**Episode #39**

**Speaker 1** [00:00:00] Welcome to the Cabrera Lab Podcast.

**Speaker 2** [00:00:06] How are you doing today?

**Speaker 1** [00:00:07] I am doing awesome.

**Speaker 2** [00:00:09] Oh good. I have a doozy of a thing for you today.

**Speaker 1** [00:00:12] Oh yeah, I always get a little nervous.

**Speaker 2** [00:00:15] probably the only person that can make you nervous. All right, I was talking to a guy about a thing on a phone call. He was asking me about our work and what we do. And I said, oh, well, we're teaching people how to be better thinkers. And not only that, we know how to measure the degree to which people are changing or improving their thinking skills. And he did one of those head tilt dog things. And he's like, measure somebody's getting better at thinking. He's like how do you do that? Is that even possible? I thought we should talk about that, like how we can measure thinking, how we can improve thinking.

**Speaker 1** [00:00:50] That's a big one. That's the biggest one, kind of, in terms of a question. I mean, where to start on that one? So the big thing there is, especially with something like thinking, you have the scientific problem of what is called construct validity, which just means it's hard to measure something that's hard to find the construct. Like think of, think of like... If I'm going out and counting sheep in a pen, it's pretty easy to find the construct of where a sheep begins and ends. And if I took 10 people that didn't even know what sheep were and I brought them out there and I said, count the number of sheep in this pen, you'd have a pretty good high probability that those 10 people would arrive at the same number.

**Speaker 2** [00:01:46] Because sheep, they can see.

**Speaker 1** [00:01:48] because they can see them, they can count them, they can individually. Now, if you had 100,000 sheep, maybe they wouldn't get the same number. But let's say there's 10 sheep in the pen. Most people, most 10 people would get 10 sheep, meaning there's some construct validity about what constitutes a sheep.

**Speaker 2** [00:02:09] Meaning we know we're measuring what we intend to measure, we know we're counting sheep because we see the sheep, we could touch the sheep and we're counting the sheep. So we have constrict validity because we're measuring the sheep

**Speaker 1** [00:02:19] And across a number of people, they would do it the same way. They would count the same sheep. They wouldn't blend sheep together and things like that. That construct validity tends not to be a problem that is dealt with as much in physics, chemistry, biology, those kinds of fields. But it's a little more difficult when you get into things like thinking. Right? Thinking is like, where do you draw the sheep boundary? You know, where you draw that the boundary of what constitutes thinking? So the hard problem to solve when it comes to things like thinking is, what is it? And that's a question that I asked myself at the beginning of my scientific career at 30-something years ago. What is thinking? Just literally what is thinking. And I was like, that book, Are You My Mommy? You know, like, do you remember that children's book?

**Speaker 2** [00:03:22] little duck walks around, meaning you were looking for a place to find what, you know, the answer. Like you thought somebody had the answer?

**Speaker 1** [00:03:29] I assumed somebody did have the answer. I never thought, you know, oh, this hasn't been answered yet. I just assumed that it had been answered. And what I learned after talking to experts and traveling around the country and the world talking to the experts was, boy, we definitely didn't have an answer. It's certainly not a good one. And so a lot of what we've done is look at... the answer to that question for 30 years, what is thinking? And trying to zero in on how do you measure it? Because what is it is sort of fundamental to that construct validity problem. And then once you sort of determine what it is, then how can we start to measure it, right? If I can determine where a sheep begins and ends, I can count it, I can start to measurement. But if I can't determine where the boundary of that thing is. then it's very difficult to measure.

**Speaker 2** [00:04:28] Okay, so let's talk about

**Speaker 1** [00:04:29] If I can measure it, what happens is we want to measure what matters. And what matters gets measured, and what gets measured matters, right? And that's kind of a weird thing, right, because what we want do is measure what matter. But we often, what matters is what gets Yes. So, in education, for example, what matters? is not really the test scores, we know that. We know that test scores are not correlated with, you know, success in life or anything like that. Case in point. Yeah. So we know, but so why do they matter so much? Oh, because we can measure them. Yes. Right? So everybody knows that they don't matter very much. Everybody knows that in education. I mean, we know that you can pass a test and not really understand the stuff. We know that can pass the test and 30 days later not know any of the information on the test. We know you can be good at passing tests. Yes. So we know, that that is not really what matters. And yet it's what we can measure so it becomes what matters? Yes. Now the flip side is we want to be able to measure what matters and thinking is what matters

**Speaker 2** [00:05:52] I think there's been a bit of a trend of late, which is to try to measure those things that seem immeasurable because we're realizing they're more and more important in human development, in education. So you think about knowledge, attitude, skills, changes in all three of those things. And I think when we say measuring thinking, that falls in line with that new emphasis on trying to measure things that it seems like we can't measure, and that's what you and I have tackled.

