you're actually as smart as you think you are like how do you know you're going to be able to accomplish this dream you have the ambition you sort of don't but you're you're kind of pulling on a on a string hoping that there's a bigger ball of yarn yeah we have this kind of intuition I I think I pride myself in knowing what I'm good at because the reason I have that intuition is because I think I'm very good at knowing all the things I suck at which is basically everything. So like whenever I notice like wait a minute I'm kind of good at this which is very rare for me I think like that that might be a ball of yarn worth pulling at and the thing with in terms of engineering systems that are able to interact with humans I think I'm very good at that and I'm just we're talking about podcasting and so on I don't know if I'm very good at podcast you're very good at podcasting but I certainly don't I think maybe it is compelling to for people to watch a kind hearted idiot struggle with this with this form maybe that's what what's compelling but in terms of like actual being a good engineer of human robot interaction systems I think I'm good but it's hard to know until you do it and then the world keeps you going to do it. And then the world keeps telling you you're not and it's just full of doubt it's really hard and I've been struggling with that recently it's kind of a fascinating struggle but then that's where the Goggins thing comes in is like aside from the stay hard motherfucker is the like whenever you're struggling that's a good sign that if you keep going that you're going to be alone in the success right like well in your case however I agree and actually David had a post recently that I thought was among his many brilliant post was one of the more brilliant about how you know he talked about this myth of the light at the end of the tunnel and instead what he replaced that myth with was a concept that eventually your eyes adapt to the dark at that the tunnel it's not about a light at the end that it's really about adapting to the dark of the tunnel is very Goggins I love him so much. Yeah you guys share a lot in common knowing you both a bit you know share a lot in common but in this loneliness and the and the pursuit of this dream it seems to me it has a certain component to it that is extremely valuable which is that the loneliness itself could serve as a driver to build the companion for the journey. Very deeply aware of that so like some people can make because I talk about love a lot I really love everything in this world and but also love humans friendship and romantic you know like even the cheesy stuff. You like romantic movies yeah I'm sure that's why got so much from Rogan about like was that the tango scene from a sent of a woman but you find like a one there's nothing better than a woman in a red dress like a you know just like classy you should move to argentina my father's Argentine and you know what he said when I when I went on your podcast for the first time he said. He dress as well because in argentina the men go to a wedding or a party or something you know in the US they by halfway through the night ten minutes and night all the jackets are off looks like everyone's addressing for the party they just got dressed up for. And he said and he said you know I like the way he dresses and then when I start he was talking about you and then when when I start my podcast he said why don't you wear a real suit like your friend Lex. But let's talk about this this pursuit just a bit more because I think what you're talking about is is building a not just a solution for loneliness but you've alluded to the loneliness as itself an important thing and I think you're right I think within people there is a caverns of thoughts and shame but also just the desire to be to have resonance to be seen and how you're going to be a woman. To be seen and heard and I don't even know that it's seen and heard through language but these reservoirs are of loneliness I think. They're well they're interesting maybe you could comment a little bit about it because just as often as you talk about love I'm quantified it but it seems that you talk about this loneliness maybe just what if you're willing you could you share a little bit more about that and what what that feels like now in the pursuit of building. This robot human relationship you've been let me be direct you've been spending a lot of time on building a robot human relationship where's that at. Oh you in terms of business in terms of systems I'm talking about a specific robot oh rope so okay I should I should mention a few things so one is there's a start up with there's idea where I hope millions of people can use. And then there's my own personal like almost like Frankenstein explorations with particular robots so I'm very fascinated with the lagged robots in my own. And then a private sounds like dark but like it one end of one experiments to see if I can recreate the magic and that's been a lot of really good already perceptual systems and control systems that are able to communicate affection in a dog like fashion so I'm in a really good place there the stumbling blocks which also been part of my sadness recently is that I also have to work with robotics. And then I work with robotics companies that you know I gave so much of my heart so love and appreciation towards Boston dynamics but Boston dynamics is also you know as a company that has to make a lot of money and they have marketing teams and they're like looking at this silly Russian kid in a suit and tie like what's he trying to do with all this love and robot interaction and dancing so on so there was a I think. And I say for now it's like when you break up with a girlfriend or something right now we decided to part ways on this particular thing they're huge supporters of mine the huge fans but on this particular thing Boston dynamics is not focusing on or interested in human robot interaction in fact they're a whole business currently is keep the robot as far away from humans as possible. Because it's in the industrial setting where it's doing monitoring in dangerous environments it's almost like a remote security camera essentially is its application. To me I thought it's still even those applications exceptionally useful for the robot to be able to perceive humans like see humans and to be able to in a big map localized with those humans are and have human intention for example like this I did this a lot of work. Pedestrians for robot to be able to anticipate what the hell the human is doing like where it's walking if you're humans are not ballistic object they're not just because you're walking this way one moment doesn't mean you'll keep walking that direction you have to in for a lot of signals especially the head movement and the movement so I thought that's super interesting to explore but they didn't feel that so I'll be working with a few other robotics companies that are much more open to that kind of stuff and they're super excited and fans of mine hopefully Boston dynamics my first love. They're getting back with the next girlfriend will come around but so the algorithmically it's I'm basically done there the rest is actually getting some of these companies to work with and then there's a for people who work with robots know that one thing is to write software that works and the other is to have a real machine that actually works and it breaks down all kinds of different ways that are fascinating and so that there's a big challenge there but that's almost it may sound a little bit confusing in the context of our previous discussion because the previous discussion was more about the big dream how I hoped to have millions of people enjoy this moment of magic the current discussion about a robot is something I personally really enjoy just brings me happiness I really try to do now everything that just brings me joy maximize that because robots are awesome but to give my little bit growing platform I want to use the opportunity to educate people it's just like robots are cool and if I think they're cool I'll be able to I hope be able to communicate why they're cool to others so the this little robot experiment is a little bit of research project to there's a couple of publications with MIT folks around that but the the others just to make some cool videos and explain to people how they actually work and as opposed to people being scared of robots they can be they can still be scared but also excited they see the dark side the beautiful side the magic of what it means to bring you know for a machine to become a robot I want to inspire people with that but that's less it's interesting because I think the big impact in terms of the dream does not have to do with embodied AI so it does not need to have a body I think the refrigerators enough that that for an AI system just to have a voice and to hear you that's enough for loneliness the embodiment is just the body when you meet the physical structure physical instantiation of intelligence so it's a Lego robot or even just the thing I have a few other humanoid robot little human robot me like you from on the table just walks around or even just like a mobile platform they can just like turn around and look at you say we mentioned with the pen something that moves and can look at you. It's like that butter robot that asks what is my purpose that that is really it's almost like art there's something about a physical entity that moves around that's able to look at you and interact with you that makes you wonder what it means to be human it like challenges you to think if I if that thing looks like he has consciousness what the hell am I and I like that feeling I think that's really useful for us it's humbling for us humans but that's less about research certainly less about business and more about exploring our own our own cells and challenging others to think like to to to think about what makes them human. I love this desire to share the delight of an interaction with a robot and as you describe it I actually I find myself starting to crave that because we all have those elements from childhood where or from adulthood where we experience something we want other people to feel that and I think that you're right I think a lot of people are scared of AI I think a lot of people are scared of robots my only experience and of a robotic like thing is my room of vacuum where it goes about actually was pretty good at picking up Costello's hair when he was shed and then and I was grateful for it but then when it would when I was on a call or something and it would get caught on a on a wire or something I would find myself getting upset with the room but in that moment I'm like what are you doing you know and I and obviously it's just doing what it does but but that's a kind of mostly positive but slightly negative interaction but what you're describing has so much more richness and layers of detail that I can only imagine what those relationships are like or like there's a few just a quick comment so I've had there currently Boston that I have a bunch of Roombas for my robot and I did this experiment wait how many Roombas I'll look a fleet of Roombas yeah so I probably seven or eight a lot of Roombas so this place is very clean well so this I'm kind of waiting this this is the place we're currently in in Austin is way larger than I need but it's I basically got it so to make sure I have room for robots so you're going to so you have these seven or so Roombas you deploy all seven at once oh no I do different experience with them a different experiments with them so one of the things I want to mention is this is a I think there was a YouTube video that inspired me to try this is I got them to the screen in pain and moan in pain whenever they were kicked or contacted and I did that experiment to see how I would feel I meant to do like a YouTube video on it but then it just seemed very cruel did any Roomba rights activists come out of the way that like I think if I release that video I think is going to make me look insane which I know people know I'm already insane now you now you have to release the video I think maybe if I contextualize it by showing other robots like to show why this is fascinating because ultimately I felt like they were human almost immediately and that display of pain was what did that giving them a voice given them a voice especially a voice of this like of pain I have to connect you to my friend Eddie Chang he studies speech and language he's a neurosurgeon and or lifelong friends he study speech and language but he describes some of these more primitive visceral vocalizations of cries, groans, moans of delight other sounds as well, user imagination as such powerful rudders for the other for the emotions of other people I can't wait to see this video is that so is the video available online no I haven't recorded it I just hit a bunch of Roombas that are able to scream and pain in my Boston place so I like people are ready next next podcast episode with Lex maybe we'll have that one you know the thing is like people I have noticed because I talk so much about love and it's really who I am I think they want to it to a lot of people seems like there's there's there got to be a dark person in there somewhere and I thought if I release videos and Roombas screaming and they're like yep yeah that guy is definitely insane what about like a shout so Glee and delight you could do that too right well I don't know how I don't how to do me delight is quiet right I got your Russian I don't I'm wearing too much Americans are much louder than Russians yeah yeah yeah but I don't I mean unless you're talking about like I don't know how you would have sexual relations with the Roomba I wasn't necessarily saying sexual delight but trust me I tried that's a joke internet joke internet okay but I was fascinating the psychology of how little it took because you mentioned you had a negative relationship with the Roomba only in well I find that mostly I took it for granted yeah it just served me it collected cost it was hair and then when it would do something I didn't like I would get upset with it so that's not a good relationship it was taking for granted and I would get that and then I'd park it again and I just like you're you're in the in the corner yeah but there's a way to frame it's it being quite dumb as almost cute you know you almost connecting with it for its dumbness and I think that's an artificial intelligence problem I think flaws are should be a feature not a bug so along the lines of this the different sorts of relationships that one could have with robots and the fear but also that some of the positive relationships that one could have there's so much dimensionality there's so much to explore but power dynamics in relationships are very interesting because the obvious ones that the unsophisticated view of this is you know one there's a master in a servant right but there's also manipulation there's benevolent manipulation you know children do this with parents puppies do this puppies turn their head and look cute and maybe give out a little little noise kids coup and parents always think that they're you know they're doing this because you know they they love the parent but in many ways studies show that those coups are ways to extract the sorts of behaviors and expressions from the parents that they want the child doesn't know that it's completely subconscious but it's benevolent manipulation so there's one version of fear of robots that I hear a lot about that I think most people can relate to where the robots take over and they become the masters and we become the servants but there could be another version that you know in certain communities that I'm certainly not a part of but they call topping from the bottom where the robot is actually manipulating you into doing things but it you are under the belief that you are in charge but actually they're in charge and so I think that's one that if we could explore that for a second you could imagine it wouldn't necessarily be bad although it could lead to bad things the reason I want to explore this is I think people always default to the extreme like the robots take over and we're in little jail cells and they're out having fun and they're not just a lot of people who are in the universe what what what sorts of manipulation kind of robot potentially carry out good or bad yeah just so there's a lot of good and bad manipulation between humans right just like you said to me especially like you said topping from the bottom is that the term so I think someone from MIT told me that term I think so first of all there's power dynamics in bed and power dynamics in relationships and power dynamics on the street and in the work environment those are all very different I think I think power dynamics can make human relationships especially romantic romantic relationships fascinating and rich and fulfilling and exciting and all those kinds of things so I don't I don't think in themselves they're bad and same goes with robots I really love the idea that a robot would be a top or bottom in terms of like power dynamics and I think everybody should be aware of that and the manipulation is not so much manipulation but a dance of like pulling away push and pull all those kinds of things in terms of control I think we're very very very very far away from AI systems they're able to lock us up they to lock us up in it you know like to have so much control that we basically cannot live our lives in the way that we want I think there's in terms of dangers of AI systems there's much more dangers that have to do with autonomous weapon systems and all those kinds of things so the power dynamics as exercised in the struggle between nations and war and all those kinds of things but in terms of personal relationships I think power dynamics are a beautiful thing now there's of course going to be all those kinds of discussions about the consent and rights and all those kinds of well here we're talking about I always say you know any discussion around this if we need to define really the context it's always we should be consensual age appropriate context appropriate species appropriate but now we're talking about human robot interactions and so I guess that no I I would actually was trying to make a different point which is I do believe that robots will have rights down the line and I think in order for in order for us to have deep meaning for relationship with robots we would have to consider them as entities in themselves that deserve respect and that's a really interesting concept that I think people are starting to talk about a little bit more but it's very difficult for us to understand how entities that are other than human I mean the same is with dogs and other animals can have rights on a level of humans well that yeah I mean that we we can't and nor should we do whatever we want with animals we have a USDA with the way of departments of of agriculture that deal with you know animal care and use committees for research for agrib you know for farming and ranching and all that so I I while it when you first said it I thought wait why would have there be a bill of robotic rights but it absolutely make sense in the context of everything we've been talking about up until now it let's if you're willing I'd love to talk about dogs because you've mentioned dogs a couple times a robot dog you had a biological dog yeah yeah I had a newfoundland named Homer for many years growing up in Russia in the US in the United States and he was about his over 200 pounds that's a big dog that's a big dog if people know people know newfoundland so he's this black dog that's really long hair and just a kind so I think perhaps that's true for a lot of large dogs but he thought he was a small dog so he moved like that and was he your dog yeah yeah yeah to you had him since he was fairly young office since yes since the very very beginning to the very very and and one of the things I mean he had this kind of we mentioned like the Roombas he had a kind hearted dumbness about him that was just overwhelmed he's part of the reason I named him Homer because this after Homer Simpson in case people are wondering which Homer I'm referring to I'm not you know so that there's a plot of see that exactly there's a clumsiness that was just something that immediately led to a deep love for each other and one of the I mean he was always it's a shared moment he was always there for so many nights together that's a powerful thing about a dog that he was there throw all the loneliness throw all the tough times through the successes and all those kinds of things and I remember I mean that was a really moving moment for me I still miss him to this day how long ago did he do maybe 15 years ago so it's been a while but it was the first time I've really experienced like the feeling of death is so what happened is he he got cancer and so he was dying slowly and then the certain point he couldn't get up anymore there's a lot of things I could say here you know that I struggle with that maybe maybe he suffered much longer than he needed to that's something I really think about a lot but I remember what I had to take him to the hospital and the nurses couldn't carry him right so you talk about 200 pound dog I was really into power lifting at the time I remember like they they tried to take him to the hospital like they they tried to figure out all these kinds of ways to so in order to put him to sleep that to take him into a room and so I had to carry him everywhere and here's this dying friend of mine that I just had to first of all it's really difficult to carry somebody that heavy when they're not helping you out and yeah so I remember was the first time seeing a friend laying there and seeing wife drain from his body and that realization that we're here for a short time was made so real that here's a friend that was there for me the week before the day before and now he's gone and that was I don't know that that spoke to the fact that he could be deeply connected with the dog also spoke to the fact that the the shared moments together that led to that deep friendship is our will make life so amazing but also spoke to the fact that death is a motherfucker so I know you've lost Castello recently yeah and you've been going and as you're saying this I'm definitely fighting back the tears I am thank you for sharing that that I guess we're about to both cry over our dead dogs that it was it was bound to happen just given when this is when this is happening yeah it's a how long how long did you know that Castello is not doing well well let's see a year ago during the start of about six months into the pandemic I he started getting abscesses and he was not his behavior change and something really changed and then I put him on testosterone because which