**Speaker 1** [00:06:21] Absolutely. And we see this all over the place. I mean, we're trying to measure, not us in particular, but lots of scientists are trying to measure things that in heretofore, we sort of said, Oh, I don't know if those things are measurable, but now we have better ways of measuring these things. So things like empathy, things like happiness, things like emotional intelligence thing, you know, all this, these different things, what, what what all those things I just mentioned and many more share is construct validity problems.

**Speaker 2** [00:06:51] Meaning we're not sure that they're measuring what they actually think they're measuring because they haven't put the scientific rigor or the validation behind it. Is that what you mean?

**Speaker 1** [00:06:59] Yeah, and just, it's hard to validate the construct. It's a much more difficult problem than how many sheep are in the pen. Right. Because how do you, it is hard to point to empathy. Different people have different versions of what they think empathy is, you know, and so. Pinning down, what exactly is empathy? How is it different from compassion, for example? Is this an instance of compassion or is it an instance empathy? Is it an instant of caring? Is it transactional in nature and therefore it's really just kind of false or faux empathy? How do we sort of dice up that landscape? And I'm using empathy as an example because it's sort of squishy and amorphous. It doesn't mean we can't measure it. It just means that the hard problem is figuring out where the boundary is so that we can begin to understand how to measure it. And to do that, you have to do lots of studies, lots of observational things, lots of pre-work to even get to the point where you can begin to measure.

**Speaker 2** [00:08:09] Right, which takes us back to the beginning, which is why you started with the question in your doctoral research, what is this thinking? Because until you know and you have a boundary of what it is, you can't even start to understand the different variables involved in measuring a thing until you what that thing is. Exactly. So that's where you started.

**Speaker 1** [00:08:26] Yeah. So measuring it is really important. And the reason that we want to measure it is because because of what I just said, like either either we're going to measure what we care about, what we really know matters or what can be measured will become what matters. And both of those things, but we want what we want is for those two things to be the same, but they're often not the same. What we can measure often doesn't matter. and what matters often doesn't. Or can't get measured. And so my thinking was, let's measure what really, really matters. Because thinking is the sort of driver of all innovation, all behavior, all things. I mean, the way we think and what we think changes everything. Right. You know, and it really is based on, it's the thing that secures readiness.

**Speaker 2** [00:09:24] in us for what

**Speaker 1** [00:09:25] For anything, readiness to see some opportunities, be ready for the future, for students and things like that. Be ready for today, be ready to learn, be ready pretty much be ready, you name it. Be ready to adapt to whatever life throws at you, whatever situation that you find yourself in. Are you ready? That readiness has a lot to do with adaptation and that adaptation has a lot to your adaptability, your agility, your ability to change. Um, and that fundamentally has to do what you're thinking. If you have a very adaptive mindset and an adaptive sort of fluid ability with thinking, then whatever's happening around you, you can sort of. Shuck and jive to that. to change to that situation and adapt to it.

**Speaker 2** [00:10:24] So there are a couple of things in what you just said that I think are interesting, and I'm gonna push you to sort of, I bet people are wondering about. One is you keep saying you ask the question, what is thinking? And if I was listening, I'd be like, well, what was the answer? What was the the answer you found as that little duckling walked around to all the experts and asked the question? What did you come up with?

**Speaker 1** [00:10:45] Well, it wasn't like it just came right away. It took years to find the answer. But what I found was a lot of nothing and a lot of contradiction, meaning the answers that I got when I began looking at it was a lots of contradictory statements and a lack of clarity and a sort of hooey and hand waving and things like that that I wasn't sort of satisfied with. Yeah. So. So what I found in asking the question was a lot of hooey.