helped a lot of things it certainly didn't cure everything but it helped a lot of things he was dealing with joint pain sleep issues and then it just became a very slow decline to the point where you know two three weeks ago he had you know eight closet full of medication I mean this dog was yeah it was like a pharmacy it's amazing when I looked at it the other day still been cleaned up and removed all his things because they can't quite bring myself to do it but did you think he was suffering well so what happened was about a week ago it was really just about a week it's amazing he was going up the stairs I saw him slip he was a big dog he wasn't 200 pounds he was about 90 pounds he's a bulldog that's pretty big and he was fit and then I noticed that he wasn't carrying the foot in the back like it was injured it had no feeling at all he never liked me to touch his hind paws and I could do that thing was just flopping there and then the vet found some spinal degeneration and I was told that the next one would go did he suffer sure hope not but something changed in his eyes yeah it's the eyes again I know you and I spend long hours on the phone and talking about like the eyes and how what they convey and what they mean about internal states and for sake of robots and biology of other kinds but you think something about him was gone in his eyes I I think he was real here I am anthropomorphizing I think he was realizing that one of his great joys in life which was to walk and sniff and pee on things this dog the fundamental loved to pee on things is amazing I wondered where he put it he was like a reservoir of urine it was incredible I think oh that's it he's just he put like one drop on the 50 millionth plant and then we get to the 50 millionth and one plant and he just have you know leave a puddle and here I am talking about Costello peeing he was losing that ability to stand up and do that he was falling down while he was doing that and I do think he started to realize and the the passage was easy and peaceful but you know I'll say this I'm not ashamed to say it I mean I wake up every morning since then just I don't even make the conscious decision to allow myself to cry I wake up crying and I'm fortunately able to make it through the day thanks to the great support of my friends and you and my family but I miss him yeah I miss him and I feel like he you know Homer Costello you know the relationship to once all you're so specific but so that that party is gone that's the hard thing you know what's what what I think is different is that I made the mistake I think I hope it was a good decision but sometimes I think I made the mistake of I brought Costello a little bit to the world through the podcast I gave I answer for more fizzed about him in public let's be honest I have no idea what his mental life was or his relationship to me and I'm just exploring all this for the first time because he was my first dog but I raised him since he was seven weeks yeah you got to hold it together I noticed the episode you released on Monday you mentioned Costello like you brought him back to life for me for that brief moment yeah but he's he's he's going well that's the he's going to be gone for a lot of people too well this is what I'm struggling with I think that maybe you're pretty good at this like have you done this before this is the challenge is I actually part of me I know how to take care of myself pretty well yeah not perfectly but pretty well and I have good support I do worry a little bit about how it's going to land and how people will feel I'm concerned about their internalization so that's something I'm still I'm still iterating you have to they have to watch you struggle with just facet right and I've mostly been shielding them from this but what would make me happiest if is if people would internalize some of Costello's best traits and his best traits were that he was incredibly tough I mean he was a you know 22 inch neck bulldog the whole thing he was just born that way but was what was so beautiful is that his toughness is never what he rolled forward it was just out sweet and kind he was and so if people can take that then then there's a win in their someplace so I think there's some ways in which he should probably live on in your podcast too you should I mean it's such a one of the things I loved about his role in your podcast is that he brought so much joy to you mentioned the robots right I think that's such a powerful thing to bring that joy into like allowing yourself to experience that joy to bring that joy to others to share with others that's really powerful and I mean not to this is this is like the Russian thing is it touched me when Louis CK had that moment that I keep thinking about in this show Louis where like an old man was criticizing Louis for about breaking up with his girlfriend and you're saying like the most the most beautiful thing about love the song that's catching out that's not making me feel horrible saying it but like is the loss the loss really also is making you realize how much that person that dog meant to you and like allowing yourself to feel that loss and not run away from that loss is really powerful and in some ways that's also sweet just like the love was the loss is also sweet because you know that you felt a lot for that you know for your friend so I you know and I continue bringing that joy I think it would be amazing to the podcast I hope to do the same with with robots or whatever else is the source of joy right and maybe you think about one day getting another dog yeah in time you're hitting on all the key buttons here I want that to we're thinking about you know ways to kind of immortalize Costello in a way that's real not just you know creating some little logo or something silly you know Costello much like David Goggins is a person but it Goggins also has grown into kind of a verb you're going to Goggins this or you're and there's an adjective like that's extreme like it I think that for me Costello was all those things he was a he was a being he was his own being he was a noun a verb and an adjective so and yet this amazing super power that I wish I could get which is this ability to get everyone else to do things for you without doing a damn thing the Costello effect is an idea I hope he lives on yes thank you for that this actually has been very therapeutic for me. Which would you actually brings me to a question we're friends we're not just a co-scientist colleagues working on a project together and and in the world that's somewhat similar just two two dogs just two dogs basically but let's talk about friendship because I think that I certainly know as a scientist that there are elements that are very lonely of the scientific pursuit there are elements of many pursuits that are lonely music math always seem to me like they're like the loneliest people who knows if that's true or not also people work in teams and sometimes people are surrounded by people interact with people and they feel very lonely but for me and I think as well for you friendship is an incredibly strong force in making one feel like certain things are possible or worth reaching for maybe even making us compulsively reach for them so when you were growing up you grew up in Russia until what age 13 and then and then you moved directly to Philadelphia to Chicago Chicago and then Philadelphia you know and San Francisco and Boston and so on but really the Chicago that's why I went to high school do you have siblings brother older brother but most people don't know that yeah he is a very different very different person but somebody I definitely look up to so he's a wild man he's extrovert he's he was into mean so he's also scientists of our engineer but he's when we were growing up and he was the person who you know did drank and did every drug and but also was the life of the party and I just thought he was the you know when you're older brother five years older he was the coolest person that you know I always wanted to be him so to that he was he definitely had a big influence but I think for me in terms of friendship growing up I had I had one really close friend and then when I came here at another close friend but I'm very I believe I don't know if I believe but I draw a lot of strength from deep connections with with other people and just a small number of people just a really small number of people that's when I moved to this country I was really surprised how like there these these large groups of friends quote unquote but they the depth of connection was not there at all from my sort of perspective now I moved to the suburb of Chicago was Naperville it's more like a middle class maybe upper middle class so it's like people that cared more about material possessions than deep human connection so that added to the thing but I I draw more meaning than almost anything else was from friendship early on at a best friend his name was his name is Yura I don't know how to say it in English how do you say in Russian Yura what's it last time do you remember that you're a miracle of Yura Mirkov so we just spend all our time together there's there's also a there's also a group of friends like I don't know it's like eight guys in Russia growing up it's like parents didn't care if you're coming back at certain hour so we spend all day all night displaying soccer is usually called football and just talking about life and all those kinds of things even at that young age that I think people in Russia and Soviet Union grow up much quicker I think the education system at the university level is world class in the United States in terms of like really creating really big powerful minds at least he used to be but I think that they aspire to that but the education system for like for younger kids in the Soviet Union was incredible like they did not treat us as kids we the level of literature does the Lasky when you were pushed a small child yeah that's your in like Matt the level of mathematics and you're made to feel like shit if you're not good at mathematics like we I think in this country there's more like especially young kids because they're so cute like they're being babyed we only start to really push adults later in life like so if you want to be the best in the world that this then you get to be pushed but we were pushed at a young age everybody was pushed and I brought out the best in people I think they really forced people to discover like discover themselves in the Goggin style but also discover what they're actually passionate about what they're not true for boys and girls where they pushed equally there yeah they were pushed yeah they were pushed equally I would say there was obviously there was more not actually but there at least for my memories more of what's the right way to put it but there was like gender roles but not in a negative connotation it was it was the red dress versus the suit and tie kind of connotation which is like there's you know like guys like lifting heavy things and girls like creating beautiful art and you know like there's a more traditional view yeah more 1950s 60s but we didn't think in terms of at least at that age in terms of like roles and then like home maker or something like that or no it was more about what people care about like girls cared about this set of things and guys cared about this set of things I think mathematics and engineering was something that guys cared about and sort of at least my perception of that time and then girls create about girls cared about beauty so like guys want to create machines girls want to create beautiful stuff and now of course that I don't take that forward in some kind of philosophy of life but just the way I grew up in the way I remember it but all everyone worked hard the value of hard work was instilled in everybody and through that I think it's like a little bit of hardship of course also economically everybody was poor especially with the collapse of the Soviet union there's poverty everywhere you didn't notice it as much but there was a because there's not much material possessions there was a huge value placed on human connection just meeting with neighbors everybody knew each other we lived in an apartment building very different than you have in the United States these days everybody knew each other you know you get together drink vodka smoked cigarettes and play guitar and sing sad songs about life what's it was with the sad songs and the Russian thing I mean I Russians that do express joy from time yeah I'm certainly you do but what do you think that's about is it because it's cold there but it's cold other places too I think this is the first of all the Soviet Union the echoes of World War II and the millions and millions and millions of people the civilians that were slaughtered and also starvation is there right so like the echoes of that of the ideas the literature the art is there like that's grandparents that's parents that's all there so that contributes to it that life can be absurdly unexplainably cruel at any moment everything can change so that's in there then I think there's an empowering aspect to finding beauty and suffering then everything else is beautiful too like if you just linger it's like why you meditate on death is like if you just think about the worst possible case and find beauty and that then everything else beautiful too and so you write songs about the dark stuff and that somehow helps you deal with whatever comes there there's a hopelessness to the Soviet Union that like you know inflation all those kinds of things people or sold dreams and never delivered and so like there's a there's a if you don't sing songs about sad things you're going to become cynical about this world so they don't want to give into cynicism now a lot of people did you know one of the but that it's the battle against cynicism one of the things that maybe common in Russia is a kind of cynicism about like if I told you the thing I said earlier about dreaming about robots is very common for people to dismiss that dream of saying now that's not that's too wild like who else do you know that that or you want to start a podcast like who else like nobody's making money on podcasts like why do you want to start a podcast that kind of mindset I think is quite common which is why I would say entrepreneurship in Russia is still not very good which to be a business like to be an entrepreneur you have to dream big and you have to have others around you like friends and support group that makes you make you dream big but if you don't give into cynicism and appreciate the beauty in the the unfairness of life the absurd unfairness of life then I think it just makes makes you appreciative of everything it's like a it's a prerequisite for gratitude so yeah I think that instilled in me ability to appreciate everything just like everything everything is amazing and then also there's a culture of romantic of like romantic sizing everything it's almost like the romantic relationships were were very like soap opera like is very like over the top dramatic and I think I think that wasn't still to me too not only do I appreciate everything about life but I get like emotional about it in a sense like I get like a visceral feeling of joy for everything and same with friends or people of the opposite sex like there's a deep like emotional connection there that like that's like way too dramatic to like I guess relative to what the actual moment is but I derive so much deep like dramatic joy from so many things in life and I think I would attribute that to the upbringing of Russia but the thing that sticks most of all is the friendship and have now since then had one other friend like that in the United States he lives in Chicago his name is Matt and slowly here and there accumulating really fascinating people but I'm very selective with that funny enough the few times you know it's not few it's a lot of times now interacting with Joe Rogan it sounds so real to say but there was a kindred spirit there like I've connected with him and there's been people like that also in the grappling sports that are really connected with I've actually struggled which is why I'm so I'm so glad to be your friend is a struggle to connect with scientists they can be a little bit wooden sometimes yeah even the biologist I mean one thing that I'm so struck by the fact that you know you work with robots you're an engineer AI you know science technology and that all sounds like hardware right but what you're describing and I know is true about you is this deep emotional life and this resonance and it's really wonderful I actually think it's one of the reasons why so many people scientists and otherwise have gravitated towards you and your podcast is because you hold both elements you know in the Herman Hess's book I don't know if you're at Narcissus in Goldman right it's about these elements of the logical rational mind and the the emotional mind and how those are woven together and if people haven't read it they should and you embody the full picture and I think that's so much of what draws people to you I read every Herman Hess said as usual as usual I've done about 90% of what life says it no it's true you you mentioned Joe who is a phenomenal human being not just for his amazing accomplishments but for how he shows up to the world one on one I think I heard him say the other day on an interview he said there is no public or private version of him he's like this is this is me he said the word it was beautiful he said I'm like the fish that got through the net you know there is no on stage off stage version you're absolutely right and I so that's a good point about public and private life he's a huge if I can just comment like that he was a I've been a fan of Joe for a long time but he's been in inspiration to not have any difference between public and private life and he had a conversation with Naval about this and he said that you can't have a rich life like an exciting life if you're the same person publicly and privately and I think I understand that idea but I don't agree with it I think it's really fulfilling and exciting to be the same person privately and publicly with very few exceptions now that said I don't have any really strange sex kinks so like I feel like can be open with basically everything I don't have anything I'm ashamed of you know there's some things that could be perceived poorly like the screaming I mean I'm not ashamed of them I just present them in the right context but there is a there's freedom to be in the same person in private is in public and that Joe made me realize that you can you can be that and also to be kind to others it sounds it sounds kind of absurd but I really I really always enjoyed like being good to others like just being kind towards others but I always felt like the world didn't want me to be like there's so much negativity when I was growing up like just around people if you actually just notice how people talk about the weather this could be just like the big cities that I visited but there's a general negativity and positivity is kind of suppressed you're not one you're not seen as very intelligent and to there's a kind of you're seen as like a little bit of a weirdo and so I always felt like I had to hide that and what Joe made me realize one I have I could be fully just the same person private in public and two I can embrace being kind and just in the way that I like in the way I know how to do and sort of for me I'm like I'm Twitter or like publicly whatever I say stuff that means saying stuff simply almost to the point of cliche and like I have the strength now to say it even if I'm being mocked you know what I mean like just it's okay if everything's going to be okay okay some people think you're dumb they're probably right the point is like just enjoy being yourself and that Joe more than almost anybody else because he's so successful at it inspired me to do that be kind and be the same person private in public and I love the idea that authenticity doesn't have to be over sharing right that it doesn't mean you reveal every detail of your life what you know it's a way of being true to an essence of oneself right you're not there's never a feeling when you deeply think in an introspect that you're hiding something from the world or you being dishonest and some fun the month away so yeah that that that's truly liberating it allows you to think it allows you to like think freely to speak freely to just to be freely that said it's not like you know it's not like there's not still a responsibility to be the best version of yourself so you know very careful with the way I say something so the whole point it's not so simple to express the spirit that's inside you with words it depends I mean some people much better than others I struggle like oftentimes when I say something and I hear myself say it sounds really dumb and not at all what I meant so that's the responsibility you have it's not just like being the same person publicly privately means you can just say whatever the hell it means there's still a responsibility to try to be to express who you truly are and that's hard it is hard and I think that you know so we have this pressure all people when I say we I mean all humans maybe robots too feel this pressure to be able to express ourselves in that one moment in that one form and it is beautiful when somebody for instance can capture some essence of love or sadness or anger or something in a song or in a poem or in a short quote but perhaps it's also possible to do it in aggregate you know all all the things you know how you show up your for instance one of the things that initially drew me to wanting it to know you as a human being and a scientist and eventually we became friends was the level of respect that you brought to your podcast listeners by wearing a suit yeah I'm being serious here you know I think I was raised thinking that if you overdress a little bit overdressed by American certainly by American standards you're overdressed for a podcast but this is but it's genuine you're not doing it for any reason except I have to assume and I assumed at the time that it was because you have a respect for your audience you respect them enough to show up a certain way for them it's for you also but it's for them yeah and I think between that and your commitment to your friendship the way that you talk about friendships and love and the way you hold up these higher ideals I think at least as a consumer of your content and as your friend I what I find is that in aggregate you're communicating who you are it doesn't have to be one quote or something and I think that you know we were sort of obsessed by like the one Einstein quote or the one line of poetry or something but it's the I think you so embody the way that and Joe as well it's about how you live your life and how you show