**Speaker 2** [00:11:17] I mean, I love it. That's a technical term.

**Speaker 1** [00:11:19] Yeah, a lot of certainly not a good enough answer, not one that I was pleased with. So, but over time, what we know today is that thinking is made up of patterns of thinking that there are that there patterns of Thinking that are called DSRP, which those label the four patterns. So we're we're making distinctions constantly between identity other where we're organizing part-hole systems. that creates hierarchy and things like that. We're looking at action-reaction relationship. So that's like something acts and then there's something else reacts. And we're doing all that from point and view perspective. So something's looking and something's being looked at, you know, and we're mixing and matching or mashing up those things constantly. And that gives us certain degrees of freedom, which are quite. large and creative, and we can do a lot with those four rules. We can do all the crazy things this mind does. So it's very dynamic. There's incredible dynamics, even though just like ATCG, the nucleotides of DMA, you take those four things and you mix and match them in different ways you can get. crazy number of combinations, right? Well, your brain can do a lot of things with a small number of sort of functional rules or functional patterns, right. So thinking is DSRP, it's organizing information to make meaning. Right. A simple equation is M equals IO, we've talked about that before, mental models equal information organized, organized information. So the organization part is DSRP and the information is all around us.

**Speaker 2** [00:13:15] So you answered that's what's thinking. Yes.

**Speaker 1** [00:13:17] And we can measure it today, but we couldn't measure it 20 years ago.

**Speaker 2** [00:13:21] So that leads into then when you say we can measure thinking, what does that mean? What are we measuring when we're measuring thinking?

**Speaker 1** [00:13:30] Well, so for example, if I had a thought and then I had a second thought, can you tell the difference between those two thoughts? Can we measure how that first thought is fundamentally different from the second thought? If, for example we had a video and we could take it down into steps, and in one video you have 10 sheep, And in the next frame, you have 11 sheep. Well, you know, you can go, oh, they added one sheep. And in the next one, you have 15 sheep. Oh, they add in four more, right? So you can see and count, you can measure what is changing over time. Well, what DSRP allows us to do is measure what's changing over times.

**Speaker 2** [00:14:16] in somebody's thought process.

**Speaker 1** [00:14:18] in a thought process or in a mapping or in how the meaning of one sentence is different from the meaning from another sentence or how the same sentence could have different meaning for one person and different meaning to another person. The same sentence. And we can measure how that same informational set, that sentence, could be interpreted by one person different than it's interpreted by another person. even though it's the same information, but the O, the organization of DSRP is different. So we can measure that.

**Speaker 2** [00:14:56] Yeah, so let's go back to what you were just saying about sort of those snapshots over time just to make it really clear, because the sheep, that's clear. So let's say I have a mental model about some information, and then you can see inside of that the distinctions I'm making, the relationships I'm make, you can see if I'm taking a perspective on it. But let's then new information comes along or something happens and I've changed my model. Maybe I have... remove some relationships, taking a different perspective. You're saying that's the kind of change you can measure.

**Speaker 1** [00:15:32] Yeah, you can see what information is new, and you can also see what organization is new or different, or what organization has gone away. Like you said, relationships have been destroyed or removed. Other relationships have then formed. So in any given mental model or thought, you could have different information or different organization, or both.

**Speaker 2** [00:16:00] Yes, and you can see the change in eye.

**Speaker 1** [00:16:02] And you can see the change in either to measure thing. Yes. So if I, if I have the same information in both, but I change the organization, I have a different thought. Yes. If I have the same organization, but different information, I have a different thought and if I have different information in different organization, I have a different thought. And if I have the exact same information in the exact same organization. It's the same

**Speaker 2** [00:16:26] you're actually measuring learning, because learning is changing your mental mind.

**Speaker 1** [00:16:30] That's right, that's why it's so important because a mental model is a thought and learning is simply a change in thought. A change in the model, right? In the schema or these are all synonyms, right, where sometimes we use the word schema, sometimes we used the word mental model, sometimes we'd use the words thought. We even use lots of words like mindset, which are just like big. Yeah, other words. Other words for mental models and things like that, right. If we change a mental model, that is learning.

**Speaker 2** [00:17:04] Which is interesting because you were talking a little while ago about education, and what that means is if I'm the teacher and you're the student, you might have a mental model at the beginning about something we're talking about or I'm teaching you, and I might have actually a mental that's sort of my target, right, for you. So I'm trying to move your original mental model as a student to the mental model I think you need to know. as a teacher. And so that's how you're measuring that learning. That's how we're assessing it.