up as a collection of things and said and done yeah that's that's fast so the aggregate is is the goal the the tricky thing and Jordan Peterson talks about this because he's under attack way more than you and I will ever be but that for now right this is very true for now that the people who attack on the internet this is one of the problems with Twitter is they don't consider the aggregate they they take a single statements and so one of the defense mechanisms again why Joe has been in inspiration is that when you in aggregate are good person a lot of people will know that and so that makes you much more immune to the attacks of people that bring out an individual statement that might be a misstatement of some kind or doesn't express who you are and so that I like that idea is the aggregate and the the power of the podcast is you have hundreds of hours out there and being yourself and people get to know who you are and once they do and you and you post pictures of screaming Roombas as you kick them they will understand that you don't mean well by the way is a side comment I don't know if I want to release this because it's not just the Roombas you have a whole dungeon of robots okay so this is the this is a problem this boss of dynamics came up against this problem but let me just let me work this like workshop this out with you and maybe because we'll post this people let me know so there's legate robots you know they look like a dog they have a very I'm trying to create a very real human robot connection but like they're also incredible because you can throw them like off of a building and they'll land fine and this beautiful amazing I've seen the Instagram videos of like cats getting jumping off of like fifth story buildings and then walking away no one should throw their cat out of the way this is the problem I'm experiencing all certainly kicking the robots it's really fascinating how they recover from those kicks but like just seeing myself do it and also seeing others do it it just does not look good and I don't know what to do with that because I it's such a I see but you know I you because you at robots now I'm getting now now I'm you know it's interesting yeah before today's conversation I probably could do it and now I think I'm thinking about robots bills of rights and things I'm actually and not not for any not to satisfy you or to satisfy anything except that if I if they have some centiant aspect to their being then I would load to kick I don't think you'll be able to kick it you might be able to kick the first time but not the second this this the problem of experience one of the cool things is one of the robots I'm working with you can pick it up by one leg and is dangling you can throw it in any kind of way and a land correctly so it's really I'm a friend who had a cat like that we look forward to the letters from the cat oh no I'm not suggesting anyone did that but his he had this cat and the cat he would just you know throw it on to the bed from across the room and then it would run back for more somehow they had that was the nature of the relationship I think no one should do that to an animal but a pair this cat seem to you know return for for whatever the robots the robot is fascinating to me how hard it is for me to do that so it's unfortunate but I don't think I can do that to a robot like I struggle with that I so for me to be able to do that with a robot I have to almost get like into the state that I imagine like doctors get into when they're doing surgery like I have to start have to do what robotics colleagues of mine do which is like start seeing it as an object associated like dissociate so it was just fascinating that I have to do that in order to do that with the robot I just wanted to take that little bit of a tangent no I think it's an important thing I mean I'm not I'm not shy about the fact that for many years I've worked on experimental animals and that's been a very challenging aspect to being a biologist mostly mice but in the past no longer thank goodness because I just don't like doing it larger animals as well and now I work on humans which I can give consent verbal consent so I think that it's extremely important to have an understanding of what the guidelines are and where one's own boundaries around this it's it's it's not just an important question it might be the most important question before any work can progress so you you asked me about friendship I know you have a lot of thoughts about friendship what do you think is the value of friendship in life well for me personally just because of my light my life trajectory and arc friendship and I should say I do have some female friends that are just friends that completely platonic relationships but it's been mostly male friendship to me has been has been all male friendships me actually interesting it's been an absolute life line they are my family I have a biological family and I have great respect and love for them and appreciation for them but it it provide it's provided me the I wouldn't even say confidence because there's always an anxiety and taking any good risk or any risk we're taking it's given me the sense that I should go for certain things and try certain things to take rest to to weather that anxiety and I I don't consider myself a particularly competitive person but I would sooner die than disappoint or let down one of my friends I can think of nothing worse actually than disappointing one of my my friends everything else is secondary to me what disappointment disappointing meaning not I mean certainly I strive always to show up as best I can for the friendship and that can be in small ways it I can mean you know making sure the phone is away sometimes it's about I'm terrible with punctuality because I'm an academic and so I just get lost in time and I don't mean anything but you're striving to to listen to to enjoy good times and to make time you know it kind of goes back to this first variable we talked about to make sure that I spend time and to get time in person and check in and it's I think there's so many ways in which friendship is vital to me it's it's actually to me what makes life worth living yeah well there's a I am surprised like with the high school friends how we don't actually talk that often these days in terms of time but every time we see each other it's immediately right back to where we started so I you know I struggle with that how much time you really allocate for the for the friendship to be deeply meaningful because they're just they're always there with me even if we don't talk often so there's a kind of loyalty I think maybe it's a different style but I think I'm much more to me friendship is being there in the hard times I think like I I'm much more reliable when you're going through shit than like you're reliable anyway no but if like you're if you're like like a wedding or something like that or like I don't know I don't know like you want an award of some kind like yeah I'll congratulate the the shit out of you but like that's not and I'll be there but that's not as important to me as being there when like nobody else is like just being there when should get shit hits the fan or something stuff where the world turns their back and you all those kinds of things that to me that's what friendship is meaningful well I know that to be true about you and that's a felt thing and a real thing with you let me ask one more thing about that actually because I'm not a practitioner of jujitsu I know you are Joe is but a years ago I read a book that I really enjoyed which is Sam Sheridan's book a fighter's heart he talks about all these different forms of martial arts and and maybe it was in the book maybe it was in an interview but he said that you know fighting or being in physical battle with somebody jujitsu boxing or some other form of physical direct physical contact between two individuals creates this bond unlike any other because he said it's it's like a one night stand you're sharing bodily fluids with somebody that you barely know yeah and I you know it and I chuckled about it because it's it's kind of funny and kind of tongue in cheek but at the same time I think this is a fundamental way in which members of a species bond is through physical contact and certainly there are other forms there's cuddling and there's hand holding and there's and there's sexual intercourse and there's all sorts of what's cuddling I haven't heard of it I heard this recently I didn't know this term but there's a term they've turned the noun cupcake into a verb cupcake it turns out I just learned about this cupcake is when you spend time just cuddling I didn't know about this you heard it here first although I heard it first just the other day cupcake is actually a cuddling is everything it's not just like is it embed or is that in the college like what's cuddling I do look up a cuddling we need to look at the stuff and we need to define the variables I think it definitely has to do with physical contact I even told but but in terms of battle competition and you know and the Sheridan quote I'm just curious so do you get close or feel a bond with people that for instance you roll jujitsu with or even though you don't know anything else about them is he it was he right about this yeah I mean I'm many levels he also has the book what a fighter's mind yeah that was the one he's actually an excellent writer what's interesting about him just briefly about Sheridan I don't know but I did a little bit of research he he went to Harvard his art major at Harvard he claims all he did was smoke cigarettes and do art I don't know if his art was any good yeah and and I think his father was in the steel teams and then when he got out of Harvard graduated he took off around the world learning all the forms of martial arts and was early to the kind of ultimate fighting kind of mixed martial arts and things great great book yeah it's amazing I don't actually remember it but I read it and I remember thinking there was an amazing encapsulation of what makes fighting the like the art like what makes it compelling I would say that there's so many ways that jiu jitsu grappling wrestling combat sports in general is like one of the most intimate things you can do I don't know if I would describe in terms of bodily liquids and all those kinds of things I think it was more or less joking but I think there's a few ways that it does that so one because you're so vulnerable so that the honesty of stepping on the mat and often all of us have ego thinking we're better than we are at this particular art and then the honesty of being submitted or being worse than you thought you are and just sitting with that knowledge that kind of honesty we don't get to experience it in most of daily life we can continue living somewhat of an illusion of our conceptions of ourselves because people are not going to hit us with the reality the mat speaks only the truth that the reality just hits you and that vulnerability is the same as like the loss of a love dwindle it's the loss of a reality that you knew before you now have to do this new reality when you're sitting there in that vulnerability and there's these other people that are also sitting in that vulnerability you get to really connect like fuck I'm not as special as I thought I was and life is like not you know life is harsher than I thought I was and we're just sitting there with that reality some of us can put words to them so I think that definitely is the thing that leads to intimacy the other thing is is the human contact there is something about I mean like a big hug like during COVID very few people hug me and I hug them and I always felt good when they did like we're all tested and especially now we're vaccinated but there's still people this is true San Francisco is a stream Boston they want to keep not only six feet away but stay at home and never touch you that that was that loss of basic humanity is the opposite of what I feel in jiu jitsu where it was like that that contact where you're like I don't give a shit about whatever rules were supposed to have in society where you're not you have to keep a distance and all that kind of stuff just the hug like that that the intimacy of a hug that's like a good bear hug and you're like just controlling another person and also there is some kind of love communicating through just trying to break each other's arms I don't exactly understand why violence is the such a close neighbor to love but it is like well in you know in the hypothalamus the neurons that control sexual behavior but also non sexual contact are not just nearby the neurons that control aggression and fighting they are salt and pepper with those neurons it's a very interesting and you know it almost sounds kind of risque and controversial and stuff there's I'm not anthropomorphizing about what this means but in the brain those structures are interdigitated they they you can't you can't separate them except at a very fine level and here you're the way you describe it is the same as a real thing I do want to make an interesting comment again these are things that could be taken out of context but you know I one of the amazing things about Jiu Jitsu is both guys and girls train it and I was surprised so like I'm a big fan of yoga pants at the gym kind of thing it reveals the beauty of the female form but the thing is like girls are you know dressed in skin type clothes in Jiu Jitsu often and I found myself like not at all thinking like that at all with training with girls well the context is very non sexual but that that I was surprised to learn that I get when I first started Jiu Jitsu I thought wouldn't that be kind of weird to train with the opposites that like in something so intimate boys and girls men and women they they roll Jiu Jitsu together completely interesting and the the only times girls kind of try to stay away from guys I mean there's two context of course there's always going to be creeps in this world so everyone knows who you know who kind of the stay away from and the other is like there's a size disparity so girls will often try to roll with people a little bit closer weight wise but no there that's one of the things that are empowering to women that that's what they fall in love with when they start doing Jiu Jitsu is I can first of all they gain an awareness and a pride over their body which is great and then second they get especially later on start submitting big dudes like these like a a bros that come in who are all shredded and like muscular and they get to technique to exercise dominance over them and that's a powerful feeling to be you've seen women force a larger guy to tap or even choke him well I was I was dead lifting four oh boy I think it's 4.95 so I was really into powerlifting when I started Jiu Jitsu and I remember being submitted by you know I thought I walked in feeling like I'm going to be if not the greatest fighter ever at least top three so as a white belt you roll in like all happy and then you realize that as long as you're not applying too much force that you're having I remember being submitted many times by like a hundred thirty a hundred twenty-pound girls at the balanced studios in Philadelphia that a lot of incredible female Jiu Jitsu players and that's really humbling too the technique can overpower in combat pure strength and that that's the other thing that there is something about combat that's primal like that there it just feels it feels like we were born to do this like that that we have circuits in our brain that are dedicated to this kind of interaction there's no there's no question it and like that's what it felt like it wasn't that I'm learning a new skill it was like somehow I am remembering echoes of something I've learned in the past it's like hitting puberty a child before puberty has no concept of boys and girls having this attraction regardless of whether or not they're attracted to boys or girls doesn't matter at some point most people not all but certainly but most people when they hit puberty suddenly people appear differently and certain people take on a romantic or sexual interest for the very first time yeah and so it's like it's revealing a circuitry in the brain it's not like they learn that it's innate and I think when I hear the way you do it and I'm doing it and I'm rolling to you to remind me a little bit Joe was telling me recently about the first time he went hunting and he felt like it revealed a circuit that was that was in him all along but he hadn't experienced before yeah that's definitely there and and of course there's the physical activity one of the interesting things about jiu jitsu is it's one of the really strenuous exercises that you can do late into your adult life like into your 50 60 70s 80s I've when I when I came up but there's a few people in their 80s that were training and as long as you're smart as long as you practice techniques and pick your partners correctly you can do that kind of art that's waiting to life and you see getting exercise there's not many activities I find that are amenable to that so because of such a thinking game the jiu jitsu in particular is an art or technique pays off a lot so you can still maintain first of all remain injury free if you use good technique and also through good technique be able to go you know be active with people that are much much younger and so that was to me that and running out of the two activities you can kind of do late in life because to me a healthy life has exercised as the piece of the puzzle no absolutely I know I'm glad that we're on the physical component because I know that there's for you you talk before about the crossover between the physical and the intellectual and the mental and are you still running at ridiculous hours of the night for ridiculously long yeah so I'm definitely I've been running late at night here in Austin people some the area we're in now people say is a dangerous area which I find laughable coming from the bigger cities now I run late at night there's something if you see a guy running through Austin at 2 a.m. in a suit and tie it's probably well yeah I mean I do think about that because I get recognized more and more in Austin I I worry that not really that I get recognized late at night you know but there is something about the night that brings out those deep philosophical thoughts and self-reflection that really enjoy but recently I started getting back to the grind so I'm going to be competing or hoping to be compete in September and October and jujitsu and jujitsu yeah to get back to competition and so that requires getting back into great cardio shape so I've been getting running as part of my day to routine got it yeah well I always know I can reach you regardless of time zone in the middle of the night wherever that happens well part of that has to be just being single and being a programmer those those two things just don't work well in terms of a steady sleep schedule it's not bankers hours kind of work nine to five I want to you mentioned single I want to you a little bit about the other form of relationship which is romantic love so your parents are still married still married still happily married that's impressive yeah rare thing nowadays yeah so you grew up with that example yeah I guess that's a powerful thing right if there's an example that I think can work it yeah I didn't have that in my own family but when when I see it it's it's inspiring and it's and it's beautiful the fact that they have that and that was the norm for you I think is really wonderful it was in the case of my parents it was interesting to watch because there's obviously tension like there will be times what they fought and all those kinds of things they obviously get frustrated with each other and they like but they find mechanisms how to communicate that to each other like to make fun of each other like to tease to get some of that frustration out and then ultimately to reunite and find their joyful moments and be that the energy I think it's clear because I got together in there I think early 20s like very very young I think you grow together as people yeah you're still in the critical period of brain plasticity and also I mean it's just like divorce was so frowned upon that you stick it out and I think a lot of couples especially from that time in the Soviet Union that's probably applies to a lot of cultures you stick it out and you put in the word you learn how to put in the work and once you do you start to get to some of those rewarding aspects of being like through time sharing so many moments together you know that that's definitely something that that was an inspiration to me but maybe that's where I have so I have a similar kind of longing to have a lifelong partner like that have that kind of view where same with friendship lifelong friendship is the most meaningful kind that there is something with that time of sharing all that time together like till death just part as a powerful thing not by force not because the religion said it or the government said it or your culture said it but because you want to do you want children definitely yeah definitely want children it's it's how many rumours do you have oh oh I thought you should know human children human human children because I already have the children exactly why I was saying you probably need at least as many human children as you do a room with big family small family so in your mind's eyes they're big they're a bunch of bunch of who freedman's running around so I'll tell you like realistically I can explain exactly my thinking and this is similar to the robotics work is if I'm like purely logical right now my answer would be I don't want kids because I just don't have enough time I have so much going on but when I'm using the same kind of vision I use for the robots is I know my life will be transformed with the first like I know I would love being a father and so the question of how many I that that's on the other side of that hill it could it could be some ridiculous number so I just know that I have a feeling and I could be I don't have a crystal ball but I don't know I see in upwards of certainly three or more comes to mind so so much of that has to do with the partner you're with too so like that that's such an open question especially in this society of what the right partnership is because I'm I'm I'm deeply empathetic I want to see like to me or what I look for in your relationship is uh for me to be really excited about the passions of another person like whatever they're into it doesn't have to be uh career success any kind of success just to be excited for them and for them to be excited for me and they can share in that excitement and build and build and build but there was also practical aspects of like what kind of shit do you enjoy doing together and I think family is a real serious