**Speaker 1** [00:17:37] Yeah, in fact, we've using DSRB we've mapped every single common core standard. Yes, we have. Right? Every single one mapping showing the difference between them. And some of them are subtle differences. If you look over time from third grade to fourth grade to fifth grade to sixth grade to seventh, eighth, ninth, and you look at the trajectory of that information that we're supposed to be teaching kids. it literally sort of changes over time. You can see it change over time, new things are added, some things are combined, taken away, and the model just kind of grows usually from as they get older. And you can see the difference between the third grade standard and what that same kind of trajectory of standard looks like at 11th grade.

**Speaker 2** [00:18:27] Right, because they have strands. And so those strands are just evolutions of the mental model they want you to build over time, right? Great, great.

**Speaker 1** [00:18:34] And we can build that. We can map that. And we can count. It's all measurable. You know, that's one example. I mean, that is just an education, but we can do it in any world.

**Speaker 2** [00:18:45] I think what's interesting to me is, when you're out and about, I'm out and out all the time, and you're talking to people, a lot of people, they kind of think, or they believe that thinking just sort of happens, like your heart beats, like your brain is just thinking. And I don't know, I think people are now starting to realize, oh, I can actually work on my thinking skills in some way, like people are working on their critical thinking, or their creativity, or you know, all kinds of different types of thinking. But when you're talking about measuring thinking, I think you're not talking about a type of thinking

**Speaker 1** [00:19:23] Yeah, so it's a little confusing, right? I mean, if you Google or look around on the internet or stuff like that, you know, you'll find something on the order of about 38 types of thinking that people talk about, whether it's critical or creative thinking or, you know, systems thinking or scientific thinking or interdisciplinary thinking or other forms like emotional intelligence or logic, things that don't actually have thinking at the end, but they're... Roughly the same thing, they're models, mental models that we're building. There are 38 different types of thinking, not according to your brain. Your brain is not like, oh, now I'm going to do critical thinking and now I'll do creative and now do this other type of thinking. Your brain's not doing that. Your brain has essentially like an algorithm or a set of rules that it's following. And there's just one kind of thinking and so you could go and learn all those different types of thinking. Really, if you just learn D and S and R and P, those are at the base of all those types of thinking. It's actually a lot simpler than what you would get if you went and tried to navigate down all these different, this maze of, you know, frameworks and things like that. But yes, I'm talking about all thinking. I'm taking about the way we think, all of us. You know, a lot of people say, I hear this a lot. Well, everybody thinks differently. No, everybody thinks exactly the same.

**Speaker 2** [00:20:53] They just think about different things.

**Speaker 1** [00:20:54] They think wildly different things, but they do it in the exact same way, in the same way that if any of us need like, you know, heart surgery, we all go to the same heart surgeon. Just because we have different hearts doesn't mean that they're like wildly different. Right. We all go to the same heart surgeon.

**Speaker 2** [00:21:13] because the underlying functions are.

**Speaker 1** [00:21:14] Yeah, I mean, we can have wildly different thoughts, but that doesn't mean we're thinking differently. We're thinking the same. We're having different thoughts. We can go watch the same movie and come away with completely different conclusions. And that's kind of an amazing, amazing thing about thinking is that we can be exposed to the exact same information and organize it differently.

**Speaker 2** [00:21:38] and build a different.

**Speaker 1** [00:21:39] and build a completely different set of thoughts around it, and arrive at different conclusions. Then what's important about that, like we were indicating about earlier, is if you look at here, M equals IO is simply saying that the mental model is made up of information and organization, and remember that that organization is D, and S, and R, and P. Right. We talked about, well, what is learning? Well, learning. is a change in mental model. Right. So now when we understand this thing, this thinking thing, when we can measure this thinking, we suddenly understand that learning is about having one mental model at one point in time and having it change into another mental model at another point in the time. Yes. And then we can look at how behavior, that a change and behavior is equal to the function of a change in a mental model. And so if we want to change behavior, we have to change the mental model. And we can look at for every problem, let's call it problem X that we have, that problem will be preceded by a mental model X. Meaning we have some mental model that brings that problem into play. So if we're dealing with a problem, we can kind of backtrack to the mental models.

**Speaker 2** [00:23:08] And then if we want to solve the problem, we can change the mental model we have about it in the first.