undertaking oh yeah it certainly is I mean I think that I have a friend who said it I think best which is that um you first half he's in a very successful relationship and uh and has a family and he said you first have to define the role and then you have to cast the right person for the role well yeah there's some deep aspect to that but there's also an aspect to which you're not smart enough from this side of it to define the right to define the role and there's part of it that has to be a leap that you have to take uh and I see um I see having kids that way you just you just have to go with it and figure it out also as long as there's love there like what the hell is life for even so I've the uh there's so many incredibly successful people that I know uh that I've gotten to know that all have kids and the presence of kids for the most part has only been something that energize them something that gave a meaning something that made them the best versions themselves like made them more productive not less which is fascinating to me it is fascinating I mean you can imagine if the way that you felt about Homer the way that I feel and felt about Costello is at all a uh a glimpse of what that must be like then exactly you know the the downside the thing I worry more about is uh the uh the the partner side of that I've seen uh the kids are almost universally a source of increased productivity enjoy and happiness uh like yeah there are pain in the ass yes complicated yeah so so on so forth people like to complain about kids but when you actually look past that little shallow layer of complaint kids are great the source of pain for a lot of people is the if when the relationship doesn't work and so I'm very kind of concerned about like you know dating is very difficult and I'm a complicated person and so it's very it's been very difficult to find um to find the right kind of person but that that that that statement doesn't even make sense because I'm not on dating apps I don't see people you're like the first person I saw in a while it's like you Michael Malice and like Joe so like um I don't think I've seen like a a a female what is it uh an element of the female species in quite a quite a while so I think you have to put yourself out there uh what is it Daniel Johnson says true love will find you but only if you're looking so there's some element of really taking the leap of putting yourself out there in kind of different situations and I don't know how to do that when you're behind a computer all the time well you're a you're a builder and you're a problem solver and um uh you find solutions and uh I'm confident this solution is the solution is out there and I think you're implying that I'm going to build the girlfriend which uh I think or that you or well and maybe we shouldn't separate this uh friendship um the notion of friendship and the community and the act if we go back to this concept of the aggregate you know maybe you'll meet this woman through um through a friend or maybe or something of that so one of the things I don't know if you uh if you feel the same way I definitely one of those people that just falls in love and that's it yeah I can't say I'm like that with with Costello it was instantaneous yeah it really was I mean I know it's not it's not romantic love but it's instantaneous no I I but that's me you know I know I think that you if you know you know because that that's a that that's a good thing that you have that well it's uh I'm very careful with that because you don't want to fall in love with the wrong person so I try to be very kind of careful with I I've noticed this because I fall in love with every like this mug everything I fall in love with things in this world so like you have to be really careful because uh um a girl comes up to you and says she loves Dusty Eski um that doesn't necessarily mean you to marry her tonight exactly yes and I like the way you said that out loud so that you heard it it doesn't mean you need to marry her tonight exactly right exactly but I mean but people people are amazing and people are beautiful and that's so I I'm fully embraced that but I also yet to be careful with with relationships and at the same time uh like I mentioned to you all flying I don't um there's something about me that appreciates swinging for the fences and not dating like doing serial dating or dating around you're a one guy one girl kind of guy yeah and said that and it's it's tricky because uh you want you want to be careful with that kind of stuff especially now there's a growing platform that have a ridiculous amount of female interest of of a certain kind but I'm looking for deep connection and and I'm looking by sitting home alone and every once in a while uh talking to Stanford professors perfect silly I guess perfect silly it's it's it's well incorpor it's um uh part of that constitutes machine learning of sorts yeah of sorts I do you mentioned um what has now become a quite extensive and expansive uh public platform which is incredible I mean the number of people well out when first time I saw your podcast I noticed the suit I was like he respects his audience which was great but I also thought this is amazing you know people are showing up for science and engineering and technology information and those discussions and other sorts of discussions now I do want to talk for a moment about the podcast so my two questions about the podcast are when you started it did you have a plan and regardless of what that answer is do you do you know where you're taking it or um would you like to leave us uh I do believe in an element of surprise is always fun but what about the podcast do you enjoy the podcast I mean your audience certainly includes me really enjoys the podcast it's incredible so I love talking to people and there's something about microphones that really bring out the best in people like would you do don't get a chance to talk like this if you and I were just hanging out we would have a very different conversation in the amount of focus we allocate to each other we would be having fun talking about other stuff and doing other things there would be a lot of distraction there would be some phone use and all that kind of stuff um but here we're 100% focused on each other and focus on the idea and like sometimes playing with ideas that we both don't know like the answer to like a question we don't know the answer to we're both like fumbling with it trying to figure out trying to get some insights as something we haven't really figured out before and together arriving at that I think that's magical I don't know why we need microphones for that but we somehow do feels like doing science it feels like doing science for me definitely that's exactly it then and I'm really glad you said that because I don't actually often say this uh but that's exactly what I felt like I wanted to talk to friends and colleagues at MIT to do real science together that's why how I felt about it like to really talk to problems they're actually interesting as opposed to like incremental work that we're currently working for for a particular conference so really asking questions like what are we doing like where's this headed to like what are the big is this really going to help us solve in the case of AI solve intelligence like is this even working on intelligence there's a there's a certain sense which is why I initially called it artificial intelligence is like most of us are not working on artificial intelligence you're you're working on some very specific problem and a set of techniques at the time it's machine learning to solve this particular problem this is not going to take us to a system that is anywhere close to the generalizability of the human mind like the kind of stuff the human mind can do in terms of memory in terms of cognition in terms of reasoning common sense reasoning this doesn't seem to take us there the the initial impulse was can I talk to these folks do science together through conversation and I also thought that there was not enough now I didn't think there was enough good conversations with world class minds the that I got to meet and not the ones with a book or like this was a thing oftentimes you go on this tour we have a book but there's a lot of minds that don't write books and the books constrain the conversation too because then you're talking about this thing as a book but there's I've noticed that with people that haven't written a book who are brilliant we get to talk about ideas in a new way we both haven't actually when we raise a question we don't know the answer to it when the question is raised and we try to arrive there like I don't know I remember asking questions of world class researchers in deep learning of why do neural networks work as well as they do that question is often loosely asked but like when you have microphones and you have to think through it and you have 30 minutes to an hour to think through it together I think that's that's science I think that's really powerful so that was that was the one goal the other one is um I again don't usually talk about this but there's some sense in which I wanted to have dangerous conversations out part of the reasons I wanted to wear a suit is like I want it to be fearless that the reason I don't usually talk about it is because I feel like I'm not good at conversation so it looks like it doesn't match the current skill level but I wanted to have really um a dangerous conversations that I uniquely would be able to do not completely uniquely but like I'm a huge fan of Joe Rogan and I had to ask myself what conversations can I do that Joe Rogan can't for me I know I bring this up but for me that person I thought about at the time was Putin like that's that's why I bring him up he's he's uh just like with Castello he's not just a person he's also an idea to me for what I strive for just to have those dangerous conversations and the reason I'm uniquely qualified is both the Russian but also there's the judo and the martial arts there's a lot of elements that make me have a conversation he hasn't had before and um and there's a few other people that uh I kept in mind like Don Knuth his computer scientist from Stanford that I thought is one of the most beautiful minds ever and nobody really talked to him like really talked to him he did a few lectures with people love but really just have a conversation with him there's a few people like that one of them passed away John Conway that I never got agreed to talk but he uh died before we didn't there's a few people like that that I thought like it's such a crime to not hear those folks and uh I have the unique ability to uh know how to purchase a microphone on amazon and plug it into a device that records audio and then publish it which seems relatively unique like it's that's not easy in the scientific community people knowing how to plug in a microphone no they can build Faraday cages and two photon microscopes and uh but the bioengineer all sorts of things but uh the idea that you could take ideas and export them into a structure or a pseudo structure that people would benefit from seems like um a cosmic achievement to them I don't know if it's a fear or just uh basically they haven't tried it so they haven't learned the skill level but I think they're not trained I mean we could rip on this for a while but I think that um but it's important uh and maybe we should which is that it's they're not trained to