**Speaker 1** [00:23:13] in the first place. Yes, exactly.

**Speaker 2** [00:23:15] And so when you talk about, there's so much in here.

**Speaker 1** [00:23:18] There's so much in here and that's just and that doesn't get too overwhelmed by all this. All I'm saying is don't worry too much about all this stuff. That all comes from understanding this thing. If we understand this thing, and by the way, this is just individual learning. If you want to know what organizational learning, organizational learning is a change in mental model shared by shared by all the different agents in your system, meaning your employees, right, a bunch of people. And if you want to understand what culture is, culture is just a mental model shared by all your employees. This episode is sponsored by Training Camp, the ultimate online spot for building the mental fitness that drives personal and professional change and success. At Training Camp you'll have access to the science and practice of thinking. with personalized thinking assessments, tiered training, and best of all, practice that improves skill. Go to CabreraLab.org to learn more. And now, back to the episode. Now, we're understanding some very important things like human learning, behavioral change, how to problem solve, organizational learning, and culture, organizational culture, all predicated on this little guy over here, M. Which which is what we think of when we're thinking of thinking when we say the words thinking there's no real thinking doesn't really it's not a scientific word it's just kind of a word that we use in regular speech yeah the scientific word for it is is cognition or mental models the study of mental models yes so if we understand this thing we understand whole world of of what we care about as humans.

**Speaker 2** [00:25:10] So we, let's just back up a minute, slow down, put the brakes on for a second, because this was a lot. And I want to digest it in a way and get to its implications. When you were walking around asking people what is thinking, and then you did your subsequent work realizing that there wasn't a consistent.

**Speaker 1** [00:25:28] a valid measure.

**Speaker 2** [00:25:29] valid measure of it. What you discovered was...

**Speaker 1** [00:25:33] the pattern.

**Speaker 2** [00:25:34] The four patterns that underlie human thought, meaning how do we have an idea, a thought. Which means when we then, when we make the claim that you can measure thinking, what we're talking about measuring is these four.

**Speaker 1** [00:25:47] Those four in there are elements, yeah. We've actually measured at the element level and found statistically valid results from the element-level, which is even deeper than this level.

**Speaker 2** [00:25:57] Right.

**Speaker 1** [00:25:57] We won't go into that right now.

**Speaker 2** [00:25:59] Well, someday we will, I'm sure, but I want people to understand when we say measure, we're measuring these four underlying skills, the degree to which you are improving at them, doing well at them, get a baseline, all of that.

**Speaker 1** [00:26:12] Well, let's be distinct there. So we're able to measure those as realities in the world. We're able the measure the existence of these things. And we're also now able to measure your ability with those things. And those are two different things, yeah.

**Speaker 2** [00:26:30] Yeah, yeah. Okay, but the implications of that are huge.

**Speaker 1** [00:26:34] Yeah, they're massive.

**Speaker 2** [00:26:35] and they're huge because of everything he just drew.

**Speaker 1** [00:26:37] Yeah, it changes the way we lead organizations. It changes the way we we do education. It changes the way we do self help and self improvement. It gives us tools that we didn't have before.

**Speaker 2** [00:26:52] When you are able to measure thinking, you're able to tell the person, a person can discover the degree to which they're good at certain ones of these foundational skills, which means you're actually developing their metacognition. They're becoming aware of where they have strengths and weaknesses in thinking skills.

**Speaker 1** [00:27:15] Yeah, we call that the TQ, the thinking quotient, which is really a much more useful utilitarian, kind of everyday useful IQ. IQ is kind of based on logic. And logic, it turns out, the way that the, logic in the Aristotelian sense is not the logic that the brain uses. Yeah. It's a much, it's a, it a much more dynamic logic. Aristotelian types of logic, I'm not going to go down the logic path. But, but another time, it's it's like, it's, like measuring what IQ measures, but it's measuring your ability to think your ability this. So think of it this way. IQ kind of measures whether you have the answer. This measures whether You'll be able to figure out the answer

**Speaker 2** [00:28:11] Yeah, I like that.

**Speaker 1** [00:28:12] Because thinking is the thing we use to figure things out. Yeah, yeah. Right, and in real life, being able to figure things out is the most important thing. Being able to have the answer, yeah, I mean, sometimes that's helpful, but.

**Speaker 2** [00:28:29] It's a little static though.

**Speaker 1** [00:28:30] It's pretty static. Oftentimes in real life, there isn't an answer. There's many answers. There's may possible answers. I mean, in real-life, it's just a lot messier. So the question is, do you have the skills to figure it out? And when we say figure it out, we don't just mean one particular class of problems like logic or mathematical or visual puzzles. We're talking about the whole range of figuring it out. Figuring it out with your kids, figuring it with your wife, figuring it up with your husband, figuring it it out your job, figuring it that with your society, figuring out homelessness, figuring out, you know, all of it. Yeah. It's a very adaptive landscape that we humans need to be good at. You know, we need to figure it out, we need figure stuff out. When we talk about readiness, when we talk about wanting future ready schools, future ready students, for today and tomorrow, future-ready employees, what is the whole K-12 and college system? The whole point of it is to prepare people for life. Well, how's it working? I mean, we're sending our kids to college. It feels like you're spending $200,000 on a four-year vacation. True. I mean it's not, I don't know if it's really preparing them for life, And we work at a very, very good college, and I don't know if it's really preparing kids for life.

**Speaker 2** [00:29:59] Right, because life is about figuring stuff out as it happens. Life is not about a set of static facts or knowledge, knowledge that you carry with you to every situation. It's about being able to think things through, things you haven't even anticipated you're going to need to think through. Which is why I think there's this move towards focusing on readiness, preparedness for students, even for employees. What do people say? We need our employees to be more adaptive. more agile, more this, more that. And that's all about the ability to just think about things differently and to get different.

**Speaker 1** [00:30:34] with the information that you have right in front of you that in many cases is different than any information than anybody's been faced with before so there's no place to go get the answer yeah right i mean think about your most recent problem at work it's it's not searchable if it was searchable that's an easy problem to solve right usually the problems you're having at or the problems you're having at home, they're not. Sure, you can get this and that little piece of information from Google or from chat or whatever from, you know, but at the end of the day, it's a very unique problem to your business or your team or your family or your relationship or your school or whatever. Yeah. So it's it's you've got to deal with the unique circumstances of that situation

**Speaker 3** [00:31:25] I would think yes.

**Speaker 1** [00:31:26] And you got to think it through and solve it and it is unique. It is a unique set of circumstances.

**Speaker 2** [00:31:34] Yeah, I mean, I think the way I would think about that is you can Google and you can find out a lot of the factors of the variables involved, but you're the one that's going to have to connect them. You're the ones that's gonna have to look at them from different perspectives. You're gonna have think about relationships. You're going to have think it through. They'll give you parts of it, but they don't have to enter.

**Speaker 1** [00:31:53] And you're going to have to decide what matters to you and what matters to others, you know, that's not really something you can Google. What matters to me? You know, how do I figure that out? You know what I'm saying? Yeah. Hey, Google, what do I care about most?

**Speaker 3** [00:32:13] Who knows?

**Speaker 1** [00:32:14] Yeah, you know, you have to figure it out. You have to be able to think that through so that you can make a whole host of decisions about life. What evolution gave us to deal with phenotypic adaptation is thinking. Okay. Go back. Sorry.

**Speaker 2** [00:32:34] Say that in English, phenotypic adaptation.

**Speaker 1** [00:32:38] Yeah, so evolution has a bunch of algorithms based on genetics, genotypic adaptation, and there's lots of different factors that factor into that, but phenotypic, the sort of on-the-ground that activity that we have.

**Speaker 2** [00:32:56] Right, so you're saying there's something...

**Speaker 1** [00:32:57] to daily events and things like that.

**Speaker 2** [00:32:59] Genetically, we evolve and adapt to things. Like, over time, we have genetic adaptations. But we also have behavioral and other types of adaptations, which are what you're calling phenotypes.