do it they're trained to think in specific aims and specific hypotheses and and many of them don't care too right they they don't they they became scientists because that's where they felt safe and so why would they leave that um haven of safety? well they also don't necessarily always see the value in it it's it's we're all together learning you and I are learning the value of this I think you're probably you have an exceptionally successful and amazing podcast that you started just recently then it's to your encouragement well but there's there's a raw skill there that that you're definitely an inspiration to me and how you do the podcast in the in the level of excellence you reach but I think you've discovered that that's also an impactful way to do science that podcast and I think a lot of scientists have not yet discovered that that this is uh if they apply same kind of rigor as they do to academic publication uh or to even conference presentations and they do that rigor and uh effort to uh to podcast whatever that is that could be a five minute podcast a two-hour podcast it could be conversational or it could be more like lecture-like if they apply that effort the other potential to reach over time tens of thousands hundreds of thousands millions of people and that's that's really really powerful but yeah for for me giving a platform to a few of those folks uh especially for me personally so maybe you can speak to what fields you're drawn to but I thought computer scientists were especially bad at this and so there's brilliant computer scientists that I thought uh it would be amazing to explore their mind explore their thinking and so that I took that almost as an uh on as an effort and at the same time I had other uh guests in mind or people that connect to my own interest so the the wrestling uh wrestling music football both American football and soccer I have a few particular people that I'm really interested in both I started satire brothers uh even could be for wrestling just to talk to them because oh because you can you guys can communicate in Russian and in wrestling right as wrestlers and as Russians and um so that that little it's like an opportunity to explore a mind that uh that I'm able to bring to the world and and also it uh I feel like it makes me a better person just that being that vulnerable and exploring ideas together I don't know like good conversation I don't know how often you have really good conversation with friends but like podcasts or like that and uh it's deeply moving uh it's the best you know and and what what you brought through I mean when I saw you sit down with pen rows you know noble prize winning physicists and these other folks I it's not just because he has a nobel it's what comes out of his mouth is incredible and what you were able to um to hold in that conversation was so much better light ears beyond what he had any other interviewer I don't even call you an interviewer because it's really about conversation light ears beyond what anyone else had been able to engage with him was was such a beacon of what's possible and I I know that I think that's what people are drawn to and and there's a certain intimacy that um certainly two people are friends as we are and they know each other that there's more of that but there's an intimacy in those kinds of private conversations that are made public and um well that that's the with you you're probably starting to realize and Castelo is like part of it because you're authentic and you're putting yourself out there completely people are almost not just consuming the the words you're saying they also enjoy watching you Andrew struggle with these ideas or try to communicate these ideas they like the flaws they like they like a human being oh good they like flaws well that's good because I got plenty of those well they like the like the self-critical aspects like where you're very careful where you're very self-critical about your flaws I mean that in that same way it's interesting I think for people to watch me talk to penrose not just because penrose is communicating ideas but here's this like silly kid trying to explore ideas like they know this kid that there's a human connection that is really powerful same I think with Putin right like it's not just it's a good interview with Putin it's also here's this kid struggling to uh to talk with one of the most powerful uh somewhat argued dangerous people in the world that they love that the the authenticity that led up to that like and and in return I get to connect everybody I run to in the street and all those kinds of things um there's a depth of connection there almost within like a minute or two that's unlike any other yeah there's an intimacy that you've formed with yeah yeah we've been on this like journey together and yeah it's the same thing with Joe Rogan before ever met him right like I was because I was a fan of Joe for so many years you have there's something this there's a kind of friendship as absurd as it might be to say in podcasting and listening to podcasts yeah maybe it maybe it feels in a little bit of that we're solves a little bit of that loneliness that you're talking about until the robots are here I have um just a couple more questions but one of them is on behalf of your audience which is um I'm not going to ask you the meaning of the hedgehog but I just want to know does it have a name and you don't have to tell us the name but just does it have a name yes or no well there's a there's a name he likes to be referred to as and then there's a private name in the privacy on company that we call each other no uh I'm not that insane now his name is hege he's a hedgehog I don't like stuffed animals but his story is uh one of minimalism so I gave away everything I own now three times in my life by everything I mean almost everything kept jeans and shirt and a laptop and recently it's also been guitar and things like that but he survived because he was always in the at least in the first two times was in the laptop bag and he just got lucky and so I just like the perseverance of that and I first saw him in the uh the reason I got a stuffed animal and I don't have other stuffed animals is uh it was in a thrift store uh in this like giant pile of stuffed animals and he jumped out at me because unlike all the rest of them he has this intense uh mean look about him that he's just he's upset at life uh at the cruelty of life and just especially in the contrast of the other stuffed animals they have this dumb smile on their face if you look at most stuffed animals they have this dumb look on their face they're just happy it's like pleasantville that's what we say neuroscience they have a smooth cortex not yeah not many exactly and this like had you like saw through all of it it was like uh uh uh dust the eskies man from underground I mean there's a sense that he saw the darkness of the world and persevered so like and uh there's also a famous Russian cartoon uh Hedgehog in the fog that I grew up with I connected with there's nothing people who uh know of that cartoon you could see it I need to it's like Hedgehog in the fog yeah he it's just as you would expect especially from like early Soviet cartoons it's a Hedgehog like sad walking through the fog exploring like loneliness and sadness it's like but it's beautiful it's like a piece of art people should even if you don't speak Russian you'll see you'll understand oh it's in I the one you said that I was gonna ask so it's in Russian but of course it's in Russian it's in Russian but it's more uh this is very little speaking in it it's almost uh there's an interesting exploration of of uh how you make sense of the world when you uh see it only vaguely through the fog so he's trying to understand the world you we have Mickey Mouse yeah we have bugs bunny yeah we have all these you know crazy what animals and you have the hedgehog in the fog so there's a there's a certain period and this is again um I don't know what it's to attribute it to but it's really powerful which there's a period in Soviet history I think probably 70s and 80s uh where like especially kids were treated very seriously like they were treated like they're able to deal with the with the weightiness of life and that that was reflected in the cartoons um and there was uh it was allowed to have like like really artistic content not like dumb cartoons that are trying to get you to be like smile and run around but like create art like stuff that you know how like shortcut ruins the short films can win Oscars like that's what they're swinging for so what strikes me about this is a little bit how we're talking about the suit earlier it's almost like they treat kids with respect yeah like that they have that they have an intelligence and they honor that intelligence yeah they're really just adult in a small body uh like you want to protect them from the true cruelty of the world sure but in terms of their intellectual capacity or like philosophical capacity they're right there with you and so the cartoons reflected that the art that they consumed the education reflected that so he represents that and there's uh there's a sense because he survives so long and because I don't like stuffed animals that it's like we've been through all this together and it's it's the same sharing the moments together it's the friendship and there's a sense in which you know if all the world turns on you and goes to hell at least we got each other that uh and he doesn't die because he's an inanimate object so until you animate him and then I probably wouldn't want to know what he was thinking about this whole time uh he's probably really into Taylor Swift or something like that it's like that I wouldn't even want to know anyway well um well I now feel a connection to the hegey the hedgehog that I certainly didn't have before and I think that encapsulates the kind of possibility of connection um that is possible between human and and other object and through the through robotics certainly um there's a saying that I heard when I was a graduate student that I that's just been ringing in my mind throughout this conversation and such a and I think appropriate way which is that uh Lex you are in a minority of one you are a truly uh extraordinary in your ability to encapsulate so many aspects of science engineering public communication about so many topics uh martial arts and the emotional depth that you bring to it and just the purposefulness and I think if it's not clear to people it absolutely should be stated but I think it's abundantly clear that just the amount of time and thinking that you put into things is uh it is the ultimate mark of respect um so I'm just extraordinarily grateful for your friendship and for this conversation I'm uh proud to be a friend and I just wish you showed me the same kind of respect by wearing a suit and make your father proud maybe next time next time indeed thanks so much my friend thank you thank you Andrew thank you for joining me for my discussion with Dr. Lex Friedman if you're enjoying this podcast and learning from it please consider subscribing on youtube as well you can subscribe to us on Spotify or Apple please leave any questions and comments and suggestions that you have for future podcast episodes and guests in the comment section on youtube at apple you can also leave us up to a five star review if you'd like to support 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