**Speaker 1** [00:33:12] Yeah, like we can adapt to our environment. We can adapt to the situation. Yeah, we're not changing our genetics to pick up and move, but we're adapting to the environment. We're adapting to a situation. We're adopting to a scenario. the gift that evolution gave us is thinking. Yeah. That's it. Yeah. I sometimes say, so we were working with a company, you'll remember this, big company, designs very technical stuff, a whole team of engineers at the high level engineers, right? Yeah. And I said to them, imagine you have a problem that comes to your desk, your team's desk. And this problem, it's, It stumps all of your equipment. you've got these amazing labs with hundreds of thousands of dollars worth of stuff in them, sometimes millions of dollars worth of technology and engineering machines and all kinds of stuff. And none of those machines or technology can solve this problem, right? I go, yeah, we get those all the time, right. And then you go, okay, now imagine that. this problem surpasses the ability of all of your frameworks and methods and processes. It evades all of those. Yeah. And they go, yeah, that's a tough one. And then you go, now imagine that this problem evades all of you were dozens of years of training, all the things you've learned about engineering collectively as a team, it evades even that. This is what we would call a wicked, difficult, complex problem, right? What are you going to rely on to solve this problem, a problem that you can't fix with your tools and technology, can't fixed with your methods, processes and frameworks, and even your training fails you. Right. Even your training of years and years and years of training. What are you going to rely on to solve this problem? They kind of mumble, and they have trouble answering it, and all that kind of squirm a little bit, and they throw out some answers. And the answer is thinking. Thinking. Think of how powerful that is. The most dastardly, effed up problem that you can possibly conceptualize, the solution to that problem will only be. and has only ever been. And yet, we do not train people in thinking. We certainly don't do it very well. There's no course in thinking at most schools. And we barely know what it is.

**Speaker 2** [00:36:09] when all else fails.

**Speaker 1** [00:36:11] When all else fails, that's our go-to. That's what we've got. That is our go to.

**Speaker 2** [00:36:15] And if that's what we've got, then we should probably think about it more, define it, measure it, get better at it.

**Speaker 1** [00:36:23] Absolutely.

**Speaker 2** [00:36:24] so that we're equipped for anything.

**Speaker 1** [00:36:25] That's what I mean by it's evolution's, you know, evolution gave us thinking to solve all the phenotypic problems. I mean, that is amazing. If you think about it, that is like uniquely what we're able to do in such a it's such a unique way. When we can solve problems, the problems that even go against all of our training, go against all of the tools and technology, all these amazing things, frameworks that have worked for years and then suddenly they don't work anymore. And what's our go-to thinking?

**Speaker 2** [00:37:02] That's why things change when thinking changes.

**Speaker 1** [00:37:04] Exactly, that's so true. That's why, you know, this has been the, you know, I'm, as you know I'm massively ABB and

**Speaker 2** [00:37:13] I am aware.

**Speaker 1** [00:37:14] and autistic and like it's hard to hold my attention but this has held my attention and my absolute hyper focus for over 30 years because it's a meaty problem. It's a problem that has to be solved. It's problem that deserves to be solve. It's the problem that we're going to keep on solving and get better and better and better at solving. I mean we're nowhere near understanding it at the level that we need to understand at. boy if there's anything we should be understanding this is it and charles darwin said uh... he had uh... he wrote in a bunch of notebooks he had notebooks and he was uh... incessant, you know, scribbler and note taker. And one of his notebooks was called, he named the notebooks and one of them was called Old and Useless Notes. It's a great name. It's great notes, right? And in that notebook, he wrote something to the effect of just scribbled, the believer in my views will turn their attention to education. and what he meant by that was if you understand the incredible implications of evolutionary theory which are quite profound in terms of what they help us understand about the universe. If you understand how powerful evolution is, then what you'll see, and this is quite profound if you think of who's writing this, this is Darwin. And when he's writing. Yeah. He's essentially saying... One of the best ways, the only way really to change society for the better is education. And that's this. This is what education is about. How do you change a mental model? How do make a person go from believing certain things and understanding things in one way to understanding them in a different way? How do you change that mental model?

**Speaker 2** [00:39:21] Yeah, and what's interesting, too, is mental models are about everything. Everything. And so, when you talk about behavior change, well, my mental model of myself, changing my mental of my own self will change some of my behaviors go to bed, right? And solving problems, that's just changing my mental models of what the problem is and what the possibilities are. So we're not just talking about formal education. and we're not just talking about. know, mastering content and knowing your capitals of each state. We're talking about deep, like what you're saying, deep evolutionary change of individual humans comes through this idea of learning. And learning is changing mental models, right?

**Speaker 1** [00:40:06] Absolutely. You know, every teacher should just understand. You could spend a whole year or two of teacher training just on that. Not just teachers.

**Speaker 2** [00:40:18] Not just teachers, parents, executives.

**Speaker 1** [00:40:21] Kids. Executives. Dogs. Dogs.

**Speaker 2** [00:40:25] I don't have much work for the dog.

**Speaker 1** [00:40:26] dog trainers. Yeah, absolutely. I mean, that's what a dog trainer is doing very well is their understanding the mental model of the dog. Yeah. Right. People that are truly gifted at training dogs. They understand what the dog is understanding. That's what makes a great teacher. Yeah a great teacher is somebody who understands what the student is thinking and understands like you said earlier, that target model that they want the student to end up with. and they can see the difference between where the student's at and where that model is, and they could see the different between those two models, and they can see trajectory and then they can meet the student where they're at and help move them to where the target is. Or if there's no target, help move them to the student creating a target. In some cases, there's a target, in some cases we just want the student to create the target that they want. In the case of there being a right way to think of something, then we want them to hear. But in another case, we want them to develop their own way of thinking about something. Then either way, there's some movement from mental model at time one to mental model at.

**Speaker 2** [00:41:42] And it seems to me now's the time to focus on this. Now is the time to really zero in on the things that matter and the things that we need to really be paying attention to.

**Speaker 1** [00:41:55] Well, I think when we say future-ready or readiness, people think about the future, but it's really the now, right? So many are not even ready for today. The social and emotional issues that are rampant today, the emotional intelligence or social and emotion issues, the anxiety, what's sometimes called overthinking, which just really a case of anxiety or worry. All of those things are mental models and that are driving them. And if you don't have awareness of those, then you don' have any ability to change them. Right. So if we want people to be ready for today or tomorrow, right, so I wouldn't think of readiness just as a, you know, future thing. I mean. Right.

**Speaker 2** [00:42:48] The future's now.

**Speaker 1** [00:42:49] The future's now, like we have a lot of folks that are not ready for now.

**Speaker 2** [00:42:54] In other words, there are so many things in their way of just showing up to be their best every day, whether it's at work, in their family, at school, whatever it is. We're just, we're struggling.

**Speaker 1** [00:43:05] Seeing opportunities, seizing on opportunities, solving problems, handling complexity, navigating complexity, all those things is just readiness. And if you have that adaptive nature built in a skill, then you can handle all that. You can go with the, I mean, I love chaos. I love chaos because I have no problem adapting to the chaos. So chaos is like the most comfortable place. For you. For me. Anyone can be taught and learn the skills to be adaptive. We can develop these skills. We've measured exactly what it takes and exactly how much you can increase in very short periods of time in these skills

**Speaker 2** [00:43:55] Yes, and the benefits of that downstream are huge.

**Speaker 1** [00:43:58] They're huge.

**Speaker 2** [00:43:58] huge and we've seen that. Well, I think you have answered my question.

**Speaker 1** [00:44:03] I feel like we went down a rabbit hole.

**Speaker 2** [00:44:06] No, I got more than I bargained for, it was all good.

**Speaker 3** [00:44:09] So that's great.

**Speaker 1** [00:44:11] That's a wrap. Oh, wait, we're back. What are you wearing?

**Speaker 3** [00:44:19] What do you mean, what am I wearing? What is that? That's my special holiday crown.

**Speaker 1** [00:44:24] holiday crown

**Speaker 3** [00:44:25] Yes, it's time to be festive, it is time to start thinking about celebrating the end of the year.

**Speaker 4** [00:44:31] Nice.

**Speaker 3** [00:44:31] and the holidays. And so I've dressed for it, as always. I do this for everyone.

**Speaker 4** [00:44:36] I love it.

**Speaker 3** [00:44:37] You know what it means.

**Speaker 4** [00:44:38] What does it mean?

**Speaker 3** [00:44:40] We really need to thank, from the bottom of our hearts, all of the people.

**Speaker 2** [00:44:46] who have been listening and commenting to the podcast. So we have a gift for them. We want to give them the gift of thinking.

**Speaker 4** [00:44:58] The gift of think.

**Speaker 2** [00:44:59] which means there will be a special QR code and a discount code available to podcast viewers only, which gives them a significant discount off of the Blue Belt course, which is a big course.

**Speaker 1** [00:45:13] Yeah, that is a bit-

**Speaker 2** [00:45:14] So they're going to save a lot of money.

**Speaker 1** [00:45:16] And that's a great course that really, you'll develop really top-notch skills in that course. So they can give it as a gift to anybody.

**Speaker 3** [00:45:28] You can share the discount code, share the QR code. We want to spread the love of faking.

**Speaker 4** [00:45:42] You